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SECRETARY OF THE AIR FORCE

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Weather

AIR AND SPACE WEATHER OPERATIONS - PROCESSES AND PROCEDURES

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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This manual implements Air Force Policy Directive (AFPD) 15-1, *Atmospheric and Space Environmental Support;* AFI 15-128, *Air and Space Weather Operations - Roles and Responsibilities;* and Army Regulation 115-10/AFJI 15-157, *Weather Support for the US Army.* It applies to all Air Force personnel and organizations conducting weather operations as defined in the preceding directives. Consult cited policy directives, instructions, manuals, and their supplements for specific policies, procedures, and requirements, as these directives are periodically updated to reflect current requirements. Check the appropriate Air Force Index to determine currency of cited publications. Send comments, suggested changes, or improvements through channels to HQ Air Force Weather Agency (AFWA)/XOPS, 106 Peacekeeper Dr, Ste 2N3, Offutt AFB NE 68113-4039. Major Commands (MAJCOMs), Field Operating Agencies (FOAs), and Direct Reporting Units (DRUs) send one copy of supplements to HQ AFWA/XOPS and one copy to HQ USAF/XOWP, 1490 Air Force Pentagon, Washington DC 20330-1490 for coordination. Other commands send one copy of supplements to the next higher headquarters for coordination. Ensure that all records created as a result of processes in this publication are maintained in accordance with AFMAN 37-123, *Management of Records* and disposed of in accordance with AFMAN 37-139, *Records Disposition Schedule.*

SUMMARY OF REVISIONS

This document is substantially revised and must be completely reviewed.

This revision updates the mandatory processes and procedures pertaining to weather operations at strategic, operational, and tactical level weather units. It reflects changes resulting from Reengineering Consultation Visits to Operational Weather Squadrons (OWSs) conducted by the AFWA Standards and Evaluation Branch (AFWA/XOPS) and from MAJCOM Staff Assistance Visits to Combat Weather Teams (CWTs). This version incorporates tactical level processes and procedures contained in AFMAN 15-135, *Combat Weather Team Operations*, which will be rescinded when this manual is published.

Numerous administrative changes were made and some existing information was rearranged and incorporated into the appropriate chapters of the manual.

Chapter 1

COMMON AIR FORCE WEATHER REQUIREMENTS, FUNCTIONS, AND SYSTEMS

1.1. Purpose. This manual provides Air Force weather personnel and organizations guidance on how to accomplish their roles and responsibilities as described in AFI 15-128, *Air And Space Weather Operations - Roles and Responsibilities* and Army Regulation 115-10/AFJI 15-157, *Weather Support for the US Army*. It also prescribes mandatory processes and procedures for atmospheric and space weather operations. Effective use of the guidance and procedures in this manual will enhance the quality, timeliness, and relevance of air and space weather information, products, and services. In this manual, "will" and "shall" indicate mandatory requirements. "Should" is used to indicate a preferred but not mandatory practice or method of accomplishment. "May" indicates an acceptable or suggested method of accomplishment.

1.2. The Forecast Funnel.

1.2.1. Weather units are organized into a three-tiered structure compatible with strategic, operational, and tactical levels of military operations. The three-tiered structure is the foundation of an operations concept known as the "forecast funnel." Units performing at the strategic and operational levels are mostly engaged in creation of weather products; tactical level units tailor these products into decision-quality weather information for an operational user.

1.2.2. Core Competencies**.** The forecast funnel is based on the weather core competencies (*collect, analyze, forecast, tailor/warfighter application, and disseminate*) performed at strategic weather centers, OWSs, and CWTs.

1.2.3. Analysis and Forecast Processes. Weather operations at the strategic and operational levels will develop logical and repeatable analysis and forecast processes that focus upon uniform analysis of observed data, prognosis, and forecasting of space and terrestrial weather conditions, producing and disseminating graphical and alphanumeric weather products, and verifying product quality. The analysis and forecasting processes will focus on timely delivery of standardized weather products to command and control agencies and other weather personnel.

1.2.3.1. The analysis and forecast processes will systematically guide personnel through the necessary steps leading to an understanding of the current and future state of the air and space environment. **Figure 1.1.** designates mandatory elements for administering strategic and operational level processes.

1.2.3.2. Some specifics of the elements are highly variable, and it is not possible to formally document every element of a management process. Therefore, unit leadership should maintain a flexible response posture to ensure changes are reflected in unit operating practices and procedures.

Figure 1.1. Administration of Strategic and Operational Level Forecast Processes.

1. Gather mission requirements for forecast products and services, and identify dissemination methods.

1.1. Assess the unit's capabilities to meet mission requirements.

1.2. Identify limitations. Resolve limitations locally or submit the limitations to MAJCOM or higher headquarters for resolution.

2. Evaluate available data, forecast models, existing products, and analysis and forecasting techniques to determine if they may be used to meet mission requirements.

2.1. Identify new data sources, models, products, and analysis/forecast techniques (as required).

3. Develop or modify existing processes and procedures to perform analyses, to develop forecasts, and generate products. Minimum Requirement:

3.1. Review and refine procedures to identify weather regimes.

3.2. Evaluate weather patterns that do not match previously identified regimes to determine the need for new procedures and additional training.

3.3. Evaluate new and updated Numerical Weather Prediction (NWP) models as required.

3.4. Develop specific worksheets and checklists and determine where and how worksheets/ checklists are used.

3.5. Leverage successful processes and procedures from other weather units to strengthen analysis and forecast capability.

4. Determine the need for new forecast products and services.

4.1. Develop new processes, procedures, and dissemination methods, as required.

5. Use forecast verification procedures and performance data (metrics) to measure product accuracy, timeliness, and relevance with respect to mission requirements.

5.1. Evaluate verification of weather products and services to ensure they meet mission requirements.

5.2. Use verification data to improve forecast products, services, and unit training.

5.3. Develop new or modify existing processes and procedures to improve forecast products and services.

1.2.4. Mission Execution Forecast Processes. Tactical level weather units will develop mission execution forecast processes that lead weather personnel through logical and repeatable steps to tailor strategic and operational level space and terrestrial weather products for an end user. The outcome of these processes will be the delivery of decision-quality environmental information to a military decision-maker.

1.2.4.1. Decision-quality environmental information offers greater temporal and spatial resolution than possible from strategic and operational level forecast products and will be delivered in any format necessary to effectively impact the end user's decision-making process.

1.2.4.2. The CWT depicted at the tactical level is a generic term that denotes weather units, teams, or individuals tailoring and delivering decision-quality information for military operations. This document will use the term CWT throughout to better describe function versus organization. For detailed information on CWT operations, refer to **Chapter 4**, *Combat Weather Team Operations*.

1.2.5. Process Documentation. Weather units will document analysis and forecast processes (strategic and operational) and mission execution forecast processes (tactical).

1.2.5.1. At the Operational and Tactical levels, the processes will be regime based. Regional or Theater scale regimes (i.e. MetTips, Baur Types from any published and readily available source document) will be used to identify weather patterns. Regime identification is critical for initializing and focusing forecasting procedures at the operational level and assists tactical level units with product tailoring.

1.2.5.1.1. Unit leadership will determine the form of documentation best suited to their operations. The following are suggested forms of documenting the processes (the list is not all inclusive).

1.2.5.1.1.1. Standing Operating Procedures (SOPs).

1.2.5.1.1.2. Workcharts.

1.2.5.1.1.3. Worksheets/Flowcharts.

1.2.5.1.1.4. Decision trees.

1.2.5.1.1.5. Nomograms.

1.2.5.1.1.6. Automated algorithms/scripts.

1.2.5.1.1.7. Rules listings.

1.2.6. Scales of Weather Features. Scale differentiation allows weather technicians to define both the size and duration of weather features relative to the type of military operation. Each level of weather organization will provide terrestrial and space weather information to the corresponding scale as defined in the forecast funnel.

1.2.7. Weather Situational Awareness. Strategic and Operational level units are responsible for providing discussion products to summarize analysis and forecast reasoning for use by tactical level units. Tactical units will use these products to gain weather situational awareness and will not re-create synoptic and hemispheric scale analysis and forecast processes in order to tailor weather products. The following situational awareness products will be produced:

1.2.7.1. AFWA Strategic Center:

1.2.7.1.1. FSNH01 KAWN Hemispheric Discussion.

1.2.7.1.2. MM5 Model Initialization Web Page.

1.2.7.2. Operational Weather Squadrons:

1.2.7.2.1. Synoptic Scale Discussions.

1.2.7.2.2. Collaboration products.

1.2.7.2.3. Mesoscale Discussions.

NOTE: this may be a stand-alone bulletin or appended to forecast graphics.

1.3. Strategic and Operational Level Production Cycle. Strategic and OWSs will develop procedures to conduct the five core processes shown in **Figure 1.2.**

Figure 1.2. Strategic and Operational Level Production Cycle.

Step 1	**Analysis Process**
Step 2	**Forecast Process**
Step 3	**Product Generation Process**
Step 4	**Disseminating Weather Products**
Step 5	**METWATCH**

1.3.1. Analysis Process. Weather technicians use a systematic analysis process to determine the current state of the air and space environment. The procedures for analyzing data may vary from visually inspecting data to producing analysis products. Units will:

1.3.1.1. Perform the analysis to the appropriate scale of military operations within the AOR. For example, a mesoscale analysis should not be performed over a global area.

1.3.1.2. Use standardized representations and symbols in accordance with (IAW) **Attachment 2.** Limit the number of items displayed on a single product to promote readability and reduce clutter.

1.3.2. Forecast Process. The forecast process guides weather technicians in developing a prediction of the future state of the air and space environment. Strategic and Operational level weather units will include the following items in the forecast processes and procedures:

1.3.2.1. Continuity and Persistence.

1.3.2.2. Climatology.

1.3.2.3. NWP Models.

1.3.2.3.1. NWP output must be evaluated (sometimes referred to as “verified” or “initialized”) before any of the model output is used in a forecast process. Units will develop processes to evaluate the initial state of a forecast model, determine the quality of the NWP and make

adjustments to the output. Meteorologists or qualified technicians will compare observed parameters to the 00hr/initial state forecast products (i.e. geopotential heights, surface pressures, location of closed pressure centers) to identify positioning and intensity errors. Units will have processes and procedures to guide meteorologists or qualified technicians when evaluating forecast motions and intensities of measured parameters and evaluating changes in synoptic regime forecast by the model against known progressions.

1.3.2.3.2. Technicians will initialize the forecast process using adjusted model output. **Note:** model verification and adjustment is normally accomplished by a "lead meteorologist" and passed to technicians for initialization of the forecast process.

1.3.2.4. Forecast Worksheets/Checklists. Worksheets and checklists help weather technicians work logically and consistently through the forecast process. Worksheets and checklists may be hard or soft copy, or developed using computer-aided or web-based technology. When developing worksheets/checklists/decision aids, weather units will:

1.3.2.4.1. Design worksheets/checklists to help forecast specific terrestrial or space weather parameters for specific locations.

1.3.2.4.2. Integrate location specific forecast reference material, forecast tools and techniques for different seasonal regimes, and atmospheric patterns as applicable.

1.3.2.4.3. Document the reasoning used to develop the forecast.

1.3.2.4.4. Document significant changes to forecast products as a result of collaboration with other weather units.

1.3.2.5. Forecast Techniques and Rules of Thumb (ROT). Weather units will determine which forecast techniques and ROTs are applicable for weather regimes in the AOR. Integrate forecast techniques and ROTs as appropriate in the forecast process.

1.3.2.5.1. ROTs are locally developed forecasting and product tailoring tools. Units will validate and document the effectiveness of ROTs before using in the forecast process. ROTs under development will be designated as "experimental" in local procedures until validated.

1.3.2.5.2. To validate a ROT, use it with other forecast tools and techniques for one season or for more than 30 events to determine its forecast accuracy. If the ROT is valid and adds value, integrate the ROT into unit processes and procedures. Modify and revalidate or discard a ROT that cannot be validated.

1.3.2.5.3. Crossfeed validated ROTs that may be useful to other units through the parent MAJCOM to AFWA/DNT.

1.3.2.6. Forecast Reviews and Studies. Unit leadership will determine the forecasts or products to be reviewed, monitor the performance of the forecasts/products, and assign the reviews as required. Forecast reviews focus on a particular weather event at a single location or region and examine the effectiveness of forecast reasoning, tools and methods employed. Forecast studies focus on particular weather phenomena (i.e. morning fog) for a point or region and are aimed at developing forecast tools or methods based on empirical examination of a series of weather events.

1.3.2.6.1. Units will develop a consistent approach to conduct and document forecast reviews. Operational Weather Squadrons will include pertinent commentary/input from CWTs in forecast reviews.

1.3.2.6.2. Forecast reviews will be short (typically three pages or less), simple to complete, and focused on a specific part of the forecast process. The forecast review will briefly outline the tools and reasoning used to make the forecast product and describe potential improvements to unit forecast processes.

1.3.2.6.3. Weather units will crossfeed significant forecast reviews and studies to their parent MAJCOM for evaluation for further crossfeed to AFWA/DNT.

1.3.2.7. Forecast Reference Material. OWSs will compile reference material and background information to assist technicians with forecast product preparation. This material should be compiled in an electronic format (paper hardcopy as necessary) and imbedded in decision-making processes during forecast development.

1.3.2.7.1. Forecast reference material will be maintained by operational-level forecast units for use in internal forecast processes. The OWS will provide this information to external users for product tailoring, planning, or briefing purposes upon request.

1.3.2.7.1.1. Forecast reference material will be maintained for the following locations:

1.3.2.7.1.1.1. Main Operating Locations (AB, AFB, AAF) for which the OWS has responsibility for producing a TAF.

1.3.2.7.1.1.2. Expeditionary/Contingency Operating Locations for which the OWS has been tasked to produce a TAF-coded forecast product.

1.3.2.7.1.1.2.1. Main Operating Locations (AB, AFB, AAF, ANGB, IAP) for which the OWS is responsible for providing weather warnings, watches, or advisories but another agency provides a TAF-coded forecast product.

1.3.2.7.2. Forecast reference material should be maintained for the following locations:

1.3.2.7.2.1. Expeditionary/Contingency Operating Locations for which the weather unit provides weather warnings, watches, or advisories and coalition, joint or indigenous agencies are producing coded forecast products.

1.3.2.7.2.2. Other routinely used location (e.g., drop zone, landing zone) where such information would prove meaningful.

1.3.2.7.3. At a minimum, the following information will be retained:

1.3.2.7.3.1. Site location (Lat/Long, Elevation).

1.3.2.7.3.2. Runway headings.

1.3.2.7.3.3. Climatology for forecast criteria. An OWS providing only warnings for a location only needs to maintain climatology for those elements (i.e. if warnings are for thunderstorms and wind you only need to maintain thunderstorm and wind climatology).

1.3.2.7.3.4. Area topography (e.g., relief maps, navigation charts).

1.3.2.7.3.5. Local effects (e.g., terrain, moisture sources, atmospheric pollution sources).

1.3.2.7.3.6. Local weather patterns, proven forecast products, techniques, tools, ROTs, and studies affecting the location.

1.3.2.7.3.7. Type and location of meteorological sensors and identified limitations (e.g., sensor blockage) if available (this information is often included in site surveys conducted by a Combatant Command evaluating locations for expeditionary operations).

1.3.2.7.4. OWS Directors of Operations or Operations Superintendents will:

1.3.2.7.4.1. Develop tools (procedures, worksheets, decision aids) to integrate forecast reference material in meteorological watch, analysis, and forecast processes.

1.3.2.7.4.2. Review reference material seasonally for forecast application updates.

1.3.2.7.4.3. Ensure forecast reference material is included in qualification training and reviewed by training and systems flight personnel on a semi-annual basis.

1.3.2.7.5. To ensure the most current forecast reference materials are on file in the Air Force Weather Technical Library at Air Force Combat Climatology Center (AFCCC), units will forward newly created or updated documents to Air Force Weather Technical Library.

1.3.3. Product Generation Process. This process will use the information assimilated in the analysis and forecast processes to generate forecast products.

1.3.3.1. AFWA Space Weather Operations Center (AFWA/XOGX), and OWSs will have an established production cycle to generate the standard products specified in **Chapter 2 and Chapter 3**. Standardized products will:

1.3.3.1.1. Use the standard product naming convention IAW AFWAMAN 15-3 *Air Force Weather File Names.*

1.3.3.1.2. Use standard map backgrounds, except for those products that use meteorological satellite images as background.

1.3.3.1.2.1. Backgrounds will have a light blue shade for bodies of water (oceans, lakes) and light brown for land. The following settings are optimized for both high- and low-bandwidth dissemination and display. Strategic and Operational level weather units will use the following as map backgrounds. Exact values provided where critical:

1.3.3.1.2.1.1. Ocean – Hue: 180, Sat: 33, Val 255/ Red: 222, Green: 255, Blue: 255.

1.3.3.1.2.1.2. Land – Hue: 60, Sat: 49, Val 255/ Red: 255, Green: 255, Blue: 206.

1.3.3.1.2.1.3. Geopolitical borders will be outlined in a neutral gray shade - Red: 135, Green: 135, Blue 135.

1.3.3.1.2.1.4. Terrain features will be minimal.

1.3.3.1.2.1.5. Military Operating Areas (operational level forecast products only) will be outlined in a neutral color that does not interfere with the depiction of meteorological features.

1.3.3.1.3. Alternate map backgrounds (i.e. non-standard color schemes, high-bandwidth terrain maps) may be used in addition to the standard map backgrounds, provided the standard map background is made available using the standard product naming convention.

1.3.3.1.4. Use scales and projections representative to their respective AOR.

1.3.3.1.5. Be available in a low bandwidth or a black and white print option.

1.3.3.2. Units may request specialized or new climatological, terrestrial, or space weather products by using the SAR function on the Joint Air Force and Army Weather Information Network (JAAWIN), Secure JAAWIN (JAAWIN-S), OWS, or AFCCC web pages.

1.3.4. Disseminating Weather Products.

1.3.4.1. AFWA standardized products will be available on JAAWIN (and JAAWIN-S as applicable). AFWA will transmit those products and data requiring assured delivery through a variety of avenues including common user communication and satellite communication networks (e.g., Very Small Aperture Terminal (VSAT)). AFWA will distribute/deliver alphanumeric data and redistribute OWS data (as required) to appropriate CWT clients.

1.3.4.2. OWS standardized products will be available on its Non-secure Internet Protocol Router Network (NIPRNET) (and Secret Internet Protocol Router Network (SIPRNET), as applicable) web page. OWSs will also transmit required products and data via common-user communication and satellite communication networks (e.g., NIPRNET, VSAT, Global Broadcast System), as required, to provide data for operations in its AOR.

1.3.4.2.1. OWSs will disseminate weather watches, warnings, advisories, and TAFs (as described in **Chapter 3**) using the Air Force Weather Weapons System. Units using a non-standard dissemination system will ensure warnings, watches, and advisories are available to all users of standard Air Force systems. OWSs will post a summary of current OWS-issued watches, warnings, and advisories to its NIPRNET (and SIPRNET, as applicable) web page.

1.3.4.3. Units participating in Joint, Coalition, or Combined Operations will make environmental data and products available for dissemination via systems and data networks approved by combatant or joint commands.

1.3.5. Meteorological Watch (METWATCH).

1.3.5.1. METWATCH procedures will:

1.3.5.1.1. Be tailored to significant weather regimes of the AOR.

1.3.5.1.2. Ensure weather technicians actively monitor and apply Pilot Weather Report (PIREPs), Air Reports (AIREPs), Airman's Meteorological Information Report, and Significant Meteorological Information Report (SIGMETs), information received from CWTs as part of the "eyes forward" process, and other perishable data sources.

1.3.5.1.3. Specify the use of Meteorological Satellite (METSAT) imagery. Outline types of imagery and/or enhancement curves most useful for identifying significant weather features.

1.3.5.1.4. Detail the use of Weather Radar Products available in the theater/region/AOR.

1.3.5.1.4.1. Include a regime-based listing directing technicians toward the most applicable product for determining significant environmental events associated with that regime. For example: radar products appropriate for determining environmental winds from Velocity Azimuth Display Wind Profile (VWP), use tropopause height and height of -20 C iso-

therm for determining lightning potential. Units will use radar products to help identify and determine the following (as applicable):

1.3.5.1.4.1.1. Type, intensity, coverage, and movement and trends of frontal systems, associated precipitation patterns, and weather features.

1.3.5.1.4.1.2. Cloud heights.

1.3.5.1.4.1.3. Wind direction and speed, outflow boundaries.

1.3.5.1.4.1.4. Detect possible radar signatures indicating severe weather, such as hook echoes, meso-cyclones, storm rotation signatures, v-notches, or bounded weak echo regions.

1.3.5.1.4.1.5. Potential for Weather Watch, Warning, or Advisory criteria.

1.3.5.1.4.1.6. Melting level detection.

1.3.5.1.4.1.7. Non-precipitation phenomena.

1.3.5.1.5. Specify the real-time surface and upper air data routinely used and its source.

1.3.5.1.6. Include the use of available lightning detection products.

1.3.5.1.7. Include the use of other technology and other data sources (as applicable).

1.4. Pilot Report (PIREP)/Air Report (AIREP). Weather units will develop procedures to enhance internal analysis, forecast, and meteorological watch using information from airborne aircraft. Units will:

1.4.1. Encourage aircrews to provide timely PIREPs/AIREPs to collect the following information:

1.4.1.1. Meteorological elements that may be of operational significance to other aircraft or to surface activities (e.g., turbulence, icing, low-level wind shear, valley fog, tornadic activity).

1.4.1.2. Specific data to fill a gap in the meteorological collecting system (e.g., cloud bases and/or tops when departing/arriving, in-flight visibility at low levels, upper winds).

1.4.2. Provide specific guidance to ensure weather technicians properly encode and disseminate PIREPs and AIREPs in accordance with AFMAN 15-124, *Meteorological Codes.* When encoding bulletins, units will:

1.4.2.1. Use standard contractions in Federal Aviation Administration (FAA) Order 7340 series, *Contractions Handbook.*

1.4.2.2. Provide specific guidance to ensure temporary location identifiers (i.e. KQXX) are NOT used as reference to the location of reported phenomena in the body of PIREP bulletins.

1.4.3. Provide specific guidance to mandate longline dissemination of all urgent PIREPs (UUA) and local dissemination of PIREPs significant to flying operations and flight safety.

1.4.3.1. Disseminate all routine PIREPs longline unless they meet the following conditions:

1.4.3.1.1. When two or more PIREPS have substantially the same information disseminate only the most recent. Include a remark indicating 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").

1.4.3.1.2. When reports of sky condition have been incorporated into an Aviation Routine Weather Report (METAR) or Aviation Selected Special Weather Report (SPECI) observation, unless deemed appropriate by the weather technician entering the report.

1.4.3.1.3. When reports include only negative reports of icing and/or turbulence from locations outside forecast areas for these phenomena.

1.4.3.2. OWSs and CWTs should notify one another of significant PIREPS (and AIREPS if applicable) for use in the METWATCH and MISSIONWATCH processes.

1.4.4. Mandate longline dissemination of all routine (ARP) and special (ARS) AIREPs upon receipt.

1.5. Pilot-To-Metro-Service (PMSV). AF weather units that provide PMSV will develop procedures for operations. All contacts with airborne aircrews, including phone patches, HF/UHF radio contacts, L-band messages, and via satellite communications equipment will be considered PMSV contacts.

NOTE: Occasionally, units may receive cell phone calls from airborne aircraft asking for updates. It is important that units keep a record of the information given to the pilot either on a PMSV log, a copy of the 175-1, or other briefing log. It is not necessary for units to use standard phraseology and radio discipline once it is determined that the call is from an airborne aircraft.

1.5.1. Units will:

1.5.1.1. Use proper radio discipline and standard phraseology found in FAA Order 7110.10, *Flight Service.*

1.5.1.2. Respond to all PMSV contacts IAW Unit Duty Priorities (if applicable).

1.5.1.2.1. Units monitoring common PMSV radio frequencies will respond if another weather unit does not answer an aircrew request after two contact attempts.

1.5.1.3. Specify that only current, complete, and relevant information will be passed to aircrews.

1.5.1.3.1. Warn of all weather hazards. Relay the position and movement of weather hazards to the aircrew.

1.5.1.3.2. Identify locations by well-known navigational aids or ground references.

1.5.1.4. Ensure personnel DO NOT vector aircraft around hazards, such as thunderstorms. **Note:** Only air traffic control facilities can vector aircraft.

1.5.1.5. Solicit a PIREP.

1.5.1.6. Log all PMSV contacts if no recording capability exists. **Figure 1.3.** illustrates an example of a locally developed PMSV log. If recording capability does not exist, units will log the following information, at a minimum, for each contact:

1.5.1.6.1. Aircraft call sign or number.

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

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

Figure 1.3. Example PMSV Log.

PILOT TO METRO SERVICE (PMSV) LOG					MONTH: XXX 01			
NO	CALL SIGN	TIME	INFORMATION GIVEN AIRCREW	PIREPS, TURBULENCE, REMARKS	INIT	DISSEMINATION		
----	----------	-------	----------1 XXX 01 --	----------	-------	LOCAL ------	LONG -----	ROS ----
1	TOWER	0001Z	RADIO CHECK – Loud/Clear		TM			
2	PUFFY 55	0640Z	WNDS CBI – COS 27060, FCST 0900Z COS 29010 7 SCT030 3005	LCK-CBI 180 LGT TURBC 220	RG		X	
3	JOY 31	0650Z	LCL FCST 0800Z 29010 7 SCT030 OVC050 3008	OVR SGF OVC CI TOP 330 LGT CAT 350 C-141	RG		X	

1.5.1.7. Log one PMSV radio equipment check each day (an operational contact meets this requirement). Radio checks are not required if operational mission contacts occur.

1.5.1.7.1. Record any discrepancies, such as weak contact, weak reception, distortion, static, etc., on the PMSV log to assist maintenance personnel in correcting the problem.

1.5.1.8. Log out PMSV contact equipment (i.e. radio, telephone equipment, etc.).

1.5.1.8.1. The form or method used may be locally developed or specified by MAJCOM/ higher headquarters.

1.5.1.8.2. UHF/VHF Radio Outages. Weather units with radio equipment will arrange for another agency or weather unit to provide backup during radio outages (as capability exists), and will notify the backup unit when the equipment is back in operation. Ensure information on outages is included in local Airfield Advisories and Notices to Airmen (NOTAMs).

1.5.2. Unit leadership will ensure information concerning the facility and its PMSV radio operation is current and correctly described in the appropriate Department of Defense (DoD) FLIPs (i.e. Instrument Flight Rules (IFR) Supplements, Flight Information Handbook, etc.).

1.5.2.1. At a minimum, the information will include:

1.5.2.1.1. CWT operating hours and PMSV radio frequency.

1.5.2.1.2. OWS contact information.

1.5.2.2. 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.

1.6. Continuity of Operations.

1.6.1. General. AF weather units will be prepared to continue mission-essential functions without unacceptable interruption during a national security emergency or other disruptive conditions, such as major equipment/communications outages or evacuations. To ensure continuity of operations during these situations, units will develop processes to use alternate equipment/systems, operate from alternate locations, or arrange transfer of critical functions to other organizations. Units aligned to provide continuity of operations support for another unit must be capable of providing the support and be fully prepared to assume the responsibility in minimum time.

1.6.2. Strategic Weather Center Continuity of Operations (COOP) Program.

1.6.2.1. As a Field Operating Agency, AFWA will develop a Continuity of Operations (COOP) program and publish a COOP Plan to ensure continuity of mission-essential functions under all circumstances. The AFWA COOP will be developed IAW AFI 10-208, *Continuity of Operations (COOP) Program*. The plan may involve the transfer of functions to several different organizations. AFWA should exploit available military and public resources when developing the COOP Plan.

1.6.2.2. AFWA subordinate units will develop processes to continue providing mission-essential functions during a national security emergency or other disruptive conditions, such as major equipment/communications outages or evacuations.

1.6.3. OWS Continuity of Operations.

1.6.3.1. OWSs will develop continuity of operations processes to continue providing mission-essential functions to its customers. The processes will address both short- and long-term interruptions of functions.

1.6.3.1.1. OWS continuity of operations may involve the transfer of functions to several different organizations. OWSs will specify the function each designated organization will perform.

1.6.3.2. **Table 1.1.** illustrates the three OWS mission tiers, the products and services required to conduct the mission, and the backup priority. OWSs unable to provide service to its customers will use the table to arrange transfer of products and services to designated backup organizations.

1.6.3.3. Designated backup organizations will assume support following the three-tiered order in **Table 1.1.**

Table 1.1. OWS Three-Tier Continuity of Operation.

Mission Tier	*Type of Products & Services*	*Back-Up Priority*
Tier 1 Wartime, Contingencies, and Military Operations Other Than War	Flight Weather Hazards in the combatant command area of responsibility, Controlling Mission Execution Forecasts (CMEFs), Military Operation Area Forecasts (MOAFs), Joint Operation Area Forecasts (JOAFs), TAFs, Flight Weather Briefings, and classified products and services.	Will backup. Immediate transfer to backup unit.
Force Protection	Forecast Weather Watches, Warnings, Advisories, and Space Warnings.	
Tier 2. Peacetime and Exercise Operations	Continental United States (CONUS) regional Flight Weather Hazards, CMEFs, MOAFs, JOAFs, TAFs, Flight Weather Briefings, and other products and services as resources allow.	Back-up to the greatest extent possible after satisfying Tier 1 requirements.
Tier 3. Mission Planning	Long Range Forecasts, Space Weather, Climatology, Staff Support, etc.	Back-up as resources are or become available after satisfying Tier 1 & 2 requirements.

1.6.3.4. Continuity of Operations processes and requirements will be formally documented. This documentation may be in the form of a MAJCOM PLAN or Memorandum of Agreement between the OWS and the supporting agency.

1.6.3.4.1. OWSs will provide a copy of the continuity of operations document to all organizations providing backup support, other command agencies involved, and HQ USAF/XOW.

1.6.3.4.2. OWS should make continuity of operations documents available to supported units upon request in accordance with parent MAJCOM policies and procedures.

1.6.3.4.3. OWSs will review and update their continuity of operations document consistent with MAJCOM continuity of operations policies or as necessary to reflect substantive changes in operations.

1.6.3.4.4. At a minimum, OWSs will exercise the continuity of operations processes annually. Real world events meet this requirement if properly evaluated and documented, to include lessons learned.

1.6.4. CWT Continuity of Operations.

1.6.4.1. CWTs at main operating locations (garrison operations) will establish an alternate operating location (AOL) to continue providing mission-essential functions to parent/host unit activities. Expeditionary units should establish AOL procedures as quickly as the tactical situation permits (i.e. when the character of operations switch from maneuver/combat to steady state/peacekeeping activities or bare base infrastructure improves to permit communication from an alternate location). Unit leaders will coordinate with parent/host agencies to select an appropriate location and secure the needed communications and other resources. At a minimum, CWTs will establish communication from the AOL with the local Air Traffic Control (ATC) tower, command post, primary installation customers, and the supporting OWS. See **Chapter 4** for instructions on performing the "eyes forward" function from the AOL.

1.6.4.2. CWTs at main operating locations will develop written continuity of operations procedures for the AOL. In addition to standing operating procedures, CWTs should include AOL activities in a parent/host unit continuity of operations or full spectrum threat response plan(s). CWTs at expeditionary locations will develop these procedures as the tactical situation permits (i.e. when the character of operations switch from maneuver/combat to steady state or peacekeeping activities or the infrastructure at a bare base improves to permit designation of an AOL).

1.6.4.3. All position-qualified airfield services element personnel will be trained to successfully operate at the AOL following the procedures and instructions in **Chapter 4.**

1.6.4.4. CWTs will notify the supporting OWS when moving to the AOL. The CWT will provide the OWS temporary telephone numbers and any changes in the weather warning (WW) and advisory notification procedures. CWTs will document AOL operations in the local operating procedures and OWS-CWT Memorandum of Agreement (MOA).

1.6.4.5. CWTs at main operating locations will review and update their AOL procedures triennially during the OWS-CWT MOA review or as necessary to reflect substantive changes in operations.

1.6.4.6. At a minimum, CWTs will exercise AOL operations annually. Real world events meet this requirement if properly evaluated and documented, to include lessons learned. Expeditionary units in steady state or peacekeeping operations should exercise AOL operations more frequently to ensure proficiency following personnel rotations.

1.7. War, Contingency, Crisis, And Military Operations Other Than War.

1.7.1. The technical aspects of providing air and space weather information, products, and services to customers in a wartime environment will mirror day-to-day in-garrison operations as closely as possible. Weather leaders will develop technical guidance and procedures based on the "*same in peace as in war*" operational concept.

1.7.2. Leaders of weather units that deploy will review MAJCOM or higher headquarters directives and guidance on contingency planning, tactical operations, training, and reporting. Incorporate these requirements in the unit's tactical operations program. Review Army Regulation 115-10/AFJI 15-157, *Weather Support for the US Army;* Filed Manual 34-81/AFMAN 105-4, *Weather Support for Army Tactical Operations;* Joint Publication 3-59; the *Joint Meteorology and Oceanography (METOC) Training Handbook;* and AFMAN 10-100, *Airman's Manual*, AFMAN 10-401V1, *Operational Plan and Concept Plan Development and Implementation* (Chapter 22), and War Mobilization Plan (Annex

CC) to ensure the tactical operations program supports the requirements in these documents, as applicable.

1.7.2.1. Weather unit leaders will ensure their personnel who are AEF deployable are prepared to successfully perform their duties in an austere environment with limited communication and weather data access.

1.8. Weather Documentation.

1.8.1. CWTs, at a minimum, will formally document the following items:

1.8.1.1. CWT Duty Priorities (if used), normal hours of duty, and contact information.

1.8.1.2. Airfield SPECI observation criteria.

1.8.1.3. Airfield LOCAL criteria (manual observing locations only).

1.8.1.4. Limitations of airfield weather sensors (i.e. blocked wind sensors).

1.8.1.5. Details of the Cooperative Weather Watch with Air Traffic Control.

1.8.1.6. Force Protection and Emergency Actions resulting from weather events/natural disasters.

1.8.1.6.1. Watch, Warning, and Advisory Criteria, Lead Times, and areas of coverage.

1.8.1.6.2. Dissemination Processes (i.e. Pyramid alert scheme, both primary and backup) and watch/warning numbering.

1.8.1.6.3. Alternate Operating Location (location, limitations, contact information).

1.8.1.6.4. Relaying Hurricane/Typhoon/Tropical Storm Warnings (if applicable).

1.8.1.6.5. Severe Weather Action Procedures.

1.8.1.6.5.1. Recalling standby personnel.

1.8.1.6.5.2. Recall action procedures (i.e. expanded eyes forward, augmenting observing equipment, enhanced MISSIONWATCH, etc.).

1.8.1.6.6. Host/Parent Unit Severe Weather response actions.

1.8.1.7. Weather services provided to Host/Parent Unit and all Tenant/Associate Units on the installation.

1.8.1.7.1. Mission-limiting environmental conditions.

1.8.1.7.1.1. Flying Missions.

1.8.1.7.1.2. Non-flying Missions.

1.8.1.7.1.3. Weather Advisories (Observed/Forecast).

1.8.1.7.2. Weather Forecast Information/Product Descriptions (e.g., sample products, formats, delivery methods, decoding).

1.8.1.7.2.1. MEF products.

1.8.1.7.2.2. Tactical Decision Aid Information (if applicable).

1.8.1.7.2.3. Bioenvironmental information.

1.8.1.7.3. MISSIONWATCH (i.e. amendment criteria, dissemination of amendments).

1.8.1.7.4. Pilot-to-Metro Service (i.e. radio frequency, number for phone patches, limitations).

1.8.1.8. OWS-CWT Interactions (Reference **Figure A2.2.**).

1.8.1.8.1. OWS Responsibilities (e.g., information, products, services).

1.8.1.8.2. CWT Responsibilities (e.g., information, products, services).

1.8.1.8.3. Obtaining weather information when the CWT is unavailable (i.e. closed, deployed, evacuated).

1.8.1.8.4. Back-up support provided by the CWT in the event of an OWS interruption (i.e. product assumption, duration, etc.).

1.8.1.8.5. Eyes Forward - Collaboration Procedures.

1.8.1.9. Staff Meteorological Functions.

1.8.1.9.1. Emergency/Crisis Action Response.

1.8.1.9.2. Climatology services.

1.8.1.9.3. Instrument refresher course briefings.

1.8.1.9.4. Air Traffic Control limited observation program.

1.8.1.9.5. Pre-deployment planning.

1.8.2. Host/Parent Unit Documents. CWT leadership will ensure that information on weather services listed in paragraph **1.8.1.** is documented in host/parent unit operations plans, contingency plans, memoranda of understanding, host-tenant support agreements, full spectrum threat response plan(s) or airfield local operating procedures (as described in AFI 13-203, *Air Traffic Control*). CWTs may prepare a stand-alone weather support document at command discretion. MAJCOMs may publish overarching weather plans to describe MAJCOM-unique weather operations requirements, processes, or products that address all or part of the documentation requirement in paragraph **1.8.1.**

1.8.2.1. Documenting CWT Weather Operations. Weather operations information in Operation Plans (OPLANs) annexes will be clearly written in a non-technical format and agree with other prescribing directives. Where technical terms are necessary, ensure they are defined. Normally, weather information included in another document is not repeated; a reference will suffice. However, if the customer does not have access to the referenced material, include pertinent elements of the information in the annex. Attachments and appendices are acceptable methods of documenting information such as SPECI observation criteria and product formats**.**

1.8.2.2. Formal Review of Weather Annexes and Plans. Weather annexes and plans will be reviewed and revised consistent with host/parent unit procedures. CWT leadership will initiate an out-of-cycle formal review to accurately reflect operational changes resulting from host/parent unit mission changes, equipment upgrades, or significant changes in overarching guidance.

1.8.3. OWS-CWT MOA. OWS-CWT MOA is an umbrella term describing formal agreements that define roles and responsibilities between OWSs and supported units unless superceded by an overarching MAJCOM weather operations plan or instruction. A sample MOA format is provided in **Attachment 2 Figure A2.2.**. that may be used in documenting roles and responsibilities.

1.8.3.1. As a minimum, OWS-CWT MOAs will contain:

1.8.3.1.1. OWS Mission, Location, and Duty Priorities.

1.8.3.1.2. CWT Mission, Location, and Operating Hours.

1.8.3.1.3. OWS Responsibilities.

1.8.3.1.4. CWT Responsibilities.

1.8.3.1.5. TAF Issue and Dissemination Procedures, non-standard Specification and Amendment Criteria.

1.8.3.1.6. Weather Watches, Warnings, and Advisories.

1.8.3.1.7. Severe Weather Action Procedures (SWAP).

1.8.3.1.8. Space Weather.

1.8.3.1.9. Wartime, Contingency, and Exercise Weather Operations.

1.8.3.1.10. OWS Backup Operations.

1.8.3.1.11. CWT Backup Operations (contact information for AOL).

1.8.3.2. OWSs will develop a formal agreement with each supported unit to include each individual CWT and other operational customers in its AOR. OWSs may use a blanket MOA for Air Force Reserve Command and Air National Guard installations if those installations' mission requirements are adequately covered by a blanket MOA. A letter of instruction (LOI) from the combatant command may govern expeditionary operations until military operations move from maneuver/combat phase to steady state or peacekeeping stages of an operation. The agreement will normally be in the form of a MOA signed at a commensurate level of command. The supporting OWS will initiate development of the agreements and will be the Office of Primary Responsibility (OPR) for the document. Any impasses that cannot be resolved between the OWS and the CWT in the drafting and coordination process will be forwarded to the appropriate MAJCOM or higher headquarters for resolution.

1.8.3.2.1. The OWS-CWT MOA is used to task the servicing OWS and outlines the specific weather information, products, and services provided by the OWS-CWT team. It will detail the information, products, and services the CWT requires from the OWS to maintain day-to-day operations. The MOA will also outline types of products and services provided to base/post agencies by the CWT-OWS team.

1.8.3.2.2. Information contained in the agreement will comply with, and complement existing regulations, instructions, plans, agreements, or similar directives. Items specified in the OWS-CWT formal agreement will be horizontally consistent with standing operating procedures, local plans and annexes or a stand-alone weather support document (if used).

1.8.3.3. Scope of the Agreement. All agreements will be valid for all personnel assigned to, attached to, or associated with the OWS and CWT.

1.8.3.4. The OWS will initiate a review of the formal agreement with the supported unit on a triennial basis. Changes in requirements or mission not coinciding with a scheduled review (and not already covered in the agreement) will initiate an interim review to ensure the new requirement/

mission is adequately covered. Major changes in operational customer's needs, either adding or deleting, will require a review and update of the MOA.

1.8.3.5. Distribution of OWS-CWT MOA. OWSs and CWTs will provide a copy of the MOA to their parent MAJCOMs upon request.

1.8.4. Standing Operating Procedures. AF weather units will develop and maintain SOPs. The format of SOPs should be as functional as possible for the users. For example, they may be document-style in a binder, placed on quick-reference SOP cards, or web based.

1.8.4.1. Unit standing operating procedures will be reviewed for accuracy and updated at a frequency not to exceed one year from the date originally published. Standing operating procedures will be horizontally consistent with other weather documents (i.e. plans and annexes, airfield local operating procedures, OWS-CWT MOA, etc.).

1.8.4.2. Administrative Control. SOPs will be maintained in their appropriate work centers. If several work centers have one or more SOPs in common, the unit will maintain a master list with a Table of Contents to cross-reference the SOP to its location and establish unit distribution of those SOPs.

1.8.4.3. Unit personnel will review SOPs applicable to the areas for which they are position-qualified at least annually.

1.8.4.4. AF weather units will develop and maintain standing operating procedures for the following areas:

1.8.4.4.1. Open/Close procedures (may be in a checklist form).

1.8.4.4.2. Severe weather action procedures.

1.8.4.4.3. Airfield services to include (CWT only):

1.8.4.4.3.1. AN/FMQ 19 augmentation procedures (if installed).

1.8.4.4.3.2. Basic/Continuous weather watch procedures (manual observing sites only).

1.8.4.4.3.3. Runway change procedures.

1.8.4.4.3.4. Relaying Runway Surface Condition Reports.

1.8.4.4.3.5. ATC Cooperative Weather Watch procedures.

1.8.4.4.3.6. Eyes Forward/OWS collaboration procedures.

1.8.4.4.3.7. PMSV radio and phone patch procedures.

1.8.4.4.3.8. PIREP/AIREP procedures.

1.8.4.4.4. Mission execution forecast procedures to include:

1.8.4.4.4.1. Host/Parent unit environmental sensitivities.

1.8.4.4.4.2. Obtaining weather situational awareness.

1.8.4.4.4.3. Product tailoring methods.

1.8.4.4.5. Disseminating weather decision aids/forecast products procedures.

1.8.4.4.6. MISSIONWATCH procedures.

1.8.4.4.7. Post-mission analysis/quality assurance procedures.

1.8.4.4.8. Lead weather unit procedures (CWTs only).

1.8.4.4.9. Arranging for parent/host unit weather operations from another weather unit (CWT only).

1.8.4.4.10. Continuity of Operations procedures/Alternate Operation Location procedures to include:

1.8.4.4.10.1. Weather equipment outage and backup procedures (CWT only).

1.8.4.4.10.2. Communications outage and backup procedures.

1.8.4.4.10.3. OWS backup procedures (OWS only).

1.8.4.4.11. Take/Augment observations.

1.8.4.4.12. Aircraft/Ground Mishap.

1.9. Aircraft Mishaps.

1.9.1. Weather Units will:

1.9.1.1. Save applicable terrestrial and space weather data when notified of any aircraft or ground mishaps (weather-related or not) requiring OPREP-3 reporting (or local reporting requirements).

1.9.1.2. Ensure all data used in the development of any weather information, product, or service provided to a customer (to include forms, TDAs, space weather products, mission impact slides, etc.) are saved.

1.9.1.3. Save enough data before and after the mishap to fully reconstruct the environmental conditions.

1.9.1.4. Coordinate with other units (OWS, another CWT, TACC) to ensure required data is saved.

1.9.1.5. Save the following products:

1.9.1.5.1. METSAT imagery (Visible, Infrared, and Water Vapor, etc.).

1.9.1.5.2. Radar products if available (Base Reflectivity, Velocity-Azimuth Display Winds, Echo Tops, Composite Reflectivity, Base Velocity, and any other products pertinent to the situation).

1.9.1.5.3. Local area work charts (LAWCs).

1.9.1.5.4. Upper air package.

1.9.1.5.5. Hazard charts (thunderstorm, lower and upper level turbulence and icing, and any other appropriate charts).

1.9.1.5.6. PIREPs, SIGMETs, AIRMETs.

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

1.9.1.5.8. WWs, watches, and advisories.

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

1.9.1.5.10. Briefing material provided to the mishap aircrew (i.e. DD Form 175-1, MEF, flimsy package, mesoscale tailored graphics, or Verbal Brief Log used to brief aircrew).

1.9.1.6. Gather the saved data and hold it until requested or send the data to the unit initiating the data save, as coordinated.

1.9.1.7. Do not dispose of the data until the unit initiating the data save determines it is no longer needed and coordinates the disposition with all units involved.

1.9.1.8. Coordinate with the AFWA Operations to save any applicable data and products that cannot be saved locally. Units contacting AFWA will provide a specific list of data to be saved.

1.10. Duty Priorities. AF weather units will develop clearly defined duty priorities to assist in task allocation and direct operations during circumstances when only one weather technician is on duty (e.g., nighttime CWT shift). Coordinate the duty priority listing with the parent/host unit and display the priority list in plain view to technicians and customers. **Table 1.2.** and **Table 1.3.** contain example duty priorities for OWSs and CWTs. The OWS should develop duty priorities tailored for each functional area within the operations to assist production flight floor managers in resource allocation decisions.

Table 1.2. Example Duty Priorities (OWS).

Order Of Priority	*Duties*
1	Perform OWS Emergency War Order (EWO) Taskings
2	Respond to Aircraft Emergencies/Mishaps
3	Execute OWS Evacuation
4	Provide Products and Services for Combat, Contingency & Military Operations Other than War Operations (graphics, text bulletins, MOAFs)
5	Provide PMSV Service
6	Provide Flight Weather Briefings
7	Provide Weather Products for Force Protection (forecast weather watches, warnings, etc.)
8	Prepare and Disseminate Peacetime/Exercise Regional and Operational-Level Graphics and Alphanumeric Products
9	Prepare and Disseminate Terminal Aerodrome Forecasts (TAFs)
10	Provide other Air and Space Weather Products, Information, and Weather Briefings
11	Accomplish other Routine Weather Requirements
12	Accomplish Recurring Training
13	Accomplish Administrative Tasks
14	Disseminate Severe PIREPs/AIREPs

Table 1.3. Example Duty Priorities (CWT).

Order Of Priority	*Duties*
1	Perform CWT Emergency War Order (EWO) Taskings
2	Execute CWT Evacuation
3	Respond To Aircraft/Ground Emergencies
4	Respond to Pilot to Metro Service (PMSV) Contacts
5	Provide Weather Information for Supervisor of Flying (SOF)
6	Augment AN/FMQ-19 Observations for Mandatory Elements
7	Provide "Eyes Forward" / Collaborate with OWS
8	SWAP Operations
9	Mission Execution Forecast Process -- Produce and Disseminate Forecasts
10	Relay Urgent PIREPs and Special AIREPs to OWS
11	Disseminate PIREPs/AIREPs
12	Perform MISSIONWATCH Activities
13	Provide Briefings
14	Weather Function Training
15	Accomplish Administrative Tasks

1.11. Coordinated Weather Operations. Coordinated weather operations ensure all technicians/war-fighters and decision-makers receive the weather information they need at the right time. It also ensures a coherent set of weather data is used at all command levels. Therefore, weather units will coordinate on how to provide weather services to missions involving more than one unit or service and when their customers operate away from their home station.

1.11.1. When two or more military units operate together and require weather services, a lead weather unit will be identified using the rules in **Table 1.4.** The weather unit integrated with the mission's command and control (C2) element is the lead weather unit. The weather unit assigned with the C2 element has direct access to mission planning information, mission execution status, and provides information for the commander making the mission's go/no go decision. Weather units can ascertain if their customer (wing) is the designated lead unit by contacting the local C2 element and simply asking. C2 elements at the wing level are very familiar with this concept.

Table 1.4. Prioritized Rules for Determining the Lead Weather Unit.

Rule	*Type of Mission*	*Designated Lead Weather Unit*
1.	Joint Missions	Joint Meteorology and Oceanography (METOC) Officer (JMO) defines weather for a Joint Operation in Joint Operations Letter of Instruction or support message.
2.	Air and Space Expeditionary Force (AEF)	Weather Unit supporting the designated AEF lead unit. **Note:** Global Mobility Task Force (GMTF) operations have the same priority. Lead weather unit is unit supporting GMTF Command and Control element.
3.	GLOBAL POWER	Weather unit providing the ACC C2 element with weather information. **Note:** normally the ACC Air Ops Group Weather Element.
4.	CORONET	Weather unit providing the ACC C2 element with weather information. **Note:** Normally the ACC Air Ops Group Weather Element.
5.	AMC IFM missions	Weather unit assigned to the IFM C2 element (see **Table 1.5.**).
6.	GLOBAL REACH	Weather unit integrated with the AMC C2 Element (**Note**: Normally the Global Mobility Weather flight-15OWS/WXM).
7	AR Missions	Weather unit servicing the lead receiving aircraft unit.
8.	Joint Airborne/Air Transportability Training (JA/ATTs) & DZ	Weather unit servicing the lead airlift aircraft unit.
9.	LZ & Land Maneuver	Weather unit attached to the lead Army unit.
10.	Deployed or Transient	Weather unit assigned/attached to the unit at home station.
11.	Special Operations	Lead weather unit depends on nature of the operation. (**Note:** When Special Operations Forces operate solely in their own channels, the Special Operations Forces CWT or SOFWOC will be the lead weather unit).

1.11.2. The lead weather unit will develop a single CMEF operation composed of multiple unit missions, and ensure all weather technicians involved have access to the pertinent data, web sites, and contact information (see below for specifics).

1.11.2.1. OWSs are responsible for developing the suite of Operational/Theater-scale graphics products for its AOR. The lead weather unit will use all applicable OWS graphics products for CMEF development. If the applicable OWS does not generate a specific graphics product needed to accomplish the mission, the lead weather unit will coordinate with the OWS to ensure the data are available in time for generating the CMEF.

1.11.3. The Lead Weather Unit will perform the following tasks during the pre-mission coordination:

1.11.3.1. Contact all units providing weather services to operational units participating in the mission. The lead unit will collect information on the types of missions involved (e.g., aerial refuel-

ing, air drops, combat sorties, ground tactics) and the points of contact for each weather unit involved including secure/nonsecure telephone numbers, fax numbers, and e-mail addresses.

1.11.3.2. Determine the CMEF format. The CMEF may be an alphanumeric product, a locally developed graphics product, a Power Point presentation, etc. The CMEF should be prepared in a format that works for all weather units involved. See **Attachment 3** for guidance on preparing an alphanumeric CMEF.

1.11.3.3. Gather the special air and space weather parameters or data needed for the mission. This includes the mission-critical thresholds of air and space weather parameters for all the weapon systems participating in the mission. These critical thresholds will be the minimum criteria for updating the CMEF.

1.11.3.4. Coordinate the CMEF delivery methods to include any updates, and the length of time prior to mission execution that the CMEF must be available to all weather units involved.

1.11.4. The lead weather unit will prepare the CMEF and deliver it to all participating weather units based on the agreed upon format, delivery method, and time before mission execution.

1.11.4.1. All weather units will use the CMEF, or information from the CMEF, when briefing their operational war-fighters and decision-makers participating in the mission.

1.11.5. The lead weather unit will METWATCH the information in the CMEF and update it as required based on the mission-critical thresholds.

1.11.6. All weather units involved will perform MISSIONWATCH for their applicable operational customer.

1.11.7. Air Mobility Command 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 (FMs) act as virtual crewmembers, 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 FMs to act as the primary point-of-contact for real-time weather operations for mobility forces around the world.

1.11.7.1. FMs interact with weather agencies much as the flying crewmember does. FMs review en route hazards, takeoff, arrival and alternate weather, SIGMETs, etc., and often act as the conduit to pass weather information (including the CMEF) to the flying crewmembers.

1.11.7.2. Weather operations for IFM missions. **Table 1.5.** shows the lead weather unit responsible for producing the CMEF and servicing the C2 agency and aircrew for IFM missions.

Table 1.5. Lead Weather Unit for IFM Missions

MAF C2 Agency	Lead Weather Unit	Mission Type	Location/Area
TACC	15 OWS/WXM	Strategic Airlift/Air Refueling	Global
USAFE AMOCC	USAFE OWS	Theater Airlift/Air Refueling	EUCOM
Pacific Air Force (PACAF) AMOCC	Pacific OWSs, CWTs	Theater Airlift/Air Refueling	PACOM

1.11.7.2.1. Specific duties and responsibilities of the PACAF and USAFE weather units providing weather information to theater AMOCC-controlled IFM missions will be documented in MAJCOM level instructions.

1.11.7.2.2. The LWU for TACC-controlled IFM sorties/missions will:

1.11.7.2.2.1. Provide 24-hour global surveillance to determine strategic, operational, and tactical weather threats to AMC assets.

1.11.7.2.2.2. Integrate weather into IFM processes.

1.11.7.2.2.3. Continuously monitor worldwide weather conditions and space environmental hazards for mission-impacting events and provide weather information for flight planning, mission execution, and MISSIONWATCH processes for all TACC controlled missions.

1.11.7.2.2.4. Create/verify the CMEF portion of the crew papers for IFM missions as outlined in MAJCOM instructions.

1.11.7.2.2.5. Provide PMSV contacts for IFM sorties/missions.

1.11.7.2.2.6. Resolve differences between LWU forecasts and OWS products.

1.11.7.2.3. For TACC-controlled IFM sorties/missions, CWTs and servicing OWSs will:

1.11.7.2.3.1. Update takeoff weather on the IFM CMEF as needed.

1.11.7.2.3.2. Notify the TACC's LWU if the takeoff update includes any of the criteria listed in **Table 1.6.**

1.11.7.2.3.3. Consult/coordinate with TACC's LWU as required to resolve any aircrew concerns/issues with the IFM CMEF. Facilitate discussions between aircrew members and TACC's LWU to elaborate on weather impacts and/or answer aircrew questions. The LWU is the final arbiter for weather issues involving IFM sorties/missions.

Table 1.6. Weather Criteria Requiring Notification to Tanker Airlift Control Center's (TACC's) LWU.

Ceiling/visibility less than or equal to 200ft/1/2sm (or other published airfield limitations)
Dry runway crosswind (predominant wind) 25kts or greater
Wet runway crosswind (predominant wind) 20kts or greater
Forecast low-level wind shear for KC-10 operations
Observed low-level wind shear for all AMC aircraft
Predominant thunderstorms on station
Freezing precipitation
Moderate (or greater severity) turbulence/icing
Forecast or observed volcanic ash on takeoff

1.12. Meteorological Equipment and Sensors.

1.12.1. AF weather units will:

1.12.1.1. Develop comprehensive procedures to ensure weather radar, METSAT, forecasting, and observing equipment and sensors are properly operated and maintained.

1.12.1.2. Notify appropriate associate units of any degraded capability of weather equipment/sensors.

1.12.1.3. Assist offices of primary responsibility and provide technical expertise necessary to obtain radio frequency assignments and report any interference to the Installation Spectrum Manager IAW AFI 33-118, *Radio Frequency Spectrum Management*.

1.12.2. Weather Surveillance Radar - 1988 Doppler (WSR-88D). OWSs and CWTs using dedicated readouts to WSR-88D systems (Principal User Processors (PUPs), Open PUPs (OPUPs)) will:

1.12.2.1. Ensure weather technicians are qualified to operate Doppler weather radar equipment and interpret radar imagery.

1.12.2.2. Develop procedures for the proper operation of the WSR-88D radar equipment IAW Technical Orders (TOs), equipment manuals, and FMH-11, *Doppler Radar Meteorological Operations (WSR-88D).*

1.12.2.2.1. Procedures will ensure technicians operating the radar are able to determine the radar's status, alert area locations and thresholds, current Volume Coverage Pattern (VCP), and Routine Product Set (RPS) list and environmental factors (e.g., environmental winds vs. VWP, tropopause height, height of -20 C isotherm) prior to data interpretation. Procedures will also guide personnel in making optimum use of the RPS lists for the current VCP and alert paired product listings for storm interrogation and assist them in choosing the best product to use for a particular forecast regime.

1.12.2.2.2. The following information will be available to the operator: list of points of contact (e.g., maintenance for units with Unit Control Position responsibility), systems troubleshooting guide, and a breakdown of the products on the RPS for the various VCPs.

1.12.2.3. Develop local procedures for reporting equipment outages and troubleshooting problems to include startup, restart, and shutdown, as appropriate.

1.12.2.4. Units will incorporate radar imagery in qualification, continuation, and upgrade training programs using archived imagery, saved data, or scenarios. A stand-alone, hardcopy, unit Radar Imagery Reference File may be necessary until electronically stored imagery is fully integrated into training and review processes. Radar imagery incorporated into training and review processes will catalog standard and regime-based Doppler/radar products in the AOR. Paper hardcopy RIRFs will be updated and reviewed annually.

1.12.3. Meteorological Station, Radar (AN/FMQ-18(V)). OWS and CWTs using the AN/FMQ-18 tactical weather radar will:

1.12.3.1. Ensure weather technicians are qualified to operate the AN/FMQ-18 radar equipment IAW the contractor-provided training material and interpret applicable Doppler radar imagery IAW the Qualification and Training Plan (QTP) listed in the AF weather Career Field Education and Training Plan (CFETP). Fully exploit all other Doppler radar training resources available from AFWA, OWSs, the contract depot, and other agencies.

1.12.3.1.1. CWTs will coordinate significant changes affecting the control and operations (i.e. range, elevation, display parameters, and screen capture intervals for the imagery products provided on the Local Area Network (LAN) and to the OWS, etc.), and maintenance of the AN/FMQ-18 radar with the servicing OWS.

1.12.3.2. Develop procedures for the proper operation of the AN/FMQ-18 radar equipment IAW TOs, equipment manuals, and other available technical documents. The procedures will:

1.12.3.2.1. Ensure technicians operating the radar are aware of the radar's status and environmental factors (e.g., environmental winds, tropopause height, height of -20 and 0 C isotherms) prior to data interpretation.

1.12.3.2.2. Direct technicians on how to use and interpret the automated screens on the status display to determine information such as the beam width and height above terrain and other operational data from the automated correction screens.

1.12.3.2.3. Guide technicians in making optimum use of the system's capabilities and assist them in choosing the best displays and functions to use.

1.12.3.3. Develop local procedures for reporting equipment outages and troubleshooting problems to include startup, restart, and shutdown, as appropriate.

1.12.3.4. All weather units using the AN/FMQ-18 weather radar should have the following minimum information available to the operator: list of points of contact (e.g., maintenance, AFWA Customer Service Center), operation and organizational maintenance instructions, and computer-based training material.

1.12.3.5. Develop procedures to print or electronically archive radar imagery for an aircraft mishap and local training.

1.12.3.6. Units will assign a Radar System Administrator to ensure proper network connection and manage the radar imagery (i.e. File Transfer Protocol (FTP) addresses, Certification and Accreditation, etc.) posted on the LAN and system software.

1.12.4. METSAT. Strategic weather centers, OWSs, and CWTs using METSAT imagery within their analysis, forecast, and mission execution forecasting processes will:

1.12.4.1. Ensure unit personnel are qualified to interpret METSAT imagery IAW the appropriate QTPs and other references listed in the 1W0X1A CFETP or 15WX CTS. In addition to QTPs, fully exploit all other METSAT training resources available from AFWA, Cooperative Program for Operational Meteorology, Education, and Training (COMET), and other agencies in qualification and continuation training programs.

1.12.4.2. Develop procedures for the proper operation and maintenance of any dedicated METSAT data acquisition and display equipment.

1.12.4.3. Develop procedures to print or electronically archive METSAT for an aircraft mishap.

1.12.4.4. Units will imbed METSAT imagery into qualification, continuation, and upgrade training. Units may maintain a dedicated METSAT Imager Reference File (MIRF) if not technically feasible to fully integrate imagery interpretation into local programs. Imagery imbedded in training programs will clearly indicate the type of image and contain a brief description/explanation of the use of the imagery for the weather situation in the training program. If used, the MIRF will catalog standard satellite, regime based, and unique images in the AOR. Units using a dedicated MIRF will continually update the imagery and review the MIRF annually.

1.13. Weather Communication And Product Development Systems. Weather product development systems receive, display, manipulate, and disseminate meteorological information. They use various communications modes to include common user communications (Internet, NIPRNET, SIPRNET, and Joint Worldwide Intelligence Communications Systems), satellite, dedicated line, and high frequency radio. For NIPRNET and SIPRNET, weather units will use existing common user base connectivity.

1.13.1. System Management. AF weather units will:

1.13.1.1. Establish system SOPs and system tables/settings.

1.13.1.2. Appoint a primary and alternate System Manager to oversee the following items:

1.13.1.2.1. Day-to-day system operations. This includes maintaining system tables/settings to satisfy the changing needs of the unit and its customers, and managing system product requirements, local forms, and product routing.

1.13.1.2.2. System integration.

1.13.1.2.3. Configuration management.

1.13.1.2.4. Logistics issues.

1.13.1.2.5. Outages.

1.13.1.2.6. Certification/accreditation.

1.13.1.2.7. User-performed preventive maintenance.

1.13.1.2.8. Ensure unit personnel remain proficient in system operations including backup systems.

1.13.1.3. Ensure primary and alternate system managers attend MAJCOM-directed formal training on theater-unique equipment.

1.13.1.4. Ensure System Managers perform duties IAW AFI 33-101, *Communications and Information Management Guidance and Responsibilities;* AFI 33-112, *Computer Systems Management;* AFI 33-202, *Network and Computer Security;* and local communication directives.

1.13.2. N-TFS Requirements. In addition to meeting the above requirements, those systems managers in units using N-TFS will, as a minimum, be able to perform the functions listed in **Table 1.7.**

Table 1.7. New-Tactical Forecast System (N-TFS) Functions Performed by System Manager.

1. Install map backgrounds.
2. Configure local destinations.
3. Change/add/delete items in alert and default routing tables.
4. Change product purge criteria.
5. Change/add/delete entries in external product retention tables.
6. Change display levels of data on Projection Indicator (PI) Sets, and change/add/delete a station to a PI Set.
7. Perform an aircraft accident investigation data save, as applicable.
8. Prepare a Checkpoint CD. Checkpoint CDs are used to save important system configuration tables. They are used to restart N-TFS after a hard drive crash/failure. Checkpoint CDs must be updated when making changes to the system and periodically as determined by unit leadership.
9. Access and print information from the event log. The N-TFS event log contains important messages about equipment performance and may be used to improve system performance. The system manager will maintain references in the event log for accessing, printing, and interpreting breakdown of codes and how they relate to the status of the system.

1.13.2.1. Units using N-TFS will have the information listed in **Table 1.8.** available to unit personnel. Document/store this information in standing operating procedures, checklists, or continuity binders.

Table 1.8. N-TFS Information.

1. Contractor Logistic Support Management Plan. A copy may be obtained from your MAJCOM or higher headquarters N-TFS functional manager.
2. Relocation Plan. A copy may be obtained from your MAJCOM or higher headquarters N-TFS functional managers or HQ AFWA/XPFT.
3. Site data (i.e. site elevation, location, latitude, etc.).
4. Checkpoint CD development procedures.
5. Procedures to change customer data sets.
6. Location of terminals, peripheral equipment, etc. (functional area information).
7. METWATCH criteria thresholds.
8. Routing distribution.
9. Alphanumeric macros (titles and detailed description of output).
10. Copy of routine Alphanumeric and Graphics data requirement listing.
11. Copy of an accurate Base Master Listing for the installation.
12. VSAT Configuration. Copy and maintain a disk of the required VSAT Communications Handler (VCH) configuration files for both fixed and Tactical Very Small Aperture Terminal (T-VSAT) systems. Contact AFWA/XPS for information on the configuration files.

1.13.2.2. Accountability of N-TFS equipment is monitored by Electronic System Center. Units will follow proper procedures outlined in the Relocation Plan when requesting additional equipment, moving existing equipment, or turning in equipment.

1.13.3. VSAT/T-VSAT System. VSAT systems provide a satellite communication capability for receiving and transmitting weather data at OWSs and CWTs in both fixed base and tactical environments. VSAT coverage includes CONUS, Europe, Azores, Southwest Asia, Alaska, Hawaii, Korea, and Japan.

1.13.3.1. OWSs and CWTs are responsible for the operation, limited maintenance, basic configuration, and administration of their VSAT and T-VSAT ground stations. T-VSAT users will also be required to set up the T-VSAT ground station and establish communication with the VSAT satellite. Users with a requirement to connect the T-VSAT ground station equipment with other networks will follow the procedures outlined in the user's manual. These procedures include adding information to the VSAT or T-VSAT via the WSS at AFWA to deliver products to this connected network.

1.13.3.2. System Managers will use the training and operations material available on the AFWA Training Division web site to conduct VSAT/T-VSAT operations. Follow the procedures in **Paragraph 1.13.4.** for VSAT/T-VSAT technical assistance.

1.13.3.3. OWSs and CWTs will use AFWA-provided system security documents to obtain site accreditation for VSAT and T-VSAT ground stations. OWS and CWT leaders will adhere to all applicable VSAT security practices, to include ensuring connected networks are virus-free and passwords are protected.

1.13.3.4. Units will review and update N-TFS data requirements through the weather subscription service annually.

1.13.4. Technical Assistance. Units that require technical assistance will notify the AFWA Customer Service Center. The AFWA Customer Service Center is the single point of contact for weather units requiring technical assistance and provides a 24-hour a day, 7-days a week service to handle trouble calls. The Customer Service Center will maintain detailed information on all outages and will track these outages until successful resolution. **Note:** AF weather units will not contact the contractors directly unless otherwise directed.

1.13.4.1. The AFWA Customer Service Center will record outage data to identify trends, extended outages, etc., and submit to AF/ Director of Weather (XOW) in the AFWA daily update. The Customer Service Center will also prioritize the management of existing outages and provide customers with timely updates when estimated restoration times change and when jobs are closed. Finally, customers will be contacted on a recurring basis in order to ascertain that each customer's concerns have been fully resolved.

1.13.4.2. Weather units should conduct basic troubleshooting to determine the nature of the equipment outage using local troubleshooting guides or ones available from a Weather System Support Center (WSSC) before contacting the AFWA Customer Service Center. With assistance from the AFWA Customer Service Center, unit personnel will generally be able to resolve most problems. If the problem cannot be resolved, the Customer Service Center will contact the appropriate maintenance agency. In some cases, the Customer Service Center may direct the unit to contact their local communication agency.

1.13.5. Certifying Newly Fielded Systems. AF weather unit leaders will be the certifying official IAW AFSSI 5024, Volume 1, *The Certification and Accreditation (C&A) Process*, for all newly fielded information systems. The certifying official will coordinate site certification and accreditation efforts of these systems with the local Information Assurance office to obtain approval from the Designated Approval Authority. An Air Force Command, Control, Communications, Computers, and Intelligence Support Plan must accompany new systems. The System Program Office (SPO) responsible for the acquisition will provide the AFC4I Support Plan. For additional assistance and guidance, contact HQ AFWA/SCMT-I.

1.14. Weather Resources Database (WRD). The WRD is a management tool to assist AF/XOW and MAJCOMs in organizing, training, and equipping the weather career field.

1.14.1. Units will update information monthly NLT the 7th of each month.

1.14.2. MAJCOMs will validate the currency of the data by the 15th of each month.

1.14.3. The WRD is hosted on the AFWA homepage.

1.15. Operational Risk Management. Operational risk management (ORM) is a decision-making process to systematically evaluate possible courses of action, identify risks and benefits, and determine the best course of action for any given situation. Leadership will apply ORM principles and processes to day-to-day weather operations to focus activities and allocate resources of the weather unit to exploit environmental conditions, mitigate mission delays, and enhance the overall effectiveness of operations.

1.15.1. AFPD 90-9*, Operational Risk Management,* establishes the Air Force Operational Risk Management Program. AF weather units will implement AFPD 90-9 with Air Force Instruction (AFI)

90-901, *Operational Risk Management;* and use the Air Force Pamphlet (AFPAM) 90-902, *Operational Risk Management (ORM) Guidelines and Tools*, as a process guide. This pamphlet provides the definitions, guidelines, procedures, and tools for the integration and execution of ORM for all US Air Force organizations and personnel. **Figure 1.4.** identifies and describes the six-step ORM process.

Figure 1.4. Six-Step Process of Operational Risk Management.

Step 1	**Identify the Hazard.** A hazard can be defined as any real or potential condition that can cause mission degradation, injury, illness, death to personnel or damage to or loss of equipment or property. Experience, common sense, and specific risk management tools help identify real or potential hazards.
Step 2	**Assess the Risk.** Risk is the probability and severity of loss from exposure to the hazard. The assessment step is the application of quantitative or qualitative measures to determine the level of risk associated with a specific hazard. This process defines the probability and severity of a mishap that could result from the hazard based upon the exposure of personnel or assets to that hazard.
Step 3	**Analyze Risk Control Measures.** Investigate specific strategies and tools that reduce, mitigate, or eliminate the risk. Effective control measures reduce or eliminate one of the three components (probability, severity, or exposure) of risk.
Step 4	**Make Control Decisions.** Decision-makers at the appropriate level choose the best control or combination of controls based on the analysis of overall costs and benefits.
Step 5	**Implement Risk Controls.** Once control strategies have been selected, an implementation strategy needs to be developed and then applied by management and the work force. Implementation requires commitment of time and resources.
Step 6	**Supervise and Review.** Risk management is a process that continues throughout the life cycle of the system, mission, or activity. Leaders at every level must fulfill their respective roles in assuring controls are sustained over time. Once controls are in place, the process must be periodically reevaluated to ensure their effectiveness.
See AFPAM 90-902 for Application and Techniques	

1.15.2. Unit leadership will tailor the six-step ORM process, and its application and techniques to be consistent with the ORM processes of operational customers, and to the unique mission needs of their organization. **Figure 1.5.** is an example ORM MISSIONWATCH process. As a minimum, units will apply ORM practices to prioritize and manage activities in the following areas:

1.15.2.1. METWATCH and/or MISSIONWATCH processes and procedures.

1.15.2.2. Force Protection processes and procedures, to include SWAP.

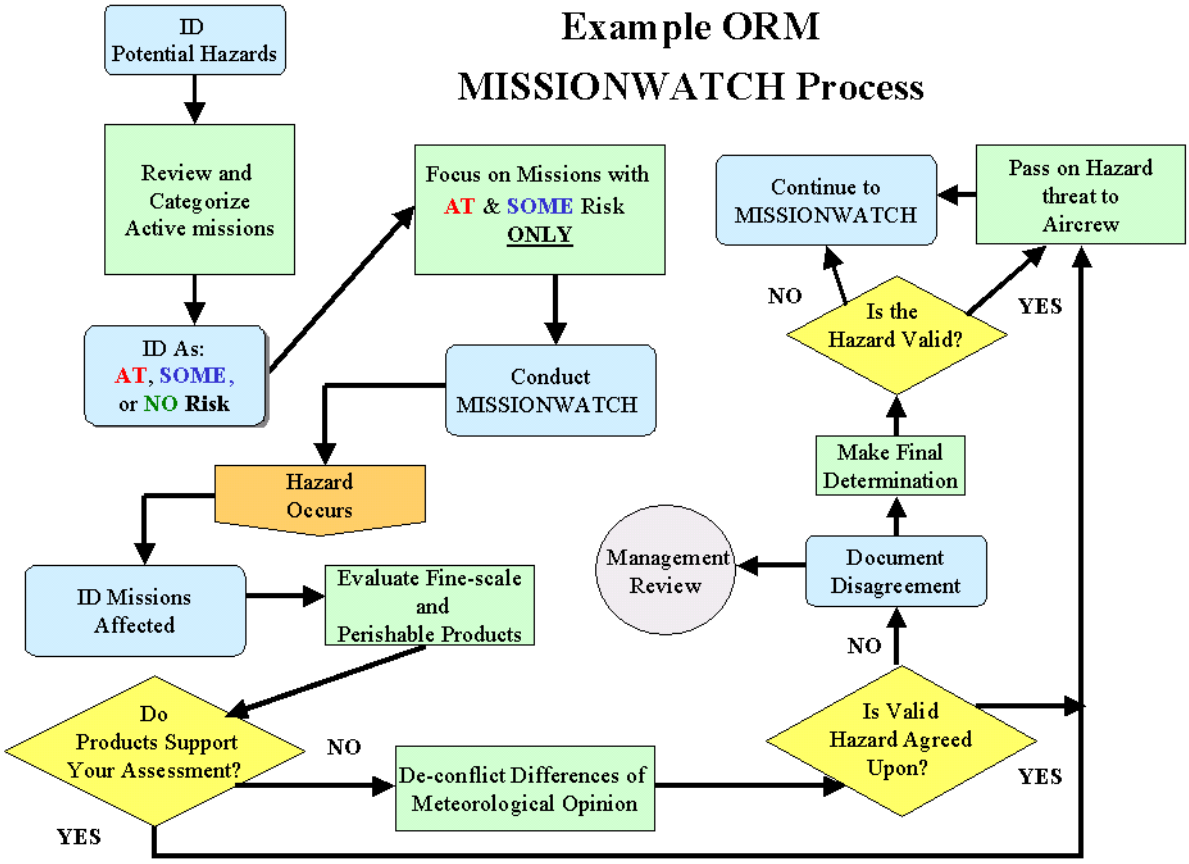
1.15.2.3. Mission planning.

1.15.2.4. Mission Execution Forecast Processes.

1.15.2.5. Backup plans and procedures.

1.15.2.6. Duty priorities.

Figure 1.5. Example ORM Mission Meteorological Watch (MISSIONWATCH) Process.



1.16. Support Assistance Request (SAR).

1.16.1. AF weather units and other customers will use the SAR process when requesting specialized terrestrial, space, or climatological services from weather strategic centers (e.g., AFWA, AFCCC), or specialized theater-level support from servicing OWSs for their respective AOR.

1.16.1.1. Units will submit requests for unclassified support directly to the appropriate strategic center or OWS using the SAR function on JAAWIN, or directly from the OWS home page. Units may also submit requests for unclassified support via telephone, fax, or e-mail.

1.16.1.2. Units will submit requests for classified support using the SAR function on JAAWIN-S or the classified OWS or AFCCC home pages on SIPRNET. Units may also submit requests for classified support via secure telephone, fax, or e-mail.

1.16.1.3. If there is a problem in providing the support, the strategic center or OWS will contact the requestor to clarify the requirement and to discuss alternatives, if required.

1.16.2. To determine the servicing OWS in an AOR, refer to Air Force Visual Aid (AFVA) 15-136, *AF Weather OWS AORs-CONUS* and AFVA 15-137, *AF Weather OWS AORs* available on the Air Force Departmental Publishing Office (AFDPO) web site.

1.16.3. Units may submit SARs for recurring, infrequent, or one-time support. If the SAR is for support that must be delivered under strict time constraints, units will submit the SAR far enough in advance to allow the strategic center or OWS to work the request effectively. For recurring support, units may develop a "pre-positioned" SAR with the appropriate strategic center or OWS that may be activated short-notice by telephone, fax, or e-mail.

1.16.4. Weather units will ensure USAF customers, other US Military Services, and other DoD or Government Agencies are knowledgeable of the SAR process.

1.16.4.1. Units will direct agencies needing specialized support to the appropriate strategic center or OWS and guide them through the SAR process to make their request.

1.16.4.2. Weather units will encourage agencies submitting a SAR to provide feedback on the quality, effectiveness, and value of support directly to the appropriate strategic center or OWS.

Chapter 2

STRATEGIC CENTER OPERATIONS

2.1. General. Strategic weather units are centers of expertise in providing strategic-level terrestrial and space weather products necessary to conduct military operations. The Air Force Weather Agency's Global Weather Center Division (AFWA/XOG) is the principal strategic center and Department of Defense (DoD) Center of Excellence for METSAT imagery. HQ AFWA/XOG develops and produces global-scale terrestrial and space weather products, and provides dedicated strategic weather and space products and forecasting expertise to Special Operations, national intelligence community customers, and to the American Forces Radio and Television Service (AFRTS) for overseas DoD personnel and their dependents.

2.2. Operations Center Functions

2.2.1. Global Weather Center Division (HQ AFWA/XOG). The strategic center will provide continuous worldwide space and terrestrial environmental forecast products and decision assistance to commanders and directors at every echelon of command. The division will also function as the focal point for backup operations for two National Weather Service Strategic Centers (Aviation Weather Center and Storm Prediction Center) and to four CONUS Operational Weather Squadrons. The division has four branches manned 24/7 designated to meet the varied customer requirements. XOG branches include the National Intelligence Community Weather Branch (XOGR), Space Weather Branch (XOGX), Special Support Operations Branch (XOGS), and Meteorological Satellite Applications Branch (XOGM).

2.2.1.1. National Intelligence Community Weather Branch. The branch will provide mission-tailored, target-specific planning and execution weather analyses and forecasts to multibillion-dollar National Intelligence Community (NIC) assets controlled by the Secretary of the Air Force, worldwide combat forces assigned to all Unified Commands, and all components of the U.S. Intelligence Community. The branch will analyze high-resolution satellite imagery from the Defense Meteorological Satellite Program (DMSP) and perform quality control of a computer-generated database of global cloud cover. It will integrate weather data from military and civilian ground observations, geostationary and polar-orbiting satellites, and computer atmospheric models. The branch will respond to short-notice weather tasking in support of Department of Defense (DoD) contingencies and provide briefings to senior DoD leaders on the impacts of weather. The branch works in the Top Secret-Specialized Compartmented Information (TS-SCI) security environment.

2.2.1.2. Space Weather Branch. The branch will provide mission-tailored analyses, forecasts, and warnings of system impacting space weather to all National agencies and DoD operators, warfighters, and decision-makers. It will provide around-the-clock space weather support to the United States Strategic Command, the Air Force Space Command, the Air Force Weather Agency, the National Intelligence Community, and other programs controlled by the Secretary of the Air Force. It will provide mission-tailored forecasts and space environmental support to DoD systems such as the Ballistic Early Warning System, the Airborne Warning and Control System, the Defense Satellite Communications System, the Global Positioning System, and High Frequency communications users. The Space Weather Branch will provide services ranging from the Unclassified to Top Secret Specialized Compartmented Information (TS-SCI) security environments.

2.2.1.3. Special Support Operations Branch. The Special Operations Support Branch will provide unique weather operations not available elsewhere in the AF. The branch is divided into the following two sections providing their unique customers specialized support.

2.2.1.3.1. Special Operations Forces Weather Operations Center (SOFWOC). The SOFWOC will perform as a specialized weather center providing accurate, mission-tailored Special Operations-specific weather products to all Special Operations Forces for worldwide operations and exercises through the continuum from peace to war. The SOFWOC tailors products from Operational Weather Squadrons and generates decision aid products to provide information ranging from unclassified to Top Secret.

2.2.1.3.1.1. When providing services to Special Operations Forces operating in an overseas Area of Responsibility (AOR) Outside Continental United States (OCONUS), the SOFWOC will coordinate with the OCONUS OWS responsible for the AOR to prevent duplication of forecast products to maintain the integrity of "one theater—one forecast."

2.2.1.3.1.2. The SOFWOC does not produce theater-scale forecast products that duplicate or compete with products from OCONUS OWSs responsible for the AOR. The SOFWOC will tailor the applicable OCONUS OWS forecast products to provide specialized services to Special Operations Forces operating in theater.

2.2.1.3.2. American Forces Network Weather Center (AFNWC). The AFNWC will provide worldwide broadcast-quality public weather services and planning forecast to the American Forces Radio and Television Service (AFRTS) for overseas DoD and Department of State personnel and dependents. Forecasters in the AFNWC will provide unclassified AFRTS broadcasts to include Atlantic, Pacific, and European regional shows; Air Mobility Command (AMC) Space-Available shows; Tropical Storm Updates (as required); and Special Event Forecasts.

2.2.1.4. Meteorological Satellite Applications Branch. The Meteorological Satellite (METSAT) Applications Branch will provide rapid-response, tailored imagery and analyses for routine and contingency support to the DoD. The branch will track/classify tropical cyclones for U.S. tropical cyclone centers; perform global volcanic ash plume surveillance; provide detailed dust event analyses for the Asian, Middle Eastern, and African theaters of operation; complete quality control and correct unique worldwide snow and ice data base; and perform regional snow depth analyses for traffic ability assessments. Products from the METSAT Applications branch will range from unclassified to Top Secret.

2.3. Continuity of Operations (Back-Up). HQ AFWA is considered a national operational processing center providing continuity of operations for several national strategic centers and multiple AF Operational Weather Squadrons. The Operations Directorate (HQ AFWA/XO) will ensure trained personnel are available throughout the entire HQ to meet requirements for each backup scenario. The HQ AFWA will provide near-real-time backup to all coordinated customers.

2.3.1. Operational Weather Squadron (OWS) Back-up. HQ AFWA will provide near-real-time backup to select OWSs. Requirements for backup services will be detailed in individual formal agreements between HQ AFWA and the individual OWS. The HQ AFWA designated Lead Meteorologist will respond immediately to execute backup services IAW the formal agreement and established procedures.

2.3.2. Storm Prediction Center (SPC) and Aviation Weather Center (AWC) Back-Up. HQ AFWA will maintain a cadre of certified forecasters specifically trained to meet backup requirements for the National Weather Service's SPC in Norman, OK; and the AWC in Kansas City, MO. Requirements for backup services will be detailed in a formal agreement between HQ AFWA and SPC/AWC agencies. The HQ AFWA designated Lead Meteorologist will respond immediately to execute backup services IAW the formal agreement and established procedures.

2.3.3. Space Environment Center (SEC) Back-Up. The Space Weather Branch (XOGX) will provide backup services to the SEC in Boulder, CO, in the event of an equipment outage, evacuation, or other emergency rendering SEC unable to produce required products or otherwise adequately monitor the space environment. SEC will initiate the backup with a phone call to AFWA/XOGX. This support will include, but is not limited to, providing telephone, fax, or e-mail notification of solar events, space environmental data, and forecasts. At a minimum, backup support will permit SEC to continue to provide Space Weather Alerts to its customers.

2.3.4. Volcanic Ash Advisory Center (VAAC) Back-Up. HQ AFWA/XOGM will provide worldwide volcanic ash plume surveillance and serve as the DoD focal point for analyses and forecasts of volcanic ash hazards. Additionally, XOGM will act as the backup cell for National Oceanic and Atmospheric Administration's (NOAA) Washington Volcanic Ash Advisory Center (W-VAAC).

2.3.5. Joint Typhoon Warning Center (JTWC) Back-Up. The METSAT Applications Branch will track and classify tropical cyclones (via METSAT analysis) for the DoD's JTWC and other U.S. tropical cyclone centers. XOGM will serve as the backup for the Satellite Operations Cell at the JTWC, Pearl Harbor, HI.

2.4. Weather Subscription Service (WSS). The web-based WSS application will function as the primary user interface for the AFWA Dissemination System. Air Force weather customers will control their own data requirements based on preset theater data sets or broadcast parameters. Additionally, WSS will provide the ability to submit observations (METAR and SPECI), TAFs, PIREPs, Addressed Messages, and freeform alphanumeric bulletins for worldwide dissemination. WSS will allow both bulletin and station Automated Response to Query (ARQ), and provide options to return ARQ responses to the terminal served by the customer's Routing Identifier (RTID), to an alternate RTID, or have the ARQ response displayed on the requestor's WSS browser. WSS will include the ability to e-mail ARQ responses after viewing them using a web browser. Modifications to requirements may be made at any time after a site's subscription account has been established and the site has been activated.

Chapter 3

OPERATIONAL WEATHER SQUADRON OPERATIONS

3.1. General. Each OWS is assigned an AOR and is responsible for providing or arranging operational/theater-level air and space weather to units assigned within or deployed to its AOR.

3.1.1. Weather Regimes. Knowledge and understanding of the weather regimes will be used as the basis for the OWS analysis and forecast processes. OWSs will develop local procedures, checklists, and tools to identify the synoptic and mesoscale weather regimes that influence the weather in the AOR.

3.2. OWS Product Generation Process.

3.2.1. OWSs will:

3.2.1.1. Develop standardized two-dimensional mesoscale analysis and forecast products for military operations in its AOR.

3.2.1.2. Use World Meteorological Organization (WMO)/Military Standard (MIL-STD) 2525 compliant meteorological symbols, isopleths, and color representations on all products as provided on the standard Air Force Weather Weapon Systems (AFWWS). See **Attachment 5** for examples.

3.2.1.3. Post a complete list of all routine operational products to its home page.

3.3. Analysis Products.

3.3.1. Surface Analysis.

3.3.1.1. OWSs will produce and post a 00Z and 12Z regime-based surface analysis to their web pages not later than 90 minutes after synoptic data hours. OWSs will disseminate the analysis via the Weather Product Management and Distribution System to AFWA for subsequent redistribution. The surface analysis will:

3.3.1.1.1. Focuses on the geographic boundary of the AOR and be scaled to meet operational needs.

3.3.1.1.1.1. CONUS OWSs may expand the geographic boundary of the analysis to include the entire CONUS if required to deliver proper situational awareness to regional CWTs.

3.3.1.1.1.2. OCONUS OWSs may automate portions of the analysis for areas with limited military operations.

3.3.1.1.2. Will contain the parameters listed in **Table 3.1.** for polar and mid-latitude regions.

Table 3.1. Polar/Mid-Latitude Analysis Parameters.

Polar/Mid-Latitude Parameters
- Plotted surface data
- Isobars Base value 1000 millibar (mb) at 4-mb intervals
- Positions of fronts and troughs
- Locations of closed pressure systems with central values
- Airmass type

3.3.1.1.3. Will contain the parameters listed in **Table 3.2.** for tropical/sub-tropical regions.

NOTE: under certain regimes, meteorological features in sub-tropical latitudes are best depicted using mid-latitude parameters from **Table 3.1.** OWSs will document these regimes in analysis processes and analyze the charts accordingly.

Table 3.2. 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, shearlines etc.)
- 12-hour continuity of cyclonic and anticyclonic circulation centers, tropical cyclones, and other significant weather features

3.3.1.2. The Lead Meteorologists will produce an analysis discussion that identifies weather regimes and discusses the continuity of critical features. OWSs will disseminate this discussion not later than 3 hours after receipt of synoptic data.

3.3.1.3. OWSs will post 12-hour surface analyses on their homepage extending back 72 hours with a loop capability.

3.3.1.4. OWSs may:

3.3.1.4.1. Conduct analyses more frequently and include additional parameters depending on the weather regime(s) and mission requirements in the AOR. OWSs will document additional analyses and parameters in the Analysis and Forecast Process (AFP) and in the MOA with supported CWTs.

3.3.1.4.2. Automate analyses for data periods other than 00Z and 12Z and for areas outside the AORs listed above. OWSs will document automated analyses in the AFP.

3.3.2. Upper Air Analysis.

3.3.2.1. OWSs will:

3.3.2.1.1. Analyze minimum required weather parameters in **Table 3.3.** from the earth's surface up to and including the first layer above the troposphere.

3.3.2.1.2. Use the 00Z and 12Z plotted rawindsonde data to depict synoptic and mesoscale weather features at 200 (250 or 300), 500, 700, 850, and 925 mb levels (see Exceptions in **Table 3.3.**).

3.3.2.1.3. Track 12- and 24-hour continuity of closed circulation centers.

3.3.2.1.4. Maintain vertical and horizontal consistency of weather features with other weather data (e.g., other pressure levels, satellite imagery, weather radar).

3.3.2.1.5. Document in local analysis procedures any deviations from **Table 3.3.** based on seasonal requirements or geographic location (e.g., tropics versus mid-latitude). Include those regimes (e.g., Kona lows, tropical storms, mid-latitude systems digging into tropical latitudes) requiring additional analysis (i.e. levels, parameters).

Table 3.3. Minimum Required Parameters in OWS Standard Upper Air Analysis.

Level	*Minimum Parameters*
200mb, **250mb** **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 - Tropical Upper Tropospheric Trough (TUTT) in tropical regions and as required in subtropical regimes - Jet stream cores ≥ 70 kts. Identify jet maxima and max wind speed (i.e. J110kt) - Areas of upper level tropospheric divergence (isopleth in blue for values greater than 1.95 radians/sec) **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 - Short-wave troughs & ridges - Isotherms: at 5C° intervals - Highlight organized axes of max wind flow ≥ 50 knots - may omit if wind bands are a reflection of upper tropospheric jet stream - Moisture areas. Color fill areas with dew point depressions (DPD) of ≤ 5C° or relative humidity 70% or greater

Level	*Minimum Parameters*
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 5C° intervals - Moisture areas. Color fill areas with DPD ≤ 5C° or relative humidity 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 AFP) - Closed Highs and Lows with center height values - Short-wave troughs and ridges - Fronts aloft - Isotherms at 5C° intervals (highlight 0°C isotherm) - Moisture areas. Color fill areas with DPD ≤ 5C° or relative humidity 70% or greater - Low-level Jet - 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 AOR with surface elevations reaching into these mandatory levels

3.3.2.2. OWSs may:

3.3.2.2.1. Use a meteorological satellite analysis over data-sparse areas.

3.3.2.2.2. Produce an analysis of other pressure levels or parameters on standard levels (i.e. height fall centers) based on seasonal weather patterns or customer requirements.

3.3.2.2.3. Analyze two levels over tropical areas: low-level (925 or 850 mb) and upper-level (300 or 200 mb).

3.3.3. Standard Analysis of Upper Air Soundings (SKEW-T/Log-P Diagrams).

3.3.3.1. OWS graphical displays will include:

3.3.3.1.1. Temperature and dew point vertical profiles.

3.3.3.1.2. Wind directions and speeds at mandatory and significant reporting levels.

3.3.3.1.3. Tropopause height.

3.3.3.1.4. Additional derived parameters (at a minimum):

3.3.3.1.4.1. Height of the freezing level.

3.3.3.1.4.2. Height and speed of the maximum wind.

3.3.3.1.4.3. Lifted Condensation Level (LCL).

3.3.3.1.4.4. Lifted Index (LI).

3.3.3.2. OWSs will provide access to SKEW-T data/diagrams and forecast SKEW-T diagrams for upper air observation sites in their respective AORs.

3.3.4. Severe Weather Analysis.

3.3.4.1. OWSs will establish processes to determine the severe weather threat to their AOR and perform a region-tailored severe weather analysis.

3.3.4.2. Use **Table 3.4.** as a guide, specific analysis parameters and thresholds may depend on the region, season and regime.

3.3.4.3. Severe weather analysis may be combined with the standard surface and upper air analysis.

Table 3.4. Standard Severe Weather Analysis Parameters.

Chart	*Standard Parameters*
200mb **or** **300 mb**	- Streamlines and axes of diffluent winds - Isotachs in red every 20 knots starting with 50 knots - Height falls (300mb 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 label all speed maximas - 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 - Thermal (cold) troughs and warm/cold pockets
700 mb	- Flow streamlines - Axes of maximum wind flow ≥ 30 kts, label all speed maxima - Isotherms 2-degree intervals, highlight 0°C isotherm (if applicable) - Circulation centers (cyclones **C**, anticyclones **A**) - Dry air intrusions (≥ 10°C dew point difference) intruding into a significant moisture field (DPD < 6°C/RH ≥70%)

Chart	*Standard Parameters*
850/ 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 of ≥10°C at 925mb and ≥ 6°C at 850mb - Circulation centers (cyclones **C,** anticyclones **A)** - Dry air intrusions (see 700 mb)
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, tropical storms, tropical cyclones, typhoons, or hurricanes, as required

3.3.5. METSAT Imagery.

3.3.5.1. Overlay the water vapor imagery on the 200 or 300 mb 00Z & 12Z upper air analysis to help depict upper level jet streams and vorticity maxima.

3.3.5.2. Overlay a visible or IR satellite image on the 00Z & 12Z surface analysis to best depict surface features (e.g., fronts, pressure centers, tropical cyclone positions, volcanic eruptions, significant dust/sand events).

3.3.6. Analysis of NWP Models.

3.3.6.1. OWSs will:

3.3.6.1.1. Select and analyze a "model of consistency" (MoC) for the supported AOR. Personnel will evaluate data on the synoptic scale or the mesoscale, depending on model scale and AOR-specific requirements.

3.3.6.1.2. Develop processes and procedures for analyzing the MoC based on, at a minimum, weather regimes and available model output.

3.3.6.1.3. Verify NWP models and initialize the forecast process before using model output to develop forecast products. The procedures for verifying, checking for trends constitute a continuous process and will be performed after each model run.

3.3.6.1.3.1. Verify the current model's performance by comparing positions of significant features from the 12- or 24-hour forecast chart to satellite imagery as well as other real-time data sources from the same time (up to +/- 2 hours).

3.3.6.1.4. Produce forecast model products at 12-hour intervals starting at the base hour (e.g., 00Z or 12Z) through the 72-hour point for parameters listed in **Table 3.5.**

3.3.6.2. OWSs may:

3.3.6.2.1. Automate as many parameters as the capability exists, except for fronts and troughs at the surface.

3.3.6.2.2. Produce analyses for either the 300 mb or 200 mb package, or the 850 mb or 925 mb package depending on location, terrain, weather regime, or other commonly understood parameters.

3.3.6.2.3. Develop modified analysis procedures for tropical regions within the AOR. OWSs will document tropical-unique analysis procedures in analysis and forecast procedures. OWSs may include a description of the modified analysis parameters in the MOA with supported CWTs if deemed operationally significant.

Table 3.5. Weather Parameters Depicted in Model Output.

Chart	*Parameters*
300, 250 or 200 mb Package	- Height contours (same as **Table 3.3.**) - Isotachs – Base value 70kts with a 20kt interval - Closed Highs and Lows with center height values - Areas of divergence. (Isopleth in blue dashed lines for areas equal to or greater than 1.95 radians/sec)
500 mb Package	- Height contours and temperatures (same as **Table 3.3.**) - Seasonal representative contour; maintain continuity to determine significant weather changes - Closed Highs and Lows with center height values - Vorticity isopleths - 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 3.3.**) - 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± 3 microbars/sec - Quantitative Precipitation Forecast (QPF) output 0.25 inches (other values may be included as required based on season/regime)

Chart	*Parameters*
850 mb Package	- Height contours and temperatures (same as **Table 3.3.**) - 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 by changing contour thickness
925 mb Package	- Height contours and temperatures (same as **Table 3.3.**) - 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
Surface Package	- Isobars at 4 mb intervals - Fronts, troughs, pressure centers, and tropical cyclones - Areas of precipitation

3.4. OWS Forecast Products.

3.4.1. TAFs. Aviation forecasts in the TAF code provide meteorological information for flight planning and command and control activities for a specific aerodrome complex. TAF-coded forecast products will be issued by Operational Weather Squadrons, the 30th Weather Squadron at Vandenberg AFB, the 45th Weather Squadron at Patrick AFB, and the Special Operations Forces Weather Operations Cell (AFWA/XOGS) for specific customers.

3.4.1.1. Units producing TAF-coded forecasts will:

3.4.1.1.1. Produce, disseminate, and amend TAFs for Active Duty USAF and USA airfields within their AORs. Exception: AFWA/XOGS produces TAF-coded forecast products as tasked by supported agencies. **Note:** Air Force-issued TAF products are not required if the US National Weather Service (NWS) or another indigenous weather service issues, for the same airfield, a WMO-compliant TAF-coded forecast that meets command and control requirements. Use the decision matrix in **Table 3.6.** as guidance for determining if an AF-issued TAF product is required for a specific location.

3.4.1.1.2. Develop a TAF production cycle and level of forecast provided to all locations (24-hour ops and limited-duty locations) that are based on customer's operational requirements.

3.4.1.1.3. Ensure forecasts are representative of expected weather conditions and remain within standard amendment criteria.

Table 3.6. Aerodrome Forecast (TAF) Responsibility.

TAF Decision Matrix				
IF: **USAF / US Army is Lead ATC Agency**	**AND:** **AF Takes Airfield WMO Observation (not-KQ)**	**AND:** **Indigenous WMO-Compliant TAF Issued**	**AND:** **Mission Load Exceeds 25 US Military Launch/ Recovery per 24 hrs**	**Then:** **OWS Responsible for TAF-Coded Forecast**
Yes	Yes	No	Yes	Yes
No	No	Yes	Yes	No
No	Yes	No	Yes	Yes
Joint with host nation or FAA	No	Yes	No	No
Joint with host nation or FAA	No	Yes	Yes	No
IF: **USAF/US Army is lead ATC Agency**	**AND: Indigenous WMO-Compliant Airfield Observation**	**AND:** **Indigenous WMO-Compliant TAF Issued by Host Nation**	**AND:** **Mission Load Exceeds 25 US Military** **Launch/Recovery per 24 hrs**	**Then:** **OWS Responsible for TAF-Coded Forecast**
Yes	No	No	Yes	Yes*
No	Yes	Yes	No	No
Joint with host nation	Yes	Yes	Yes	No**
Joint with host nation	Yes	Yes	No	No**
IF: **Airfield is Equipped for Instrument Approaches**	**AND:** **Flight Operations are Continuous/ On-going**	**AND:** **Multiple Users of Airfield AND Forecast required For C2**	**AND:** **Mission Load Exceeds 25 US Military** **Launch/Recovery per 24 hrs**	**Then:** **OWS Responsible for TAF-Coded Forecast**
Yes	Yes	Yes	Yes	Yes
Yes	No	Yes	No	Yes (valid period covers hours of operation)
Yes	No	No	No	No

TAF Decision Matrix				
No	Yes	Yes	Yes	Yes
No	No	Yes	Yes or No	No ***
No	No	No	No	No

* No if joint or coalition partner issues WMO-compliant TAF-coded forecast.

** Yes if tasked by Combatant Command Senior METOC Officer in LOI.

*** Lead weather unit provides CMEF to supporting weather units. However, some locations may require non-standard TAF support based upon contractual requirements.

3.4.1.1.4. Disseminate all TAF-coded forecast products (including amendments) via the AFWWS into the Weather Data Collection and Dissemination System (i.e. the Automated Weather network (AWN)).

3.4.1.1.5. Encode the TAF-coded forecast product IAW AFMAN 15-124, *Meteorological Codes.*

3.4.1.1.6. Issue forecasts valid for a 24-hour period. **Note:** Non-standard TAFs issued IAW **Table 3.6.** note 3 are exempt from the 24-hour valid period.

3.4.1.1.7. Issue TAF-coded forecasts at a frequency not to exceed every 8 hours, within 15 minutes after file time during forecast service hours.

3.4.1.1.8. Disseminate TAF-coded forecasts for limited operation airfields not more than 3 hours before opening, or as coordinated with the CWT prior to the beginning of airfield operating hours and documented in the CWT-OWS MOA. **Note:** Valid hours of TAF-coded forecasts will correspond with the installation control tower duty hours.

3.4.1.2. TAF Specification and Amendment.

3.4.1.2.1. Individual elements in the TAF will be forecast as accurately as the state of the art allows. As a minimum, TAFs (scheduled or amended) will specify time of occurrence to the nearest hour (and minute as appropriate), the duration, and intensity of the standard criteria listed in **Table 3.7.**

3.4.1.2.2. TAF-coded forecast products will be amended for the standard criteria and conditions listed in **Table 3.7.**

Table 3.7. Standard USAF TAF Amendment Criteria.

<table>
<tr><th>Forecast Element/Occurrence</th><th colspan="2">Standard TAF Amendment Criteria</th></tr>
<tr><td rowspan="6">Ceiling or Visibility observed or later expected to decrease to less than, or if below, increase to equal or exceed:</td><td>Category</td><td>Limits</td></tr>
<tr><td>D</td><td>≥ 3,000 feet/4800 meters (3 statute miles)</td></tr>
<tr><td>C</td><td>< 3,000/4800 and ≥ 1,000 feet/3200 meters (2 miles)</td></tr>
<tr><td>B</td><td>< 1,000/3200 and ≥ 200/0800 meters (1/2 mile)</td></tr>
<tr><td>A</td><td>< 200/0800 meters (1/2 mile)</td></tr>
<tr><td colspan="2">Categories are determined by the lower of the values.
NOTES:
1. Forecast category is determined by the lower ceiling or visibility value.
2. Use surface visibility to determine forecast category.
3. Substitute the lowest published airfield minimum for Ceiling/ Visibility category A. (may require deletion of the B category at some airfields)</td></tr>
<tr><td>Surface Winds:</td><td colspan="2">Wind Speed: The difference between the predominant wind speed and the forecast wind speed is ≥ 10 knots and/or the difference between the observed gusts is ≥ 10 knots from the forecast gust. For example, amend a forecast specifying surface winds of 23018G25KT if observed predominant wind speed is 28 knots or more, or if the observed gusts are 35 knots or higher. Similarly, amend the TAF if predominate winds are 8 knots or less, or gusts are 15 knots or less.

Wind Direction: A change > 30 degrees when the predominant wind speed or gusts are expected to be over 15 knots.</td></tr>
<tr><td>Icing, not associated with thunderstorms, from the surface to 10,000 feet AGL.</td><td colspan="2">The beginning or ending of icing first meets, exceeds, or decreases below moderate or greater thresholds and was not specified in the forecast.</td></tr>
<tr><td>Turbulence (for Cat II aircraft), not associated with thunderstorms, from the surface to 10,000 feet AGL.</td><td colspan="2">The beginning or ending of turbulence first meets, exceeds, or decreases below moderate or greater thresholds and was not specified in the forecast.</td></tr>
</table>

Forecast Element/Occurrence	*Standard TAF Amendment Criteria*
Forecast **WW** criteria and/or TAF-amendable **WA** criteria – including non-convective low-level winds shear: ***NOTE:*** Watches or Advisories issued for an area may or may not be specified in a TAF-coded forecast for an installation depending on situation.	Occur, or are expected to occur, during the forecast period, but were not specified in the forecast. Were specified in the forecast, but are no longer occurring or expected to occur during the forecast period.
Thunderstorms:	Incorrect forecast start or end time.
Specification of Temporary Conditions:	Forecast conditions specified as temporary become predominant conditions. Forecast conditions specified as temporary do not occur as forecast. Forecast conditions specified as temporary are no longer expected to occur.
Changes to Predominant Conditions:	Forecast change conditions (BECMG or FM group) occur before the beginning of the specified period of change and are expected to persist. Forecast change conditions (BECMG or FM group) do not occur by the specified time. Forecast change conditions (BECMG or FM group) are no longer expected to occur.
Representative Conditions:	Forecast conditions are considered unrepresentative of existing or forecast conditions and amending the forecast improves safety, flight planning, operations efficiency, or assistance to in-flight aircraft.

3.4.2. OWS Standard Forecaster-in-the-Loop (FITL) Graphics Products.

3.4.2.1. OWSs will:

3.4.2.1.1. Operate on at least a once-per-day production cycle using the OWS MoC NWP to produce the standard FITL graphics products listed in **Table 3.8.**

3.4.2.1.2. Make products valid for the +12, +18, +24, +30, +36, and +48 forecast hours. All products will be Point-In-Time (PIT) depicting conditions expected at the valid time of the product.

3.4.2.1.3. The +12hr suite of standard FITL graphics products will be disseminated not later than synoptic model run time plus 9 hours (0900Z/2100Z). The remaining products will be available to customers in time to meet mission requirements in the AOR.

Table 3.8. OWS Standard FITL Graphics Products.

Products	*Weather Parameters*	*Threshold Values*	*Map Depictions*
Theater Icing Forecast (Mean Sea Lever (MSL))	- Mesoscale icing (outside thunder-storms). Rime, Clear (CLR) mixed (MXD) icing (surface - 50,000 feet MSL to the nearest 1,000 feet).	- Light (LGT). - Moderate (MDT). - Severe (SVR).	- As defined in **Attachment 5**.
Theater Turbulence Forecast (MSL)	- Mesoscale turbulence (outside thunderstorms). Mechanical, Mountain Wave (MTN Wave), Clear Air Turbulence (CAT) (surface – 10,000 feet; above 10,000 feet - 50,000 feet MSL to the nearest 1000 feet).	- Moderate (MDT). - Severe (SVR). - Extreme (EXTRM).	- As defined in **Attachment 5**. ***NOTE:*** For depicting light turbulence, OWSs may caveat turbulence products with a clarification remark e.g., "LGT TURBC IMPLIED OVR RUFF TRN"

<table>
<tr><th>Products</th><th>Weather Parameters</th><th colspan="2">Threshold Values</th><th>Map Depictions</th></tr>
<tr><td rowspan="3">Theater Thunderstorm Forecast (MSL)</td><td rowspan="3">- Theater-scale convective activity.</td><td>Coverage & total area affected</td><td>Blocks on DD Form 175-1</td><td rowspan="3">- Maximum tops (MSL)

- Amount of coverage (ISOLD, FEW, SCT, NMRS)

- Thunderstorm symbol (optional stand-alone thunderstorm progs)</td></tr>
<tr><td>ISOLD: 1 - 24 %
FEW: 25 - 49 %
SCT: 50 - 74 %
NMRS: > 74 %</td><td>1 - 2 %

3 – 15 %

16 – 45 %

> 45 %</td></tr>
<tr><td colspan="2">- Coverage forecasts based on total area affected

- Implied maximum 1-hour coverage as defined on the DD Form 175-1.</td></tr>
<tr><td>Horizontal Weather Depiction (AGL)</td><td>- Ceiling and Visibility.</td><td colspan="2">AGL Areas:

- < 3,000/5 (USAF alternate airfield required).

- < 1,500/3 (USAF fixed-wing IFR).</td><td>- As defined in Attachment 5.</td></tr>
<tr><td>Theater Surface Pressure, Fronts, and Weather Forecast</td><td>- Mesoscale surface pressure centers and values, fronts, troughs.

- Significant weather.

- Tropical cyclone positions (as required, from official hurricane/ typhoon forecast centers).</td><td colspan="2">- As displayed. Fronts maintained as long as air mass discontinuity exists.</td><td>- As defined in Attachment 5.</td></tr>
<tr><td>Theater Cloud Forecast</td><td>- Mesoscale depiction of ceilings above 5,000ft AGL extending to the tropopause (apporx 55,000ft)</td><td colspan="2">- Broken (BKN) or Overcast (OVC) cloud cover</td><td>- As defined in Attachment 5.</td></tr>
</table>

3.4.2.2. OWSs will refine all areas, as feasible, without cluttering the chart.

3.4.2.3. Low-Use Areas. OWSs are not required to produce standard FITL Graphics products covering regions not routinely used by the U.S. military, but will have processes and procedures in place for users to request, and the OWS to produce and disseminate, standard FITL Graphics for these areas if needed.

3.4.2.4. MSL Heights. All forecast heights on OWS thunderstorm, icing, turbulence products, and the cloud tops on theater cloud products will be depicted using MSL values. OWSs will take into account the geography changes in the AOR to prevent forecasting MSL bases below general terrain heights. This does not include the small-scale changes in terrain heights (e.g., differences between mountain peaks in close proximity), which CWTs will integrate into the mission execution forecast process to further refine forecasts.

3.4.2.5. Above Ground Level (AGL) Heights. The OWS Horizontal Weather Depiction (HWD) and theater cloud forecast products will depict cloud bases as AGL height depictions.

3.4.2.6. OWS Turbulence Product. OWSs will:

3.4.2.6.1. Produce two separate turbulence products, with low-level (LL) forecasts from the surface to 10,000 feet on one graphic, and upper-level (UL) forecasts from above 10, 000 feet to 50,000 feet on another graphic.

3.4.2.6.2. Turbulence areas on the LL products that extend beyond 10,000 feet will be forecast to the top of the layer and be consistent with areas on the UL products.

3.4.2.7. METWATCHING and Amending Graphics Products. OWSs will METWATCH and amend standard graphics products for the criteria listed in **Table 3.9.** Use perishable data (PIREPS, observations, RADAR data, and METSAT imagery) and the MoC NWP output available at forecast hours after the production cycle to METWATCH and amend products as required.

3.4.2.7.1. Immediate amendments will be accomplished whenever the following criteria are met:

3.4.2.7.1.1. Moderate or greater icing is incorrectly depicted in horizontal extent, vertical extent, type, intensity, or time of occurrence.

3.4.2.7.1.2. Moderate or greater turbulence is incorrectly depicted in horizontal extent, vertical extent, intensity, or time of occurrence.

3.4.2.7.1.3. Lines or organized clusters of thunderstorms, not easily circumnavigated (usually described as Numerous thunderstorms) are incorrectly depicted on the forecast.

Table 3.9. Amendment Criteria for OWS Standard FITL Graphics Products.

1. Thresholds listed in **Table 3.8.** incorrectly forecast.
2. Vertical extent incorrectly forecast by ≥2,000 ft.
3. Horizontal extent incorrectly forecast by ≥90 nautical miles.
4. Graphical depiction is not representative of existing or forecast conditions.

3.4.2.8. Graphic Product Collaboration. When producing and amending products, OWSs will collaborate and mesh the borders of their AOR to ensure areas of forecast mission-limiting parameters crossing the AOR mesh with the areas of the bordering OWSs.

3.4.2.8.1. Collaborate and mesh areas of thunderstorms, and moderate or greater turbulence and icing to the greatest extent possible.

3.4.2.8.2. Time permitting, OWSs should attempt to mesh frontal position and associated weather areas on the HWD.

3.4.2.8.3. If significant disagreement exists on the threshold value of hazardous weather between AORs, the OWS responsible for the AOR with the upstream conditions will decide the threshold value. The OWS responsible for the downstream AOR will represent the upstream conditions on the affected FITL Graphics products.

3.4.2.9. Graphic Product Fusing. The 26 OWS will fuse the Thunderstorm, Upper- and Lower-level Turbulence, and Icing products from the four CONUS (15th, 25th, 26th, and 28th) OWSs and the 11th OWS into single CONUS products. The 26th OWS will fuse the 12-, 18-, 24-, 36-, and 48-hour individual hazard products once daily to create 24 fused CONUS products.

3.4.2.9.1. The 26th OWS will collaborate with the other OWSs to develop the process and procedures for fusing graphic hazard products.

3.4.2.9.1.1. The 12-hour fused products will be completed and posted on the 26th OWS web site NLT 09Z.

3.4.2.9.1.2. The 18- and 24-hour fused products will be completed and posted on the 26th OWS web site NLT 10Z.

3.4.2.9.1.3. The 30-, 36-, and 48-hour fused products will be completed and posted on the 26th OWS web site NLT 12Z.

3.4.2.9.1.4. As amendments to the charts are made throughout the day, individual hubs will contact the 26th OWS to update fused products.

3.4.2.9.1.4.1. Individual OWSs will coordinate their amendments with bordering OWSs before initiating contact with the fusion cell of the 26th OWS.

3.4.2.9.1.4.2. 26 OWS will include NO (ICING, TURBC, TSTMS) EXPECTED in the center of the applicable hazard product when no hazards meet thresholds forecast by any of the CONUS OWSs.

3.4.3. OWS Automated Products.

3.4.3.1. OWSs will:

3.4.3.1.1. Produce or make available the automated products listed in **Table 3.10.** OWSs will produce these products, at minimum, once per day during the same production cycle as the OWS standard graphics products.

3.4.3.1.1.1. OWSs may produce the Surface Wind Chill Temperature and Heat Stress Index product seasonally (as applicable).

3.4.3.1.1.2. Surface Wind Chill Temperature products are not required for tropical climatic zones.

3.4.3.1.1.3. Heat Stress Index products are not required for arctic climatic zones.

3.4.3.1.1.4. Freezing-level chart parameters may be combined with theater icing forecasts in the Standard FITL Graphics suite.

Table 3.10. OWS Automated Products.

Weather Parameters	*Minimum Threshold Values*
Freezing Level	Height of the freezing level in 2,000ft increments.
Surface Wind Speed	Wind plots in 5-knot intervals.
Surface Temperature	Base 0^0C, interval 3C°. Units may substitute equivalent Fahrenheit temperatures.
Surface Wind Chill Temperature	Base -5^0C (or 20°F), incremented every 5^0C below that value. **NOTES:** - OWSs may adjust thresholds to meet mission requirements for arctic climatic zones in the AOR. - Units may substitute equivalent Fahrenheit values provided the product legend clearly indicates units of measure.
Heat Stress Index	Base 25^0C (or 80°F) incremented every 5°C above that value. **NOTES:** - OWSs may produce 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.

3.4.3.1.2. OWS will select the best NWP model as the MoC for use in producing automated products.

3.4.3.1.2.1. OWSs may reference more than one NWP model when developing products; however, all NWP models will be initialized and verified prior t use in OWS forecast processes.

3.4.3.1.3. OWS automated products will be valid for the +12, +18, +24, +36, +48, +60, and +72 forecast hours. All products will be Point-In-Time (PIT) depicting forecasts valid at the time of the product.

3.4.3.1.3.1. OWSs using 00Z NWP model(s) will make the 12Z forecast available to customers NLT 09Z. The remaining forecast products will be produced in time to meet mission requirements in the AOR.

3.4.3.1.3.2. OWSs using 12Z NWP model(s) will make the 00Z forecast available to customers NLT 21Z. The remaining forecast products will be produced in time to meet mission requirements in the AOR.

3.4.3.1.4. OWSs may produce additional automated products based on routine customer requirements.

3.4.3.1.5. To conserve resources, OWSs should not generate/duplicate automated products routinely produced by AFWA. If AFWA automated products meet mission requirements in the AOR, OWSs should leverage these products from AFWA.

3.4.4. Military Operation Area Forecast (MOAFs).

3.4.4.1. The primary source of information for MOAFs will be the OWS graphical product suite, provided the graphical products depict commonly used military operating areas and are routinely evaluated for accuracy and amended as necessary.

3.4.4.2. OWSs may issue routine alphanumeric (A/N) MOAFs for:

3.4.4.2.1. High-use military operating areas as directed by the MAJCOM.

3.4.4.2.2. Air Force Reserve Command and Air National Guard missions (AFRC/ANG) as determined by OWS leadership.

3.4.4.3. If routine A/N MOAFs are required, OWSs will coordinate the format and required weather parameters with the MAJCOM and AFRC/ANG units. **Attachment 3** contains suggested weather parameters and example formats for A/N MOAFs.

3.4.4.3.1. Unless otherwise specified by the MAJCOM or AFRC/ANG units, A/N MOAFs for point-specific locations where aircraft conduct operations in close proximity to the ground will depict forecast heights as AGL. **NOTE:** This rule does not apply to IFR Military Training Routes (IR).

3.4.4.3.2. A/N MOAFs for higher-altitude flying areas (usually for altitudes above 10,000ft) and IFR Military Training Routes will depict forecast heights as MSL values.

3.4.4.3.3. OWSs will clearly identify AGL and MSL heights on A/N MOAFs to minimize confusion.

3.4.4.3.4. OWSs will amend A/N MOAFs for the minimum criteria listed in **Table 3.11.**, unless otherwise defined by the MAJCOM or AFRC/ANG units.

Table 3.11. Minimum Amendment Criteria for A/N MOAFs.

1. Incorrect forecast of the weather parameters as defined by the MAJCOM or AFRC/ANG units for all MOAFs.
2. Vertical extent incorrectly forecast within 1,000 feet above and below for all higher-altitude MOAFs.
3. Horizontal extent incorrectly forecast within 25 miles either side for all higher-altitude MOAFs.
4. Representativeness for all MOAFs.

3.4.5. OWS Meteorological Discussions.

3.4.5.1. OWSs will:

3.4.5.1.1. Produce standardized regional analysis/forecast meteorological discussions and make them available in advance of any scheduled verbal meteorological discussion with CWTs.

3.4.5.1.1.1. Coordinate the format, frequency, and means of discussions with CWTs in their AOR.

3.4.5.1.1.2. Discuss mission changes and critical weather elements over secure communications as required.

3.4.5.1.2. Use topics listed in **Table 3.12.** in discussion products. The amount of detail required for each item will depend on the degree of situational awareness required by the end users of the product.

Table 3.12. Minimum Items Included in OWS Discussion Bulletins.

- Current regimes and air mass. - Current upper air pattern. - Model of consistency and its initialization/ verification performance. - Significant synoptic and regional weather features. - Significant weather features in current meteorological satellite imagery.	- Hazardous weather in the AOR to include severe weather, turbulence, icing, precipitation, winds, low ceilings/visibilities, and other items deemed significant to the OWS forecaster. - Space weather (if relevant to daily operations). - Pertinent OWS operations information (e.g., scheduled outages and product availability), if applicable.

3.4.6. Space Weather Products. OWSs will post or disseminate space weather products from AFWA/ XOGX for phenomena or events impacting the OWS' AOR.

3.4.7. Weather Products for Force Protection (Weather Watches, Warnings, and Advisories).

3.4.7.1. OWSs, 30WS, 45WS, and AFWA/XOGS will:

3.4.7.1.1. Issue, disseminate, amend, cancel, and verify all weather warnings, watches, and advisories using the Air Force Weather Weapons System. OWSs will use the Integrated Weather Warning Capability (IWWC); AFWA/XOGS, 30WS, and 45WS will use N-TFS.

3.4.7.1.2. Issue WWs and Warnings for forecast phenomena affecting the following locations in their AOR:

3.4.7.1.2.1. Active duty USAF and Army installations (main, secondary, and tertiary operating locations).

3.4.7.1.2.2. Expeditionary operating locations in their AORs.

3.4.7.1.2.3. Guard and Reserve installations.

3.4.7.1.2.4. Homeland Defense - Border monitoring activities and Tethered Aerostat Sites.

3.4.7.1.2.5. Special sites of national interest (e.g., The White House).

3.4.7.1.2.6. Major CONUS Lock and Dam facilities.

3.4.7.1.2.7. Joint, Coalition, NATO munitions storage areas.

3.4.7.1.3. Issue Watches and WWs using the standard set of criteria listed in **Table 3.13.**

3.4.7.1.4. Issue Watches and WWs with the standard desired lead-times (DLT) indicated in **Table 3.14.**

3.4.7.1.4.1. OWSs will coordinate and document any deviation from the standard criteria in **Table 3.13.** in the OWS-CWT MOA or overarching MAJCOM plan or instruction. For example, a location may require a warning for 4-inch precipitation accumulation in 6 hours

(e.g., tropical areas) versus a warning for 2 inches in 12 hours; or a location may not require a Sandstorm Warning at all (e.g., arctic areas), etc.

3.4.7.1.4.1.1. Units will forecast the actual amount of expected accumulation and its duration for Heavy Rain/Snow Watches and WWs.

3.4.7.1.4.1.2. Units will forecast the maximum wind speed and hail size expected.

Table 3.13. Standard Weather Watch/Warning Criteria.

1. Tornadoes
2. Damaging Winds (≥ 50 knots, or locally established criteria)
3. High Winds (≥ 35 and < 50 knots)
4. Hail (≥ 3/4 inch diameter, or locally established criteria)
5. Hail (≥ 1/2 inch diameter, but < 3/4 inch)
6. Heavy Rain/Snow (≥ 2 inches in 12 hours or locally established criteria)
7. Freezing Precipitation (any intensity)
8. Blizzard Conditions: Duration of ≥ 3 hours, sustained winds or gusts ≥ 30 knots, considerable falling and/or blowing snow, with prevailing visibility frequently ≤ 1/4 mile/0400 meters (all criteria must be met)
9. Sandstorm: Strong winds carrying sand particles from the surface to no more than fifty feet above the surface, prevailing visibility ≤ 5/8ths to 5/16ths statute miles (1000 to 600 meters). For prevailing visibility of < 5/16ths statute miles (500 meters), the storm is considered a severe sandstorm
10. Lightning Within 5 Nautical Miles: (Implements Air Force Occupational Safety and Health (AFOSH) Standard 91-66, *General Industrial Operations*, and AFOSH Standard 91-100, *Aircraft Flight Line – Ground Operations and Activities*)

Table 3.14. Standard Desired Lead-Times for Weather Watches and Warnings.

Weather Phenomena	*Desired Lead-Time of Watch*	*Desired Lead-Time of Warning*
Tornado	As potential warrants.	**30 minutes** prior to occurrence.
High Winds (≥ 50 knots or local criteria)	As potential warrants	**2 hours** prior to occurrence.
Winds (≥ 35 - < 50 knots)	Not required.	**90 minutes** prior to occurrence.
Hail (≥ 3/4" diameter or local criteria)	As potential warrants	**2 hours** prior to occurrence.
Hail (≥ 1/2" but < 3/4" diameter)	As potential warrants.	**90 minutes** prior to occurrence.
Heavy Rain or Snow (≥ 2" in 12 hours or local criteria)	As potential warrants.	**90 minutes** prior to start of event.
Freezing Precipitation	As potential warrants.	**90 minutes** prior to occurrence.
Blizzard Conditions	As potential warrants.	**90 minutes** prior to occurrence.
Sandstorm	As potential warrants.	**90 minutes** prior to occurrence.
Lightning Within 5 Nautical Miles (or locally established severe criteria)	**30 minutes** prior to start of thunderstorm.	- None. CWT issues when lightning is observed within 5nm. - OWS issues when CWT is closed and capability exists.

3.4.7.1.4.2. Lead times may be adjusted to meet Installation Commander's requirements. All deviations from the standard will be documented in MOAs between the OWS and the supported agency or an overarching MAJCOM plan or instruction.

3.4.7.1.5. Use the standard numbering scheme resident in the IWWC software. AFWA/XOGX, 30WS, and 45WS will develop a standardized numbering scheme. **Note:** The number values portrayed in this section are for example purposes only.

3.4.7.1.6. Provide Watches and WWs using the rules and information in **Table 3.15. Table 3.16. and Table 3.17.**

Table 3.15. Rules for Issuing Weather Watches and Warnings.

1. A Watch can never be a substitute for a Warning. Units will issue Warnings, as required, regardless of whether or not a Watch had previously been issued
2. All Watches and WWs are issued for specific and distinct locations
- The area affected by a Watch or Warning will be clearly indicated in the text of the Watch/WW
- Watches may be issued for an area larger than the corresponding Warning (Watch for base X Local Flying Area, WW for the aerodrome)
- WW normally affect an area no larger than 5 nautical miles (nm) radius (except for lightning warnings that have a minimum radius of 5 nm). Document deviations in OWS-CWT formal agreements or overarching MAJCOM plans or instructions
- Watches and WWs for Military Operating Areas (e.g., training areas, ranges, and missile complexes) may cover larger areas
3. Watches and WWs for phenomena other than lightning:
- Only one Watch will be in effect for the same time span for any given location (e.g., airfield, range). **Note:** Does not include the lightning watch
- Only one WW will be in effect for the same time span for any given location (e.g., airfield, range). **Note:** Does not include the observed lightning WW
- If a Watch or WW is issued for one criterion and it later becomes necessary to issue another Watch or WW for another criterion, a new Watch or WW will be issued to include both criteria forecast to affect that location (this new Watch or WW replaces the previously issued Watch/ WW)
4. The lightning watch and the observed lightning WW are separate entities and do not supersede previously issued Watches or WWs for other criteria
5. A separate valid time will be specified for each criterion when warranted
- All times used in a Watch or WW will be expressed in Coordinated Universal Time (UTC) and Local
- **Exception:** A valid time is not used in an observed lightning warning. In place of valid time, the following statement is used: "*Valid until further notice*"
6. Do not issue a forecast WW for a single unforecast event that is not expected to persist or recur. Account for this warning as “required-not issued” in unit WARNVER.

Table 3.16. Rules for Amending, Extending, and Canceling Weather Watches and Warnings.

1. When a Watch/WW no longer adequately describes the phenomenon's potential or onset, amend the notice by issuing a completely new Watch or WW with a new number
2. Watches/WWs may be extended provided the extension is issued prior to the expiration of the original notice Established DLTs are not applicable for extensions and downgrades
3. Clearly state how the amended or extended Watch or WW affects any previously issued notice. Compute actual lead-times for amendments that "upgrade" previously issued WWs using the DLT of the upgraded criteria. Compute actual lead-times for amendments that “downgrade” previously issued WWs using the DLT of the original criteria
4. Cancel Watches/WWs when previously forecast/observed conditions are no longer occurring and are not expected to recur
5. Lightning Watches are canceled 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 within 30 minutes
6. Cancel WWs for OBSERVED LIGHTNING when thunderstorms have passed beyond the area covered by the Wwarning and lightning is no longer occurring within 5NM of the installation For lightning warning cancellations, include a statement indicating its affect on any previously issued warnings, such as "WEATHER WARNING #XX-XXX remains in effect" or “WEATHER WATCH #XX-XXX FOR LIGHTNING REMAINS IN EFFECT.”
NOTE: The CWT, or OWS when the CWT is off duty, will cancel the lightning warning.

Table 3.17. Mandatory Information in a Weather Watch and Warning.

1. Watch or WW Number (determined locally). For example, SAMPLE AFB WEATHER WATCH #06-001, or SAMPLE AFB WEATHER WARNING #11-013.
2. Specific location (installation or area) for which Watch or WW is valid. For example, ANDERSEN AFB WEATHER WARNING #10-003.
3. Valid time of Watch/WW. For example, SAMPLE AFB WEATHER WARNING #02-010 VALID 20/1800Z TO 21/0200Z.
4. Specific conditions forecast, (e.g., specify maximum forecast wind speed, total precipitation amount). For example, SAMPLE AFB WEATHER WARNING #02-010 VALID 20/1800Z TO 21/0200Z SURFACE WIND GUSTS 35KT – 49KT, MAX WIND FORECAST 45KTS.
5. Explanation of how the new Watch/WW affects previously issued Watch, WW, or WA:
a) SAMPLE AFB WEATHER WARNING #02-010 VALID 20/1800Z TO 21/0200Z SURFACE WIND GUSTS 35KT – 49KT, MAX WIND FORECAST 45KTS THIS WEATHER WARNING DOWNGRADES WW #02-009.
b) SAMPLE AFB WEATHER WARNING #02-010 VALID 20/1800Z TO 21/0200Z SURFACE WIND GUSTS 35KT – 49KT, MAX WIND FORECAST 45KTS THIS WEATHER WARNING UPGRADES WA #02-022.
c) SAMPLE AFB WEATHER WARNING #02-011 VALID UNTIL FURTHER NOTICE LIGHTNING OBSERVED W/I 5NM OF SAMPLE AFB WEATHER WARNING #02-010 SURFACE WIND GUSTS 35KT – 49KT REMAINS IN EFFECT.

3.4.7.1.7. Will use Watch and WW text pre-loaded into IWWC to ensure continuity; specific text may vary by location. Text will be brief and clearly describe weather conditions in terms understood by all users of the product.

3.4.7.1.8. Issue observed Warnings during non-duty hours, as capability exists.

3.4.7.1.9. METWATCH all locations and areas for which it issues Watches and WWs.

3.4.7.2. **Table 3.18.** shows examples of Watches and WWs.

Table 3.18. Example Weather Watches and Warnings.

Event 1 – Tornado
FT SAMPLE **WEATHER WATCH #04-008**. VALID 10/0400Z (09/2300L) TO 10/0600Z (10/0100L) POTENTIAL EXISTS FOR TORNADO DEVELOPMENT AT FT SAMPLE AIN AND THE TRAINING RANGE COMPLEX. A WARNING WILL BE ISSUED IF REQUIRED.
FT SAMPLE WEATHER WARNING #04-012. VALID 10/0410Z (09/2310L) TO 10/0440Z (09/2340L) TORNADO W/I 5NM OF FT SAMPLE AIN. THIS UPGRADES WEATHER WATCH #04-008.
Event 2 – Severe Thunderstorms
SAMPLE AFB WEATHER WATCH #06-009. VALID 08/1200Z (08/0700L) TO 08/1700Z (08/1200L) POTENTIAL EXISTS FOR SEVERE THUNDERSTORM DEVELOPMENT AT SAMPLE AFB. SURFACE WINDS OF 50KTS OR GREATER AND HAIL OF 3/4 INCH OR GREATER ARE POSSIBLE. A WARNING WILL BE ISSUED IF REQUIRED.
SAMPLE AFB WEATHER WARNING #06-015. Valid 08/1400Z (08/0900L) to 08/1500Z (08/1000L) SEVERE THUNDERSTORMS WITH SURFACE WINDS OF 50KTS OR GREATER AND HAIL 3/4 INCH OR GREATER AT SAMPLE AFB. MAX WIND AND MAX HAIL FORECAST 65KTS AND 1-INCH HAIL. WEATHER WATCH #06-009 REMAINS IN EFFECT.
Event 3 – Severe Winds with Blanket Weather Watch
.**SAMPLE AFB WEATHER WATCH #07-001**. VALID 01/1200Z (01/0700L) TO 02/0200Z (01/2100L) POTENTIAL EXISTS FOR PERIODS OF SEVERE WEATHER AT SAMPLE AFB FROM NUMEROUS BANDS OF THUNDERSTORMS AND RAIN SHOWERS ASSOCIATED WITH TROPICAL STORM KUJIRA. THESE BANDS MAY INCLUDE SURFACE WIND GUSTS OF 50KTS OR GREATER. A WEATHER WARNING WILL BE ISSUED IF REQUIRED.
SAMPLE AFB WEATHER WARNING #07-002. VALID 01/0100Z (31/2000L) TO 02/0200Z (31/2100L) SURFACE WIND 35 KT - 49 KT. MAX WIND GUST FORECAST 45 KTS. THIS UPGRADES WEATHER ADVISORY #07-015
SAMPLE AFB WEATHER WARNING #07-003. Valid 01/1430Z (09/0930L) to 01/1530Z (09/1030L)

SURFACE WINDS OF 50KTS OR GREATER. MAX WIND GUST FORECAST 65KTS. THIS UPGRADES WEATHER WARNING #07-002. WEATHER WATCH #07-001 WILL REMAIN IN EFFECT UNTIL THE POTENTIAL FOR SEVERE WEATHER HAS PASSED.
SAMPLE AFB WEATHER WARNING #07-004. VALID 01/1530Z (01/1030L) TO 02/0200Z (01/2100L) SURFACE WIND 35KT - 49KT. MAX WIND GUST FORECAST 45KTS. THIS DOWNGRADES WEATHER WARNING #07-003. WEATHER WATCH #07-001 WILL REMAIN IN EFFECT UNTIL THE POTENTIAL FOR SEVERE WEATHER HAS PASSED.
SAMPLE AFB WEATHER WARNING #07-005. VALID 01/2100Z (01/1600L) TO 01/2230Z (01/1730L) SURFACE WINDS OF 50KTS OR GREATER. MAX WIND GUST FORECAST 65KTS. THIS UPGRADES WEATHER WARNING #07-004. WEATHER WATCH #07-001 WILL REMAIN IN EFFECT UNTIL THE POTENTIAL FOR SEVERE WEATHER HAS PASSED.
SAMPLE AFB WEATHER WATCH #07-002. VALID 01/2100Z (01/1600L) TO 02/0200Z (01/2100L) POTENTIAL EXISTS FOR LIGHTNING W/I 5NM OF SAMPLE AFB. A WARNING WILL BE ISSUED IF REQUIRED. WEATHER WATCH #07-001 AND WEATHER WARNING #07-005 REMAIN IN EFFECT.
SAMPLE AFB WEATHER WARNING #07-006. VALID 01/2130Z (01/1630L) UNTIL FURTHER NOTICE LIGHTNING OBSERVED W/I 5NM OF SAMPLE AFB. WW #07-002 STILL IN EFFECT WEATHER WATCH #07-001 AND WEATHER WARNING #07-005 REMAIN IN EFFECT.
Event 4 – Severe Thunderstorms with Observed Lightning
SAMPLE AFB WEATHER WATCH #08-009. Valid 06/1200Z (06/0700L) to 06/1700Z (06/1200L) THE POTENTIAL EXISTS FOR SEVERE THUNDERSTORM DEVELOPMENT WITHIN 25 MILES OF SAMPLE AFB. SURFACE WINDS OF 50KTS OR GREATER AND HAIL OF 3/4 INCH OR GREATER ARE POSSIBLE. A WARNING WILL BE ISSUED FOR IF SEVERE STORMS THREATEN SAMPLE AFB.
SAMPLE AFB WEATHER WARNING #08-015. Valid 06/1400Z (06/0900L)to 06/1500Z (06/1000L) Severe Thunderstorms with SURFACE windS OF 50KTS OR GREATER AND HAIL OF 3/4 INCH OR GREATER. MAX WIND gusts AND MAX HAIL FORECAST 65kts and 1-inch hail. Weather Watch #08-009 REMAINS IN EFFECT.
SAMPLE AFB WEATHER WATCH #08-010. Valid 06/1330Z (06/0830L) to 06/1600Z (06/1100L)

potential exists for lightning W/I 5NM of Sample AFB. A warning will be issued if REQUIRED. WEATHER WARNING #08-015 FOR SEVERE THUNDERSTORMS REMAINS IN EFFECT.
SAMPLE AFB WEATHER WARNING #08-016. Valid 06/1430Z (06/0930L) until further notice LIGHTNING OBSERVED W/I 5NM OF SAMPLE AFB. WEATHER WARNING #08-015 FOR SEVERE THUNDERSTORMS AND WEATHER WATCH #08-010 REMAINS IN EFFECT.
Event 5 - Blizzard
SAMPLE MISSILE COMPLEX WEATHER WATCH #01-002. Valid 13/1200Z (13/0700L) to 14/0600Z (14/0100L) potential exists for blizzard conditions at Sample Missile Complex. SURFACE Winds 35 - 49kts with heavy snow causing visibility of 1/4 mile or less ARE POSSIBLE, potential accumulation of 8-10 inches. A warning will be issued if required.
SAMPLE MISSILE COMPLEX WEATHER WARNING #01-007. VALID 13/1600Z (13/1100L) TO 14/0600Z (14/0100L) BLIZZARD CONDITIONS AT SAMPLE MISSILE COMPLEX. SURFACE WINDS 35 – 49KTS WITH HEAVY SNOW CAUSING VISIBILITY OF 1/4 MILE OR LESS. MAX WIND AND SNOW ACCUMULATION FORECAST 40KTS AND 10 INCHES. THIS UPGRADES WEATHER WATCH #01-002.

3.4.7.3. Under rare circumstances CWTs may, without prior coordination, issue WWs to facilitate force protection actions when sufficient time does not exist to communicate a change in weather with the OWS as per paragraph **4.5.1.4.2.** CWTs will forward pertinent information to the servicing OWS to ensure the warning is entered into the IWWC verification and reports database.

3.4.7.4. CWTs will issue observed lightning WWs during duty hours.

3.4.7.5. Weather Advisories.

3.4.7.5.1. Advisories provide specific notice to an operational agency of environmental phenomena impacting operations. Weather advisories issued with an advance notice requirement are known as a Forecast Weather Advisory (FWA) and advisories issued to provide notice of an event's occurrence are known as an Observed Weather Advisory (OWA). CWTs will coordinate advisory requirements with the servicing OWS for criteria or phenomena for which a local capability to forecast does not exist.

3.4.7.5.2. OWSs will issue Forecast Weather Advisories (FWAs) as required. The specific criteria and desired lead-times for FWAs will depend on requirements forwarded by CWTs and formalized via the CWT-OWS MOA process.

3.4.7.5.3. OWAs will be issued from the OWS when the CWT does not have personnel on duty and the OWS has the capability to sense the phenomena and issue the OWA in a timely fashion.

3.4.7.5.4. The OWS staff will coordinate with the CWTs in its AOR to satisfy units' requirements within existing OWS capabilities. When several units require WAs for similar criteria, the OWS may consolidate advisories to the extent possible without compromising the requirements of individual agencies.

3.4.7.5.5. Advisory text will be brief and clearly describe the weather conditions in terms easily understood by all users of the product. **Table 3.19.** contains the information required in the text of a Forecast Weather Advisory (FWA). The specific format of the FWA will be coordinated between the appropriate OWS and operational unit and entered into IWWC templates to ensure continuity.

Table 3.19. Mandatory Information in a WA.

1. WA Number (automatically inserted by IWWC). For example, SAMPLE AFB WA #06-001.
2. Valid time of WA.
3. Location (installation or area) for which WA is valid.
4. Specific conditions forecast (e.g., specify maximum forecast wind speed).
5. Explanation of how the new WA affects a previously issued WA, Watch, or WW. For example, DOWNGRADES WEATHER WARNING #05-012.
NOTE: The number values portrayed in this chapter are for example purposes only.

3.4.7.5.6. OWSs will provide WAs based on rules in **Table 3.20.**

Table 3.20. Rules for Issuing, Amending, Extending, and Canceling Weather Advisories.

1. Units may not issue an FWA for a single unforecast event that is not expected to persist or recur. Account for this FWA as "required-not issued."
2. More than one WA may be in effect at the same time for the same location, but only one WA will be in effect for a particular phenomenon at the same time, i.e. a FWA for 15KT XWNDS and a FWA for SURFACE WINDS 25KT – 34KT is appropriate; whereas a FWA for SURFACE WINDS 12KT – 24KT and a FWA for SURFACE WINDS 25KT – 34KT is not appropriate.
3. When a FWA no longer adequately describes a phenomenon or its onset, OWSs will amend the advisory by issuing a completely new FWA under a new number. When a new advisory is issued, clearly state its affect on any previously issued advisory or warning in the text, for example, UPGRADES WEATHER ADVISORY #11-014 or DOWNGRADES WEATHER WARNING #08-002. Compute actual lead-times for amendments that "upgrade" previously issued FWAs using the DLT of the upgraded criteria. DLT is not computed when a FWA is issued to downgrade a less severe condition.
4. Extend FWAs only if the duration changes and the extension are issued prior to the expiration of the original advisory. Established DLTs are not applicable for extensions.
5. Cancel FWAs when previously forecast/observed conditions are no longer occurring and are not expected to recur.

3.4.7.6. General Watch, Warning, and Advisory Procedures.

3.4.7.6.1. Using the following general procedures, units will issue Weather Watches, Warnings (WWs), and Advisories (WAs) in a standard format. The format for issuing Watches, WWs, and WAs will be well publicized to all customers to ensure they are familiar with the products when they are issued.

3.4.7.6.2. Do not issue a warning and a forecast advisory for differing thresholds of the same phenomena valid for overlapping times (e.g., a WW for 40-knot convective winds and a FWA for 25-knot winds). In this situation, if the 40-knot winds diminish, but 25-knot winds are forecast to continue, issue a WA for the 25-knot winds effective the same time the WW expires, or is cancelled, with a remark appended stating the WA downgrades the WW (e.g., WEATHER ADVISORY #09-015 DOWNGRADES WEATHER WARNING #09-002).

3.4.7.6.3. Units may issue a lightning Watch, WW, and one or more weather advisories (Forecast Weather Advisories (FWAs) or Observed Weather Advisories (OWAs)) for different phenomena valid for the same time for a location (e.g., a lightning Watch within 5NM, WW for 55-knot winds, and WA for 36-knot crosswinds could be issued for the same location).

3.4.7.6.3.1. Additional circumstances may warrant issuing a Watch, WW, and WA valid for overlapping times for a location. For example, a severe thunderstorm Watch could be issued for an extended block of time (if potential exists) and one or more severe thunderstorm WWs concurrently issued and expiring within the valid time of the Watch. In this situation, the severe thunderstorm potential is not associated with only a single line of storms, but with multiple lines or additional severe weather development of an area might be expected. Some situations where this may apply are areas affected by several intersecting convergent boundaries or possibly in tropical AORs where a location may be affected by numerous feeder bands associated with a nearby tropical cyclone.

3.4.7.6.4. Units may “upgrade” and “downgrade” Watches and WWs to minimize confusion. For example, if a tornado Watch has been issued valid 12-14Z and a tornado WW is issued at 13Z, then the tornado WW may be issued with a remark stating it upgrades the tornado Watch (the Watch is upgraded into a WW and the Watch is cancelled). In this situation, the tornado WW will be effective until it expires, is cancelled, or is downgraded by reissuing the Watch if the potential still exists for tornadic development.

3.4.7.6.5. Lead-time computation for FWAs or WWs that downgrade an existing WW is based on the issue time of the WW provided there is no break in coverage. Ensure there is no break in coverage and a “DOWNGRADE” remark is appended to the new Watch, WW, or FWA. If a break in coverage does occur, the new Watch, WW, or FWA must meet the DLT.

3.4.7.6.5.1. Watches, WWs, and FWAs may be issued with the intention of upgrading an existing Watch, WW, or FWA at a specified time. For example: A FWA for wind gusts of 25-34 knots is in effect and it becomes apparent winds will equal or exceed 35 knots, then a WW for 35-49 knots will be issued. The new WW will contain a remark stating its effect on the FWA. All Watches, WWs, and FWAs issued as upgrades will meet their respective DLT, regardless of any break in coverage.

3.4.7.6.5.2. The Watch, WW, or FWA text will contain remarks clarifying the effect it will have on existing Watches, WWs, or FWAs (e.g., THIS WEATHER WARNING UPGRADES WEATHER WARNING #XX-XXX).

3.4.7.6.6. WWs, and WAs will maintain product consistency with other forecast products. For example, if a WW is issued for wind 35 knots or greater, the TAF, and other products for that location and valid time will forecast (either predominate wind speed and/or gusts) ≥ 35 knots to reflect the WW winds. Products will be amended, corrected, or updated to ensure categorical/horizontal consistency.

3.4.7.6.7. Watches issued for areas larger than the aerodrome complex need not be included in the body of the TAF-coded forecast depending on circumstance. Example: Watch is issued for severe thunderstorm criteria in the base X local flying area. The TAF may not reflect the warning if the technician anticipates the thunderstorms will not affect the installation. Watches issued for aerodrome complexes must be reflected in the body of a TAF-coded forecast product. Example: Watch is issued for base Y. TAF would reflect the entire valid period of the watch.

3.4.7.6.8. OWSs will coordinate with each customer in their AORs to document in a formal agreement the Watch, WW, and WA criteria and specific details of the dissemination and notification process, including backup procedures.

3.4.7.7. Verification of Weather Watches, WWs, and FWAs.

3.4.7.7.1. Units issuing WWs will:

3.4.7.7.1.1. Enter all verification data in the IWWC verifications database. 30WS and 45WS will verify WWs on AF Form 3807 or develop local verification tools to replace the printed form per instruction in **Attachment 6**.

3.4.7.7.1.2. Verify WWs for a specific installation based on sensed data within the area specified in the text of the Warning. Example: a wind warning is issued for an aerodrome complex; objectively verify the Warning using FMQ-19 sensor readings from active or inactive ends of the runway or other calibrated sensors within the aerodrome complex. Use all sensed data available in the area affected by the warning (e.g., radar, mesonet, indigenous meteorological services reporting stations) to verify warnings. **Note:** These same data sources will be used to determine if a WW is required but not issued.

3.4.7.7.1.2.1. Subjective evaluation may be necessary to expand on and quantify forecast performance and capability, and to identify procedural or training deficiencies. Subjective evaluation will be annotated separately and indicated as a subjective evaluation in the IWWC verification database. Rules applied for subjective verification will also be used to indicate situations where warnings were required but not issued.

3.4.7.7.1.2.2. Complete objective verification on all forecast WWs (including the Lightning Watch). For warnings with multiple criteria, verify each element separately. In cases where objective verification is not possible, inadequate, or misrepresentative, OWSs may subjectively verify WWs, and WAs. OWS leadership will carefully analyze the data to determine if, in fact, the event actually occurred, or if the data is just sound justification for a good WW or FWA that did not verify. In situations where units use subjective verification, they will also take responsibility for a missed occurrence if these phenomena are reported with no WW or FWA issued.

3.4.7.7.1.2.2.1. OWSs may objectively verify WWs using information received from credible, official sources within the area of the WW, such as off-duty weather operators, military/state police, NWS certified spotters, local news media, etc.

3.4.7.7.1.2.2.2. Objective verification for winds greater than or equal to 50 knots, hail greater than or equal to 3/4 inch, or tornadoes (or the substituted local severe weather thresholds where different) is based on reported or observed occurrences within the forecast area, or 10 nautical miles, whichever is larger. Objective verification for other forecast criteria will be based on occurrence within the area covered by the warning as defined in the OWS-CWT MOA.

3.4.7.7.1.2.2.3. If required, use subjective verification for heavy precipitation WWs. An example of subjective verification of a heavy precipitation WW could be reports of flooding with visible damage within the area covered by the warning indicating heavy precipitation occurred but was not measured at the location of the official airfield observation. Radar generated precipitation total products may be used to verify precipitation accumulation WWs provided the data has been evaluated for accuracy (account for any high reflectivity phenomena such as hail or bright band contamination of the data).

3.4.7.7.1.2.2.4. Lead-time computation is not required for downgrades to warnings that have already verified with no break in coverage and extensions.

3.4.7.7.1.3. Verify all FWAs objectively. Subjective verification may be used for phenomena that cannot be directly measured by sensing equipment or pilot report. Subjective evaluation criteria will be determined by unit leadership and documented in SOPs. For FWAs containing multiple phenomena, verify each phenomenon separately. Examples of subjective verification include phenomena, such as low-level wind shear, turbulence, and icing that may be inferred from wind profiles or Skew-T/Log-P charts in the absence of pilot reports.

3.4.7.7.1.4. Verify each phenomenon separately when forecast WWs or FWAs contain multiple phenomena.

3.4.7.7.1.5. Verify the Lightning Watch as if it were a forecast weather warning with 30-minute DLT. The verification will be based on the issued time of the watch subtracted from the time the observed warning was issued for lightning within 5NM.

3.4.7.7.1.6. OWSs will verify all WWs and FWAs transferred to them from the CWT and enter the verification data in the IWWC database.

3.4.7.8. Weather Watch, WW, and FWA Justification. OWSs will document meteorological reasoning used in determining the need for all weather watches, WWs, and FWAs. Include sound meteorological reasoning (e.g., attached data, written synopsis) in the appropriate spaces provided in the IWWC.

3.4.7.9. Documentation of Weather Watches, Warnings, and Advisories.

3.4.7.9.1. Weather units issuing Watches or WWs will record notification and verification using IWWC. AF Form 3807, *Watch/Warning Notification and Verification,* will be used by 30WS and 45WS. **Attachment 6** contains instructions for completing AF Form 3807.

3.4.7.9.2. Weather units issuing a FWA will record notification and verification using the IWWC. AF Form 3806*, Weather Watch Advisory Log,* will be used by the 30WS and 45WS. **Attachment 7** contains instructions for completing the AF Form 3806.

3.4.8. Other Products.

3.4.8.1. OWSs may produce additional products to meet CWT requirements based on specific operational necessities or unique weather regimes in their AOR.

3.4.8.2. OWSs will leverage unique products from other meteorological agencies to include US, civilian and military agencies (e.g., Naval worldwide oceanographic products), and foreign nation products. These products will be displayed directly or will exist as links to the operational products hosted elsewhere.

3.4.9. Disseminating Weather Products.

3.4.9.1. OWSs will:

3.4.9.1.1. Provide AF-Standard weather web pages as fielded in the AFWWS IAW specifications provided by HQ AFWA. Weather products posted on the AF-Standard weather web page will be disseminated using AF-Standard weather product naming conventions.

3.4.9.1.2. Post all OWS-products and those made available from other sources (e.g., AFWA Space products, leveraged products, etc.) on its NIPRNET web page, and post mission-essential products on its SIPRNET (if available) web page as needed to meet customer requirements.

3.4.9.1.3. Transmit required products and data via common-user communication and satellite communication networks (e.g., VSAT), as required for supported operations in their AOR.

3.4.9.1.4. Disseminate TAFs to CWTs and other customers (if applicable) using N-TFS/OPS-II platforms. OWS may use MAJCOM-approved theater specific, or joint dissemination systems as required.

3.4.9.1.5. Disseminate Watches, WWs, and WAs directly to the CWT and the installation's command and control infrastructure (e.g., command post) using IWWC and the CWT's N-TFS Local Weather Network System (LWNS)).

3.4.9.1.6. Coordinate with each location (e.g., CWTs or non co-located CWTs, command posts, ATC, etc.) to ensure key local operation and command and control activities receive OWS-issued Watches, WWs, and WAs from IWWC.

3.4.9.1.7. Post a summary of current OWS-issued watches, warnings, and advisories to its NIPRNET/SIPRNET web pages.

3.5. OWS-CWT Severe Weather Interaction.

3.5.1. Although OWSs provide products enabling force protection decisions for locations in their area of responsibility (i.e. USAF and Army installations, Guard and Reserve installations, etc.), it is the OWS-CWT "team" that provides the most effective protection. CWTs and OWSs must work as a team during severe weather events.

3.5.1.1. Team members must understand how each severe weather event affects operational customers and their individual role during the event.

3.5.2. OWS SWAP, unlike CWT SWAP, normally do not include the need to recall personnel in response to severe weather affecting installations under their responsibility or occurring in the AOR. OWSs will document any specific actions or plans executed when severe weather is expected or occurring in their AOR (e.g., SOPs describing reallocation of OWS resources from other tasks; focused support to a specific region in their AOR).

3.6. Tropical Cyclone Procedures.

3.6.1. OWSs will:

3.6.1.1. Fully exploit on-line forecast resources provided by Tropical Cyclone Forecast Centers (i.e. the Tropical Prediction Center (Miami, FL), the Central Pacific Hurricane Center (Honolulu, HI), and the Joint Typhoon Warning Center (Pearl Harbor, HI)).

3.6.1.1.1. OWSs will not deviate from the official forecast position, track, movement, maximum wind speed, or intensity unless tailored for terrain effects to issue TAFS, MOAFs, Watches, WW, and FWAs at specific locations.

3.6.1.1.2. Although most weather impacts are implied within a tropical cyclone, OWSs will identify areas of non-convective weather, such as MOD/SVR turbulence, within the tropical system on their graphics charts.

3.6.1.2. Perform METWATCH and serve as the primary liaison between the Tropical Cyclone Forecast Centers and CWTs.

3.6.1.3. Tailor wind forecasts for terrain effects when issuing tropical cyclone discussions (e.g., WDPN (Tropical Cyclone Discussion for North Pacific Area), or equivalent bulletins), TAFs, MOAFs, Watches, WWs, and FWAs.

3.6.1.4. Release official tropical cyclone forecasts to the general public in accordance with the policies and procedures specified by the theater Combatant Commander (CC) (or appropriate level command agency) regarding the release of information to non-military organizations.

3.7. Flight Weather Briefings.

3.7.1. OWSs will provide flight weather briefings to aircrews or CWTs requesting briefings for aircrews transiting their AOR.

3.7.2. OWSs will provide required flight weather briefing services to Air National Guard, Army Guard, Air Force Reserve, and Army Reserve units without a collocated, assigned weather unit.

3.7.2.1. OWSs may assist Reserve Component aircrews by generating FITL'd tactical decision aid forecasts or NWP models for selected missions.

3.7.3. Air Mobility Command Strategic Airlift Integrated Flight Managed (IFM) Missions. Air Mobility Command maintains Command and Control of strategic airlift missions transiting and staging through combatant command AORs and is in the process of completely integrating strategic operations into the AMC C2 system via an integrated flight management team. The Global Mobility Weather Flight (15 OWS/WXM) is the weather element to the IFM team and will provide all mission weather packages to IFM strategic airlift missions. These missions receive AMC-unique weather packages imbedded in flight papers provided to the aircrews that will be updated by the IFM team as the mission progresses.

3.7.3.1. CWTs will refer requests for flight weather briefs from AMC strategic airlift IFM missions to the Global Mobility Weather Flight. CWTs may provide access to meteorological satellite imagery, take off data, and other perishable weather data to crews on IFM missions upon request but will refer the aircrew to the IFM team for weather updates to the mission package.

3.7.4. When preparing and presenting flight weather briefings, OWSs will:

3.7.4.1. Use the Product Generation Server/Scheduler (PGS/S) briefing outline, DD Form 175-1, *Flight Weather Briefing*, MAJCOM form, or computerized equivalent, as the standard tool for delivering flight weather briefings.

3.7.4.1.1. **Attachment 8** contains instructions for completing DD Form 175-1.

3.7.4.1.2. Presenting flight weather briefings. Technicians presenting flight weather briefings will focus on customer needs and tailor briefings to the mission.

3.7.4.1.2.1. Briefings should include the following:

3.7.4.1.2.1.1. General meteorological situation for the mission area.

3.7.4.1.2.1.2. Current and forecast weather (including flight hazards and SIGMETs) for takeoff.

3.7.4.1.2.1.3. Forecast enroute weather (including flight hazards and SIGMETs). **Note:** A reasonable rule of thumb is to brief flight hazards within 25 miles either side of the route and within 5,000 feet above and below the planned flight level.

3.7.4.1.2.1.4. Current and forecast conditions at destination and alternate airfields.

3.7.4.1.2.1.5. Evaluate, interpret, and apply the contents from watches, warnings, advisories, and forecasts to each individual briefing. Relay the complete text of weather watches, warnings, and advisories for departure location and destination(s), and alternate airfield(s) (if available).

3.7.4.1.2.2. Use the term “thunderstorms” rather than “CBs” or “cumulonimbus” when briefing aircrews.

3.7.4.1.2.3. Request aircrews provide PIREPs (and take AIREPs when applicable) during takeoff, enroute, and destination arrival.

3.7.4.1.2.4. Briefer will inform aircrews on steps taken to ensure the aircrew receives updates to flight weather briefings at their next destination (i.e. call back to unit conducting the briefing, mission number of the next briefing loaded in PGS/S at a servicing OWS), or how to obtain a flight weather briefing at their destination.

3.7.4.1.2.5. Maintain or have readily available current applicable FLIPs and the flight weather briefing references listed in **Table 3.21.**

Table 3.21. Flight Weather Briefing References.

AFI 11-202V3, *General Flight Rules*
AFH 11-203V1 & V2, *Weather for Aircrews*
AFI 11 Series, *Flying Operations* (for applicable aircraft Operations Procedures)
Army Regulation 95-1, *Aviation Flight Regulations*
OPNAVINST 3710.7 series, *NATOPS General Flight and Operating Instructions*
FAA *Aeronautical Information Manual* (NWS In-Flight Weather Advisories)
FAA Order 7340 series, *Contractions Handbook*
FAA Order 7350 series, *Location Identifiers* and International Civil Aviation Organization (ICAO) Doc 7910, *Location Indicators*

3.7.4.1.2.6. Give the briefing (DD Form 175-1 if used) to the aircrew and retain a duplicate copy, in either electronic or paper hardcopy format in unit files. The briefing may be sent to the aircrew via e-mail, fax, or posted to a web page.

3.7.4.2. Flight Weather Briefing Documentation and Retention.

3.7.4.2.1. OWSs will document all flight weather briefings. Maintain a record of the following mandatory items:

3.7.4.2.1.1. Briefing time.

3.7.4.2.1.2. Briefer initials.

3.7.4.2.1.3. Aircrew call sign or mission number.

3.7.4.2.1.4. Army or Navy Void Time (as applicable).

3.7.4.2.2. Units will maintain a record of verbal briefings (e.g., local flights, telephone, closed-circuit television) using disposition instructions contained in AFMAN 37-139, *Records Disposition Schedule*. Use an electronic record or a MAJCOM or prescribed log. **Figure 3.1.** illustrates an example of a locally developed Aircrew Briefing Log.

Figure 3.1. Aircrew Briefing Log.

AIRCREW BRIEFING LOG					PERIOD OF RECORD			
					FROM XX Month XXXX		TO XX Month XXXX	
ACFT TYPE	ACFT IDENT	DEP POINT/ DTG ETD	FL	DEST/ DTG ETA	SIGNIFICANT/SEVERE WEATHER BRIEFED		DTG WX BRF	PILOT NAME
					PHENOMENA/LOCATION	BASED ON	VOID	FCSTR INIT
UH1	Huey1	OFF 01/1000Z	030	SUX 01/1030Z	LGT TURBC SFC-020	PIREPS	01/0900Z 01/1030Z	N/A JR

3.7.4.2.3. Web-Based Aircrew Briefings. OWSs will:

3.7.4.2.3.1. Provide access information and procedures to units for computer/web-based briefing applications using the PGS/S system. Procedures will address how aircrews request/schedule a weather briefing and include contact information for clarification and follow-up.

3.7.4.2.3.2. Develop procedures to monitor the currency and accuracy of web-based products accessed by aircrews.

3.7.4.2.3.3. Encourage aircrew members to provide a minimum of 2-hours advance notice before brief time.

3.7.5. MISSIONWATCH. OWSs will implement the risk management processes, stated in **Paragraph 1.15.**, to ensure that missions placed at risk by environmental conditions receive the appropriate level of MISSIONWATCH necessary to ensure flight safety. OWSs will:

3.7.5.1. Provide weather updates when significant changes in weather occur after the briefing or after the aircrew has departed.

3.7.5.2. Define who will contact the mission director or aircraft commander and the method of contact if significant changes occur. Methods of contact may include, but are not limited to: verbal relay of information to the SOF or mission commander, PMSV radio contact, phone patch, L-Band or satellite communications (SATCOM), or using existing command and control systems. **Table 3.22.** lists some basic steps used for MISSIONWATCH.

Table 3.22. Basic Steps for MISSIONWATCH.

Determine the missions placed at risk due to terrestrial or space weather conditions to assign MISSIONWATCH priorities.
Continuously monitor at risk mission routes, areas, installation, etc., for significant changes. Spot check low risk missions.
Focus on mission-limiting weather thresholds for specific mission.
Notify operational users of weather parameters crossing mission-limiting thresholds.
Provide operational alternatives to exploit mission weather.
Update mission execution forecast products / flight weather briefing as necessary.
Continue to monitor missions based on MISSIONWATCH priorities.

3.8. Tactical Decision Aids for Reserve Component Forces. OWS will provide unmediated (no forecaster in the loop) model output for meteorological parameters required for tactical decision aids run for Reserve Component units without a collocated CWT.

3.9. Meteorological Watch (METWATCH). OWSs will:

3.9.1. METWATCH for standard weather parameters and any additional mission execution parameters as coordinated with customers.

3.9.2. Focus on detecting changes in the weather not occurring as forecast that would prompt a change to forecast reasoning or forecast products.

3.9.3. Amend forecast products and coordinate with CWTs per conditions established in the OWS-CWT MOA.

3.9.4. Develop METWATCH procedures to include the following items:

3.9.4.1. Identify all METWATCH data sources, document forecast methods, and standardize methods of obtaining weather situational awareness.

3.9.4.2. Identify all geographic areas and OWS forecast information, products, and services to METWATCH.

3.9.4.3. Define the minimum set weather parameters to METWATCH.

3.9.4.4. Establish the minimum acceptable frequency and duration for checking weather parameters.

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

3.10. METWATCH and MISSIONWATCH Tools.

3.10.1. OWSs will use the following tools in the METWATCH/MISSIONWATCH process:

3.10.1.1. METSAT imagery (e.g., IR, VIS, Water Vapor, Microwave).

3.10.1.2. Real-time surface and upper air data (e.g., alphanumeric products, PIREPs, AIREPs, and SIGMETs).

3.10.1.3. Weather radar/lightning data.

3.10.1.4. Other data sources (e.g., tower cameras, on-line weather resources, MESONET data, and indigenous products).

3.11. Shift Change Briefings.

3.11.1. Shift change briefings will be conducted to pass meteorological and operational information from the out-going personnel to the in-coming personnel.

3.11.2. Work center leaders will develop procedures outlining these briefings and ensure all available weather personnel attend.

Chapter 4

COMBAT WEATHER TEAM OPERATIONS

4.1. General. Each CWT has unique characteristics and functions based on the mission, geographical location, and level of command of its primary or host customers. The comparative services and products produced by CWTs may be significantly different by location, but the specific core processes/requirements will be the same. This chapter defines those core processes and requirements each CWT will follow as they provide weather services/products to its customers.

4.2. Task Organization of the Combat Weather Team.

4.2.1. Staff Weather Element. The CWT Flight Commander (or Officer in Charge (OIC)) and Non Commissioned Officer In Charge (NCOIC) will perform both the operational and staff weather functions. In addition to leadership and management of unit activities, these unit members will function as a direct interface with the host or parent unit's commander and staff, and provide direct support to command, control, and planning functions. Weather technicians will be integrated into the staff weather element when possible.

4.2.2. Mission Weather Element. The Mission Weather Element will use the MEF process to tailor weather products and provide decision-quality environmental information for mission planning and execution for their host or parent unit. CWT personnel will fully understand their customers' mission and tactics, along with the OWS's capabilities, in order to better anticipate and exploit the weather.

4.2.3. Airfield Services Element. The Airfield Services Element is responsible for direct interface with supervisors of flying, the servicing OWS, and other operational users in the parent/host unit. Weather officers and weather technicians will infuse the elements of weather observing, meteorological watch, and force protection roles to function as the "eyes forward" for the OWS and, in many cases, will serve as the primary point of contact for the OWS-CWT collaborative forecast effort. The Airfield Services Element will use the procedures in AFMAN 15-111, *Surface Weather Observations*, along with procedures in this manual to perform the Airfield Services function at the installation airfield, deployed sites, and all other operating locations.

4.2.3.1. During normal duty hours, a function of the Airfield Services Element will be to take, record, and disseminate manual surface observations IAW AFMAN 15-111 or, if equipped, augment observations generated by the automated observing system (e.g., AN/FMQ-19 or other certified automated system) and backup the system sensors (as required) IAW augmentation and backup procedures in AFMAN 15-111.

4.2.3.2. During non-duty hours, the airfield services element will consist of observations generated by the automated system (if equipped) with no augmentation or backup performed.

4.2.3.3. Supervisors of Flying rely on the Airfield Services Element for tailored weather information to make operational decisions, especially when rapidly changing weather conditions are present. OWS standardized TAF-coded forecast products are designed to deliver forecast information based on common thresholds to command and control systems and provide detailed situational awareness for the CWT's MEF process. This product is useful in SOF activities but may require further tailoring by the CWT to enhance SOF decision-making. The SOF requires decision-quality information that is most often based on weather impacts resulting from aircraft-specific or pilot-specific weather limitations, status of airfield navigation aids, runway conditions,

and other perishable data sources not available to OWS technicians. The Airfield Services Element is best suited to provide this tailored information to the SOF.

4.2.4. Combined Element. In some cases, one person may be required to perform the functions of the staff weather element, the mission weather element, and airfield services element simultaneously.

4.2.4.1. Combined element procedures will ensure the airfield services "eyes forward" function and other responsibilities continue without significant degradation.

4.2.4.2. CWT leaders should arrange the work center to facilitate one person performing multiple tasks.

4.2.5. CWT leadership (officers and NCOICs) will be position-qualified to perform all functions of the CWT, including the combined element.

4.2.6. Newly assigned personnel will be given a thorough orientation before position qualification. The orientation will include the following:

4.2.6.1. Physically visiting all meteorological sensors on the airfield. Orientation will focus on known siting limitations and their effect on operations.

4.2.6.2. A tour of Air Traffic Control facilities (Tower and Radar Facility). Orientation will focus on cooperative nature of the weather watch and how local weather impacts flight operations.

4.2.6.3. Visiting operational customers and their weapon systems. Orientation will focus on the weather sensitivities of the various weapons systems and missions performed by the parent/host unit.

4.2.6.4. Visiting SOF duty sections. **Note:** This function is known by many different names, “SOF” is an umbrella term. The orientation will focus on the SOF processes and how timely and accurate weather information enhances flight safety.

4.2.6.5. Visiting local C2 Agencies (i.e. the command post, maintenance operations center, and other key operations). The orientation will focus on how local weather products and services fit into the base/post overall mission.

4.2.7. “Eyes Forward.” CWTs will relay significant, time-sensitive meteorological information to the technicians conducting forecasting and METWATCH operations at the OWS.

4.2.7.1. CWTs will retain an “eyes forward” role with the OWS providing force protection products under circumstances where the US National Weather Service or a host nation issues the aerodrome forecast.

4.2.7.2. Expeditionary/deployed CWTs will relay pertinent observations from tactical or fixed radars, upper air soundings, and any other meteorological information to the servicing OWS or another agency as tasked in the JMO LOI for the ongoing operation.

4.3. Mission Execution Forecast Process (MEFP).

4.3.1. MEFP Defined. The MEFP is an organized and systematic approach used to temporally and spatially refine forecast products to provide decision-quality environmental information for an operational decision-making process. The MEFP will specify techniques and tools used to forecast relevant individual weather elements critical to mission success, and how to best apply them to parent/host unit’s operational requirements.

4.3.1.1. The MEFP will be detailed in SOPs, checklists, flowcharts or other decision aids. **Table 4.1.** lists the specific steps in the MEFP.

4.3.1.2. The MEFP is a continuous cycle that adapts as parent/host unit needs change. CWTs will develop internal processes to ensure continuous improvement of the MEFP based on customer feedback.

4.3.2. The OWS is the primary source for theater weather products. CWTs will develop processes and procedures for establishing meteorological situational awareness and refining weather products for the parent/host unit.

Table 4.1. Specific Steps in the MEFP.

Phase 1 - Planning and Coordinating (Determined by CWT Leadership)
STEP 1 - Determine Mission (Primary and Secondary Mission) - the what, when, where, who, and how
1. Mission type (e.g., flying missions: air refueling, troop transport, low-level, drop zone, training; non-flying missions: resource protection, convoy, maintenance and sortie generation).
2. Mission objective (e.g., air strike, training, jump, and camp).
3. Mission execution times (e.g., aircraft take-off, drop time, airfield opens, AR time, convoy checkpoints).
4. Mission location (e.g., aircraft route, convoy route, designated DZ/AR).
5. Mission tactics (e.g., intelligence, weapons systems, and evasion).
6. Mission profile (e.g., electro-optics, helicopter, Night Vision Goggles (NVG), Nuclear, Biological, Chemical (NBC)).
7. Mission focus (i.e. operator definition of mission success).
8. Mission briefing/decision time.
9. Mission alternatives (e.g., primary, secondary, tertiary routes or targets).
10. Mission support (e.g., AF Communications, SATCOM).
STEP 2 - Define Weather Thresholds
1. Important mission-limiting terrestrial and space weather parameters for specific mission – "Know your customer's mission and understand their requirements."
2. Critical "Go/No Go" threshold values for weather parameters (i.e. based on mission, weapon system, aircraft, and pilots).
3. Know where these parameters are applied (i.e. airfields, ranges, DZs, ARs, low-fly routes, and communications).
4. Terrestrial and space weather elements that may be exploited to accomplish mission.
5. Incorporate training requirements.
STEP 3 - Define Products, Services, and Data Types
1. Products, data & services needed and available from OWS, AFWA, AFCCC, other units.
2. DoD, public, and indigenous sources.
3. Weather data available in area of operation.
4. Available climatology and sources.
5. Space weather data.
6. Tactical decision aids.
STEP 4 – Coordinate Operations
1. Coordinate times and criteria for delivery of environmental information.
2. Determine Lead Unit (multi-units ops) if required.
3. Issue Letter of Instruction, if required.
4. Request special terrestrial, climatic, and space weather products via SAR, if required.

Phase 2 - Preparing
STEP 5 – Obtain Weather Situational Awareness 1. Understand the "air and space weather regime." 2. Review strategic center products and OWS analysis and forecast products (e.g., hemispheric, synoptic, mesoscale patterns and key parameters, TAFs, METWATCH products). 3. Collaborate with the OWS (Meteorological Conference (METCONs) and discussion bulletins) and provide feedback. 4. Consider geography-related forecast challenges. 5. Exploit other DoD, public, and indigenous sources. **STEP 6 - Conduct Mission-Scale Analysis** 1. Focus on mission execution areas. 2. Apply real-time data (i.e. PIREPs, radar, satellite imagery, surface observations.) 3. Integrate geographic, terrain, and vegetation impacts on weather and mission. 4. Review space weather conditions and effects on the mission. **STEP 7 – Predict Mission Execution Weather Parameters** 1. Apply specific forecast techniques (e.g., icing, turbulence, contrails, and local rules of thumb/studies). 2. Integrate information gathered from Steps 1 through 6 to mission forecast. **STEP 8 - Tailor Forecast Parameters to Mission** 1. Focus on critical operational thresholds & mission parameters defined by customers. 2. Use Target Acquisition Weapons Software (TAWS), Integrated Weather Effects Decision Aids (IWEDA), and other tactical decision aids and specialized tools to determine terrestrial and space weather effects to mission. 3. Provide environmental information. Use format(s) defined by customers.
Phase 3 - Executing
STEP 9 - Disseminate MEF 1. Deliver, send, host on LAN/Web page, post, or otherwise make environmental information available to host/parent unit and any weather units involved. 2. Present information to decision-makers (e.g., mass briefing, flight weather briefing, crisis action briefing). 3. Make environmental information available to other potential users of the information. **STEP 10 - Conduct Mission Watch** 1. Continuously monitor mission routes, areas, installation, etc., for significant changes to forecasts. 2. Focus on parent/host unit defined mission-limiting weather thresholds for specific mission.

Phase 4 – Follow-up
STEP 11 – Update Forecast Products/Information 1. Notify users of weather parameters crossing mission-limiting thresholds. 2. Provide an alternative to exploit mission weather - objective is mission success. 3. Update information - loop back to continuous MEF process. 4. Coordinate with OWS, if required. **STEP 12 – Conduct Mission Verification** 1. Implement systematic procedures to analyze and measure accuracy/relevancy of environmental services provided to parent/host unit. 2. Debrief operator. Face-to-face feedback is preferred; employ other feedback methods whenever direct feedback cannot be obtained. 3. Disseminate output from weather debriefs or PIREPs to OWS and other weather team members. 4. Perform technical verification (evaluate forecast skills, under/over forecast, bias, etc.). 5. Conduct operations verification on established "Go/No Go" thresholds. 6. Develop and apply metrics to process improvement. Use feedback to develop rules of thumb, and lessons learned. 7. Accomplish, document, train with, and crossfeed forecast reviews.

4.3.3. Format of the environmental information output from the MEFP will be customer focused. CWTs will coordinate with their customers to determine the content and format to ensure it contains decision-grade information.

4.3.3.1. CWTs may use Red/Green/Yellow stoplight products to convey environmental information. These products are effective in the planning and allocation phases of an operational decision cycle and easily convey information to multiple users.

4.3.3.2. Software programs that present the forecast in a format highlighting direct impacts to the customer (i.e. IWEDA, Infrared Target Scene Simulation Software, and TAWS) may be used later in the operational decision cycle and should be directed to a specific mission.

4.3.3.3. Forecast products provided to operational users will address all phases of an operation. For example, transportation, maintenance, civil engineering, and logistics activities are affected by certain weather conditions. CWTs will apply parent/host unit weather sensitivities and requirements to tailor weather products to meet operational needs of all host/parent unit activities with an environmental impact.

4.3.3.4. CWTs will document parent/host unit weather sensitivities. CWT leadership will review and update sensitivities on a frequency not to exceed one year.

4.3.4. Developing the MEF process. CWTs will have a defined methodology to incorporate climatology, perishable weather data, strategic-level and operational-level forecast products, forecasting techniques, and a logical, verifiable process (the MEFP) to conduct weather operations. Data sources will be identified, forecast methods will be documented, and methods of obtaining weather situational awareness will be described.

4.3.4.1. AFWA TN-98/002, *Meteorological Techniques*, will be fully incorporated into the MEFP, and be used as a baseline for best practices for forecasting techniques.

4.3.4.2. CWTs will identify ROTs and local forecasting techniques to enhance accuracy and applicability to the parent/host unit needs. CWTs will locate established ROTs for deployed Area of Operations for which their parent/host units are tasked to deploy.

4.3.4.3. CWTs will use OWS-issued TAFs, Watches, Warnings (WW), and FWA in the MEFP, as well as for updating parent/host unit decision makers on environmental impacts to operations. Example: OWS issues a warning for 35 knot winds associated with thunderstorms valid from 1400-1800Z. The CWT conducts applicable portions of their MEF process based on the threat assessment provided by the warning and determines that the prime threat period to the installation (i.e. the onset of worst conditions) is from 1600-1730Z. Ensuring that the valid time of the warning and criteria aren't deviated from, the CWT passes the specific threat information to commanders and the Maintenance Operations Center to assist in sortie generation and force protection decisions.

4.3.4.4. CWTs will coordinate potential changes to weather products with their servicing OWS when significant disagreements exist over an OWS-issued Watch/WW/FWA, or the need for these products if not issued.

4.3.4.5. CWTs will coordinate potential amendments to TAF-coded forecasts with the servicing OWS to resolve disagreements involving weather conditions impacting flight safety.

4.3.4.6. CWTs will maintain consistency with Joint Meteorological and Oceanographic Forecast Unit (JMFU) and JMO operational guidance during joint/combined operations.

4.3.5. PIREPs, Air Reports (AIREPs), and SIGMETs. CWTs will actively monitor and apply PIREPs, AIREPs, and SIGMETs to MEF processes.

4.3.5.1. CWT leadership will coordinate with Air Traffic Control agencies and develop local procedures to ensure weather operators receive PIREPs relayed to Air Traffic Control. Local operating procedures should include timeliness requirements (e.g., Air Traffic Control/Supervisors of Flying will relay pilot report information to weather not later than 5 minutes after receipt).

4.3.6. Product Tailoring. CWTs will obtain, examine, and if necessary, modify meteorological parameters (e.g., products and parameters produced by OWSs, AFWA, etc.) to meet the parent/host unit operational requirements. Example: The TAF for the local airfield specifies a 500ft ceiling gradually forming from 11-13Z (BECMG 1113), based on climatology and perishable data, the airfield services element technician determines the ceiling will likely form at 700ft starting off as a FEW or SCT deck at 1000Z becoming a 700ft ceiling by the end of the period specified in the BECMG group. Providing this information to the supervisor of flying may permit flight operations in the 1100-1300Z window specified in the aerodrome forecast and provide decision-quality information enabling the supervisors of flying to make launch or recovery decisions.

4.3.7. MEF Delivery. CWT leadership will coordinate/tailor the delivery method and timing of the MEF with their customers to fit mission requirements. Examples of MEF delivery include in-person delivery, e-mail, FTP, post to a web site (local or OWS-provided site), access to Integrated Meteorological System (IMETS) visualization or web site products via the Army Battle Command System, fax to the customer, etc. CWTs will tailor information delivery to critical decision points within the

customers' operational cycle (e.g., mission planning) where a weather forecast would provide the maximum benefit to the successful outcome of the mission.

4.3.8. Post-Mission Analysis and Verification. CWTs will establish procedures to evaluate their information and obtain customer feedback based on customer-defined thresholds, critical points of mission failure, and elements of quality assurance (e.g., timeliness, effectiveness, accuracy). CWTs will ensure information is forwarded to MAJCOMs as appropriate.

4.3.8.1. Metrics. CWTs will establish procedures to compile metrics information from the evaluation of weather products provided to their customers. Procedures will follow guidance in AFI 15-114, *Functional Resource And Weather Technical Performance Evaluation,* and include the following:

4.3.8.1.1. Methods to advise customers on the status of weather products/services provided.

4.3.8.1.2. Methods to identify limitations to parent/host unit operations that could be mitigated based on application of environmental information.

4.3.8.1.3. Methods to identify opportunities for improvement.

4.4. MISSIONWATCH.

4.4.1. CWTs will develop procedures to MISSIONWATCH the parent/host unit mission-limiting parameters. CWTs will:

4.4.1.1. Develop procedures for determine critical thresholds requiring intensified MISSIONWATCH and updating parent/host unit on changes to environmental conditions critical to the mission.

4.4.1.2. Maintain a MISSIONWATCH tailored to the mission(s) of the day.

4.4.1.3. Employ sound Operational Risk Management techniques, outlined in **Paragraph 1.15.**, to assign risk, allocate resources and direct activities to conduct MISSIONWATCH for parent/host unit missions.

4.4.1.4. Conduct a MISSIONWATCH for critical portions of every mission placed at risk due to environmental conditions.

4.4.1.5. Inform the servicing OWS when weather products issued by the OWS do not accurately reflect observed conditions and impact flight safety.

4.4.1.6. CWTs will structure MISSIONWATCH processes to match basic steps outlined in **Table 4.2.**

Table 4.2. Basic Steps for MISSIONWATCH.

Conduct MISSIONWATCH
Continuously monitor mission routes, areas, installation, etc., for significant changes to weather products.
Focus on mission-limiting weather thresholds for specific mission as defined by supported units.
Army CWTs with IMETS and Army Battle Command Systems monitor the Order of Battle and other battlescale features using the Common Tactical Picture.
Notify customers of weather parameters crossing mission-limiting thresholds.
Provide alternatives to exploit mission weather—Objective is mission success.
Update environmental information —Loop back to continuous MEF process.
Coordinate with OWS, if required.

4.5. Weather Products for Force Protection.

4.5.1. Weather Watches and Warnings. CWTs are responsible for coordinating parent/host units' weather watch (WATCH) and Warning (WW) criteria to include the DLTs and notification methods with the servicing OWS. **Chapter 3** contains the standard criteria and DLTs for Weather Watches/ Warnings.

4.5.1.1. CWTs will limit additional WW criteria to intense weather phenomena that threaten life or property, or cause the host/parent unit to take protective action. Any additional criteria must fall within the OWS's forecasting capabilities as outlined in the MOA.

4.5.1.2. Deviations from standard criteria listed in **Chapter 3** (e.g., adding, excluding, and changing criteria) will be documented in the OWS-CWT MOA.

4.5.1.3. Observed Lightning WWs. Lightning WWs are issued when lightning is observed or detected within 5 nautical miles of the airfield IAW AFOSH Standard 90-100. Lightning Warnings are issued only for installations or deployed locations that take protective actions upon receipt of the WW.

4.5.1.3.1. CWTs will issue and cancel observed lightning WWs during duty hours. When issuing or canceling an observed lightning WW, the CWT will provide timely notification to supported units IAW AFOSH Standards 91-66 & 91-100 and its servicing OWS IAW OWS-CWT MOA.

4.5.1.3.2. CWTs issue observed lightning WWs separately from, and at times, concurrent with an OWS-issued warning for any other criteria. The observed lightning WW is the only warning that may be issued separately from warnings for other criteria.

4.5.1.3.3. CWTs will include a statement in the WW cancellation message indicating the effect on any previously issued warnings, such as "WEATHER WARNING for Thunderstorms with 1-inch hail and 50-knot winds remains in effect."

4.5.1.3.4. During non-duty hours, the servicing OWS may issue and cancel observed lightning warnings IAW the OWS-CWT MOA.

4.5.1.3.5. CWTs attached to Army units or CWTs providing lightning warnings to off-base customers, will document the supported agencies requirements in local operations plans and annexes or the OWS-CWT MOA as appropriate.

4.5.1.4. CWTs may issue WWs for forecast phenomena when imminent weather conditions pose a hazard to life and property, and notification to the servicing OWS is not possible.

4.5.1.4.1. CWT issuing a WW will be responsible for local dissemination of the warning.

4.5.1.4.2. CWT issuing a WW will contact the supporting OWS as soon as possible after local dissemination to ensure warning information is entered into the OWS warning tracking and verification system and that expanded METWATCH is assumed. When deployed, CWTs will rely on customer-furnished communications to relay WW information back to the OWS.

4.5.2. Weather Advisories. Weather advisories are special notices provided an operational user to notify them of environmental conditions impacting operations. CWTs determine parent/host unit requirements and develop MEF products to meet these needs.

4.5.2.1. CWTs will:

4.5.2.1.1. Coordinate with their servicing OWS and document the requirement in the OWS-CWT MOA for a Forecast Weather Advisory (FWA) product to fill needs that cannot routinely be met by the CWT.

4.5.2.1.2. Coordinate the desired lead-time based upon the supported unit's requirement and the OWS's capability to provide such advance notice. A desired lead-time is not required for an FWA resulting from a WW downgrade. These requirements will be documented in the OWS-CWT MOA.

4.5.2.1.3. Issue all Observed Weather Advisories (OWAs) while on duty.

4.5.2.1.3.1. During non-duty hours, the servicing OWS may issue and cancel OWAs IAW the OWS-CWT MOA.

4.5.3. SWAP. CWTs will develop SWAP to ensure sufficient personnel are available during potential/actual severe weather events or during meteorological/operational events critical to mission success. CWT leadership will determine which environmental conditions require SWAP. For garrison operations, SWAP may be linked to watch/warning products (reference AFI 10-229, *Responding To Severe Weather Events*, for additional guidance). At expeditionary locations, SWAP is integral to force protection; exact processes and procedures may be limited at austere locations or during combat/maneuver phases of military operations. See also AFMAN 15-111, *Surface Weather Observations*, for guidance on augmentation/backup of automated weather observing systems during SWAP.

4.5.3.1. The CWT's SWAP will define the events, personnel requirements, and operating procedures (e.g., "eyes forward" and customer interaction) required to meet the threat of severe/mission-limiting weather. The CWT's customers determine the operational impact and desired courses of action for the severe criteria (reference AFI 10-229).

4.5.3.2. CWTs will ensure personnel maintain proficiency in appropriate weather techniques (i.e. radar storm interrogation, identification of severe weather patterns, severe weather observing skills) important to the operator's mission and can respond to hazardous or severe weather. Training should focus on the type of weather expected in the upcoming season (e.g., during the summer,

training may focus on gusty winds; during autumn, training should focus on winter storms; by late winter, training should focus on severe thunderstorms).

4.5.4. Severe Weather Reporting. CWTs will develop procedures with their servicing OWS to provide appropriate information to the installation agency (usually the command post) that prepares Operational Report 3 (OPREP-3) reports for the installation commander IAW AFI 10-229. Severe weather events are reported to the command agency of the supported location IAW OPREP-3 reporting procedures in AFMAN 10-206, *Operational Reporting*. CWTs will ensure the OWS and parent MAJCOM Directorate of Operations, Weather Division (or equivalent) are aware of the OPREP-3 report.

4.5.4.1. CWTs will also provide the supporting OWS severe weather reports not normally available through standard observations. These include reports from CONUS/OCONUS indigenous sources, local law enforcement, local news media, and unit personnel. These reports will be passed immediately after fulfilling any local distribution requirement (e.g., a special or local weather observation). If this is not possible, pass the reports as soon as practical to assist the servicing OWS in post-analysis and verification.

4.5.5. Tropical Cyclone Procedures.

4.5.5.1. CWTs will follow MAJCOM guidance if available.

4.5.5.1.1. The National Hurricane Operations Plan clarifies terms and establishes policies, procedures, and responsibilities in the Atlantic and the Eastern and Central Pacific westward to 180 degrees west.

4.5.5.1.2. Pacific Air Forces Instruction (PACAFI) 15-102, *Tropical Cyclone Reconnaissance,* provides information for the Pacific Ocean west of 180 degrees West and the Indian Ocean.

4.5.5.2. CWTs will use the tropical cyclone forecasts issued by the designated tropical cyclone centers (e.g., National Hurricane Center or Joint Typhoon Warning Center). No deviation from the official forecast position, track, movement, maximum wind speed, or intensity trend is authorized. The OWS will perform the METWATCH and serve as the primary liaison between the Tropical Forecast Centers and the CWTs.

4.5.5.2.1. CWTs will use the MEFP to tailor the official tropical cyclone forecasts into a specific mission forecast product for their supported customers. Tailoring may include factors such as specific local effects such as terrain or relative position to the storm.

4.5.5.3. CWTs will ensure their customers are notified of all updates to the tropical cyclone forecasts. In addition, CWTs will ensure their customers understand that 48-hour and 72-hour outlooks (or longer if issued) contain a high degree of uncertainty, are for planning purposes only, and are subject to change. This notification must include the forecast error probability statements included in discussion bulletins or on the forecast products.

4.5.5.3.1. CWTs will provide the necessary forecast services/products required for installation commanders to determine or declare a Tropical Cyclone Condition of Readiness (TCCOR) and Hurricane Condition (HURCON) as outlined in local Operation Plans. CWTs will also provide the necessary forecast services/products required for installation commanders to make mission execution decisions such as evacuation and force protection.

4.5.5.3.2. CWT staffs will follow local policies and procedures regarding the release of tropical cyclone forecasts to the general public.

4.6. Specialized Weather Products and Services.

4.6.1. Web-based Aircrew Briefing Terminals. CWTs will provide or arrange for an Aircrew Briefing terminal in a designated area to allow aircrews to self-brief or schedule a flight weather briefing from the supporting OWS. The location of this area should be convenient for transient aircrews to access (e.g., base operations, flight planning area). At a minimum, the briefing area will include the following items:

4.6.1.1. Computer (with access to the OWS web page) and printer.

4.6.1.2. Class A (DSN/Commercial capable) telephone and fax machine.

4.6.1.3. Required briefing forms (e.g., DD Form 175-1).

4.6.1.4. Pertinent information (i.e. web site instructions and OWS Briefing Cell phone numbers/ instructions, AFVA 15-136 and 15-137) to assist the transient aircrews in completing their briefings.

4.6.2. "Provide or Arrange For" concept of operations. CWTs are the primary source of tailored weather information for their parent/host unit. When mission activities occur away from the main operating location, CWTs will assume responsibility to determine the most effective means of ensuring their units receive mission execution weather information.

4.6.2.1. The primary course of action for CWTs will be:

4.6.2.1.1. Provide execution forecasts for their unit assets transiting another location by reachback to the main operating location.

4.6.2.1.2. Provide execution forecast products for their unit staging from another location by:

4.6.2.1.2.1. Deploying with the unit.

4.6.2.1.2.2. Arranging for unit to reachback to the main operating location.

4.6.2.2. CWTs that cannot directly provide mission execution forecast products for parent/host unit missions transiting or staging from another location, must arrange briefing support by any of the following means:

4.6.2.2.1. Requesting assistance from the OWS servicing the transient or staged operating location by entering mission data into the servicing OWS' PGS/S. Include contact information and briefing number assigned by the PGS/S to the aircrew by logging it on the execution forecast forms.

4.6.2.2.2. Requesting assistance from the CWT at the transient or staged location.

4.6.2.2.3. If follow-on mission data is not known at execution from home station, provide the appropriate OWS web site or telephone information to the departing aircrew (e.g., Off-station cross country training missions staging from another airfield: CWT technicians provide flight briefing cell contact numbers for the OWS servicing the staged airfield).

4.6.2.2.4. Transient Aircrews. Sister service activities, mission changes to Air Force and Army flight activities, and other circumstances may result in aircrews transiting or staging through an airfield without receiving weather information from their CWT. CWTs will employ the "provide or arrange for" concept when faced with walk-in requests from transient aircrews. When transient or staged aircrews request briefing support, CWTs will:

4.6.2.2.4.1. Provide a briefing or update an existing briefing form as time and resources allow. EXCEPTION: Pass all strategic mobility missions handled by an IFM to 15 OWS/WXM.

4.6.2.2.4.2. If unable to provide a briefing or update an existing briefing:

4.6.2.2.4.2.1. Direct the aircrew to the web-based aircrew briefing terminal (see paragraph **4.6.1.**).

4.6.2.2.4.2.2. Provide telephone contact information for the servicing OWS.

4.6.3. Army Visual Flight Rule Operations. CWTs will have personnel on duty when ATC is open and/or when their host unit is performing their primary operation, duty, or mission. CWTs will use the "provide or arrange for" concept to ensure the host unit receives weather information for Visual Flight Rules (VFR) operations outside of ATC published hours.

4.6.3.1. CWTs are not required to be on duty when ATC is closed unless the SWAP has been implemented and it is necessary to provide the eyes forward function. The servicing OWS will provide flight weather briefing support to single and 2-ship VFR flights conducted outside normal squadron/battalion operations when ATC is closed and CWT personnel are unavailable.

4.6.3.2. CWTs will enter mission information into the servicing OWS' PGS/S when the host unit provides advance notification of intent to conduct VFR operations and the CWT is unable to provide execution forecast products.

4.6.3.3. CWTs will coordinate requests for briefing support with the servicing OWS on larger flying operations when the CWT cannot provide execution products to the host unit due to manning levels or Temporary Duty commitments.

4.6.4. Aero Club Activities. CWTs and OWSs will provide flight weather briefings to Aero Club members performing official Air Force operational duties. Examples are Civil Air Patrol and Initial Flying Training Programs. CWTs will provide or arrange briefings when such Aero Club flights are in a transient status through the appropriate OWS or Flight Service Station. Aero Club members performing official flight duties should be advised of PGS/S remote and self-briefing capabilities.

4.6.4.1. CWTs will not remain open on weekends or times outside normal ATC published operating hours to provide briefings for Aero Club flying activities.

4.6.5. Tactical Decision Aids (TDAs). TDAs, such as TAWS, use physics-based weather impacts to provide guidance in a manner that makes it as easy as possible to use. Decision-makers may require this weather intelligence for both friendly and threat platforms.

4.6.5.1. CWTs will use Air Force and Army developed, certified, and approved TDAs to provide the parent/host unit with service standard user-friendly analyses and forecasts to properly plan and effectively execute tactical operations:

4.6.5.1.1. TAWS. TAWS predicts the maximum detection or lock-on range of air-to-ground electro-optical weapon and navigation systems. For the weather input, TAWS may use real-time or model weather data downloaded directly from AFWA or the Navy Tactical Environmental Data Server (TEDS). Weather personnel will use situational awareness products provided by the OWS or strategic center to initialize and adjust modeled parameters used in the TDA to improve the accuracy of the TDA output. In addition to its use by AF weather personnel, pilots in mission planning incorporate TAWS into the Pilot Flight Planning System.

CWT personnel should advise operators of the potential for error when using raw model output in TDAs.

4.6.5.1.1.1. TAWS software is also designed to support forces performing operations using NVGs by predicting the impact of weather on NVG detection range. It provides NVG performance predictions for a specified mission (e.g., helicopter refueling, target acquisition/detection, search and rescue) and forecast local conditions. These performance predictions can be used by mission planners to make "go/no go" decisions, to modify mission execution tactics, or to evaluate the general suitability of environmental conditions for NVGs. Operators use the performance predictions to prepare for expected conditions during a mission.

4.6.5.1.2. IWEDA. IWEDA is a rules-based TDA application on the Army IMETS. IWEDA supports both Army and Air Force systems, improves interoperability, and minimizes the amount of training necessary for weather technicians. IWEDA uses artificial intelligence techniques and knowledge of atmospheric effects with model data to enhance and expand current weather decision capabilities. It allows commanders to compare weather-based advantages/disadvantages of friendly and enemy systems.

4.6.5.1.2.1. IWEDA rules may be tailored to allow for local differences in tactics based on threat systems. Whenever the local CWT changes the thresholds, they should notify the OWS to preclude confusion.

4.6.5.1.3. (Tactical Army) Heat Stress TDA. This IMETS application creates gridded forecast values pertaining to heat stress based on clothing type (e.g., BDUs, Mission-Oriented Protection Posture 1-4 levels) and work rate (resting to heavy). Output graphics include water consumption (canteens consumed per hour), heat injury percent (percentage of troops temporarily disabled), wet bulb globe temperature, work/rest cycle, and maximum work time displayed on the Common Tactical Picture.

4.6.6. Chemical Downwind Messages (CDMs). Upon request from Disaster Preparedness or any other airfield agency, CWTs will provide weather inputs for constructing CDMs. Tactical Army CWTs derive the CDM from the IMETS Chemical Downwind Report (CDR) application. The CDM is used much like a toxic corridor forecast except that it is a forecast of winds, stability, temperature, humidity, cloud cover, and weather. Additional guidance for preparing CDMs is contained in Army Field Manual 3-3, *Chemical And Biological Contamination Avoidance*. CWTs can link to this Field Manual from the AFWA Field Support Division (AFWA/XOP) web page. See **Attachment 4** for the CDM format.

4.7. Instrument Refresher Course (IRC). CWTs will participate in area indoctrination and IRC briefings upon request. The parent/host unit dictates the frequency and seasonal content of the briefings. Weather information presented at IRCs includes items such as lightning avoidance, microburst and windshear, monthly/seasonal climatology, seasonal severe weather events, etc. Additionally, IRCs provide an excellent forum to educate the customer on latest space weather forecast products and how space weather may potentially impact their operations. CWTs should work with the installation IRC Point of Contact to finalize the weather agenda for IRC briefings. FYI 42, *Instrument Refresher Course*, provides a guide to IRC procedures and can be located on the AFWA Training Division (AFWA/DNT) web site. See AFMAN 11-210, *Instrument Refresher Course (IRC) Program,* for information on the Air Force IRC program.

4.8. Flight Information Publications (FLIPs). CWTs will provide information to the Airfield Manager or appropriate base/post agency for FLIP entries. Data includes, but is not limited to, operating hours, PMSV frequency, supporting OWS contact information, and pertinent observing information such as use of automated equipment and limitations hindering unobstructed visibility observations. CWTs will validate the accuracy of the information each time the FLIP is published and take immediate steps to correct erroneous data.

4.9. Space Weather. CWTs have a two-fold responsibility: (1) to identify those units and operations, within its purview, that may be affected by space weather events and should receive space weather support; and (2) to interpret, apply, and tailor the AFWA space products to provide mission-enhancing data to their customers. The six general categories of missions/systems affected by space weather and the applicable AFWA products are listed in **Table 4.3.**

4.9.1. In their first role, the CWT collects space weather product requirements from their supported customers and coordinates with AFWA to satisfy those requirements. CWTs must consider all units or operations within its purview as a potential customer of space weather products. CWTs must understand the impacts of space weather on their customers and incorporate those impacts into the MEFP. The CWT must coordinate requirements with their customers and revalidate them annually as part of the continuous improvement process of the MEFP. AFWA/DNT maintains on-line training material to assist personnel in understanding the types of military systems that are affected by space weather.

4.9.2. In their second role of interpreting, applying, and tailoring existing products for their particular customers, CWTs interpret space weather products and then extract the relevant data and information and apply it for their customers' operations.

4.9.3. CWTs will submit any known space weather impacts to AFWA via the Space Weather Impact Debriefing and Assessment Form located on JAAWIN. Subject matter experts at AFWA will provide direct assistance with space weather questions and observed impacts to customers via this process.

4.9.4. CWTs will be knowledgeable of the AFWA space weather products built around the following six categories of missions/systems adversely affected by space weather: (1) communications (both high frequency over-the-horizon communications and satellite communications), (2) navigation using the Global Positioning System (GPS), (3) satellite operations (command/control and launching of satellites), (4) space tracking (performed by ground-based radars), (5) high-altitude human flight (aircrews transiting polar regions), and (6) intelligence collection.

4.9.5. CWTs must be aware of these space weather products and determine their utility to other customers. Likewise, CWTs may submit requests for new products through the SAR to best satisfy their customer requirements.

Table 4.3. Space Weather Analyses, Forecast, Alerts, and Warnings.

Mission Area	*AFWA Product*	*Description*
HF Communications and other applications using over-the-horizon HF radio waves	Regional 6-hr ionospheric analyses; issued four times daily on JAAWIN/ JAAWIN-S/JAAWIN-SCI	Identifies locations where space weather conditions have caused degradation in HF communications and other HF applications.
	Regional ionospheric forecasts; issued four times daily on JAAWIN/ JAAWIN-S/JAAWIN-SCI	Identifies locations where space weather conditions are expected to degrade HF communications and other HF applications.
	Point-to-point forecasts of useable HF frequencies; issued on JAAWIN/ JAAWIN-S upon request of customer/user	Identifies maximum minimum, and optimal HF frequencies for customer-specific transmitter and receiver locations based on expected ionospheric conditions.
	Point-to-regional HF illumination maps; issued every hour on JAAWIN-S for customer reequested locations	Identifies areas where user-defined HF signals from a user-defined point location are most likely to have greatest strength.
	Short Wave Fade Advisory; issued via AWN, fax, phone, pager, and e-mail when a space weather disturbance suddenly degrades HF conditions	Identifies the HF frequency ranges and locations that are effected by an observed sudden disturbance and then forecasts the duration and magnitude of that degradation.
	Polar Cap Absorption Advisory; issued via AWN, fax, phone, pager, and e-mail when HF conditions have been severely degraded above/below 55 degrees north or south due to a space weather disturbance	Identifies that conditions exist which may prevent use of all HF communications in the polar zones.
Ultra High-Frequency Satellite Communications (UHF SATCOM)		

Mission Area	*AFWA Product*	*Description*
	Regional 6-hr ionospheric forecasts; issued four times daily on JAAWIN/ JAAWIN-S/JAAWIN-SCI	Identifies locations where space weather conditions are expected to degrade UHF SATCOM. Valid for UHF SATCOM frequencies 245 MHz-410 MHz.
	Regional nowcasts of ionospheric conditions; issued for selected global regions every 30 minutes on JAAWIN-S	Identifies locations where space weather conditions are currently degrading UHF SATCOM signals.
UHF SATCOM and Super High-Frequency (SHF) SATCOM	Solar radio wave burst warning; issued via the AWN, fax, telephone, pager, and e-mail when the Sun emits a severe burst of radio wave energy	Identifies UHF and/or SHF SATCOM frequency ranges affected by an observed burst of radio wave energy capable of causing interference; includes burst strengths and frequencies.
GPS Navigation	Regional nowcasts of single-frequency GPS accuracy; issued every hour on JAAWIN and JAAWIN-S	Identifies estimates of current single-frequency GPS accuracy based on calculations that take into account satellite availability and geometry as well as ionospheric-induced errors.
Satellite Operations	Hourly magnetometer analyses--Ap Index; issued every hour via the AWN and JAAWIN/JAAWIN-S/ JAAWIN-SCI	Quantifies the level of disturbance in the electrical current network of the ionosphere and magnetosphere. Possible effects are satellite drag on low earth orbit satellites, SATCOM scintillation, HF radio communication interference, or launch trajectory errors.
	Geomagnetic storm advisory/warning; issued via the AWN, fax, telephone, pager, and e-mail when the hourly Ap and/or 24-hourly Ap index reaches or is expected to reach significant levels	Identifies the expectation or the observation that the electrical current network of the ionosphere and magnetosphere has reached significantly disturbed levels. Includes forecast of storm strength and duration. Possible effects are satellite drag on low earth orbit satellites, SATCOM scintillation, HF radio communication interference, or launch trajectory errors.

Mission Area	*AFWA Product*	*Description*
	Energetic Proton Flux Advisory; issued via the AWN, fax, telephone, pager, and e-mail when high-energy proton fluxes at geostationary orbit are expected to reach significant levels	Identifies the expectation for satellites to be bombarded with high-energy protons; includes a forecast of proton flux strength and duration; identifies potential for anomalous behavior in satellites due to proton bombardment.
	Energetic Proton Flux Warning; issued via the AWN, fax, telephone, pager, and e-mail when high-energy proton fluxes at geostationary orbit have reached significant levels	Identifies observed conditions that may lead to anomalous behavior of satellites caused by the bombardment of high-energy protons; includes current and forecasted proton flux strength and forecasted duration.
	Internal Electrical Charging Advisory; issued via the AWN, fax, telephone, pager, and e-mail when high-energy electron fluxes at geostationary orbit reach significant levels	Identifies observed conditions that may lead to anomalous behavior of satellites caused by internal charging/discharging due to a satellite being bombarded by high-energy electrons.
Space Tracking	Solar radio wave burst warning; issued via the AWN, fax, telephone, and e-mail when the Sun emits a severe burst of radio wave energy	Identifies observed conditions that may lead to interference affecting ground-based space tracking radars using UHF-SHF frequencies; includes specific frequencies and strengths of radio energy burst.
	Auroral radar clutter analyses; issued hourly via JAAWIN-S/JAAWIN-SCI	Identifies locations and strengths of potential interference to ground-based space radars caused by electron precipitation (auroral electrons).
	Hourly magnetometer analyses--Ap Index; issued every hour via the AWN and JAAWIN/JAAWIN-S/ JAAWIN-SCI	Quantifies the level of disturbance in the electrical current network of the ionosphere and magnetosphere; identifies potential for increased drag to cause objects in space to change orbital profile.

Mission Area	*AFWA Product*	*Description*
	Advisory/Warning of Geomagnetic Storming; issued via the AWN, fax, telephone, e-mail when the hourly Ap and/or 24-hourly Ap index reaches or is expected to reach significant levels	Identifies the expectation or the observation that the electrical current network of the ionosphere and magnetosphere has reached significantly disturbed levels; identifies potential for increased drag to cause objects in space to change orbital profile; includes forecasts of strength and duration.
High Altitude Flight (Flights transiting polar regions)	Radiation Dosage Analyses; issued four times daily via JAAWIN based on cosmic radiation measurements	Quantifies the global level of radiation dosage at high altitudes based on background cosmic radiation.
	Energetic Proton Flux Advisory; issued via the AWN, fax, telephone, pager, and e-mail when high-energy proton fluxes at geostationary orbit are expected to reach significant levels	Identifies the expectation for radiation dosages due to high-energy protons at high altitudes to exceed significant levels; includes a forecast of proton flux strength and duration.
	Energetic Proton Flux Warning; (issued via the AWN, fax, telephone, pager, and e-mail when high-energy proton fluxes at geostationary orbit have reached significant levels	Identifies observed high-altitude radiation dosage conditions that have exceeded significant levels; includes current and forecasted proton flux strength and forecasted duration.
Intelligence Collection	Various classified products as well as unclassified products shown above	The ability to collect intelligence information can be affected by space weather conditions. For example, the ability to intercept HF signals is affected by space weather. Furthermore, the ability to use ground-based and/or space-based intelligence collection assets to gather data may be prevented or inhibited, or it may be facilitated, depending on space weather conditions. Likewise, the ability of an adversary to conduct operations may be impacted due to space weather.

4.10. Expeditionary Operations.

4.10.1. Predeployment Activities. Prior to deployment, CWTs will:

4.10.1.1. Tailor environmental information for the decision-making processes in the deployed location; using deployed mission and the operational requirements, rules of engagement, and theater specific environmental impacts of the host/parent unit.

4.10.1.2. Participate in pre-deployment planning to ensure theater-specific environmental impacts are properly factored into parent/host unit deployment activities.

4.10.1.3. Develop duty priorities for the deployed location. Duty priorities should be coordinated with the parent/host unit. Duty priorities in **Table 4.4.** are provided as an example.

Table 4.4. Recommended Duty Priorities for Deployed/Expeditionary CWTs.

Wartime defense of the duty site/location, including NBC defense measures.
Wartime support of the Division and/or Brigade Commander/principle staff elements.
Aircraft/ground emergencies.
Pilot to Metro Service (PMSV) calls from airborne crews.
Prepare and disseminate Weather Watches/Warnings/Advisories.
Augment TMQ-53/Take and record manual surface weather observations.
Maintain/restore primary communications.
Prepare/issue MEF products.
Other briefings and staff functions.
NOTE: Based on the judgment of the OIC, NCOIC, or the CWT technician on duty, these priorities may be changed, especially if there is danger to life or property.

4.10.2. Deployed equipment.

4.10.2.1. CWTs will deploy with tasked equipment and weapons. Submit requests for additional equipment through parent/host unit channels for inclusion in the logistics and mobilization flow of the parent/host unit.

4.10.2.2. Inventory all equipment before deployment and upon arrival.

4.10.3. Unit leadership should contact the servicing OWS and prearrange (as much as possible) support requirements not addressed in the JMO Letter of Instruction.

4.10.3.1. Air Force/Army CWT members deploying to a contingency theater will review, at a minimum, Joint Publication 3-59, contingency theater METOC regulations (e.g., CENTCOM Regulation 115-2), combatant command's METOC LOI, AFFOR LOIs, and applicable METOC, OWS, JMFU, and SIPERNET web sites. Air Force CWT members deploying to a contingency theater in support of conventional Air Force units will review AFI 13-1AOC, Vol 3 *Operational Procedures--Aerospace Operations Center* section 9.5 Weather Support Teams.

4.10.4. Air Force CWT members deploying to a contingency theater will ensure the AFFOR SWO is included in the distribution of SITREPs, which include weather operational issues.

Chapter 5

TRAINING

5.1. General. Certain elements of weather specialty training must be standardized to ensure common capabilities in weather operations forces worldwide. Commanders of weather forces are responsible for ensuring standardized Air Force training practices and programs in AFI 36-2201, *Developing, Managing, and Conducting Training* and AFMAN 36-2234, *Instructional System Development* are correctly applied to meet qualification standards as stated in AFMAN 36-2105, *Officer Classification,* AFMAN 36-2108, *Enlisted Classification,* and the Officer and Enlisted CFETP.

5.1.1. Units will conduct and document training in accordance with the following directives:

5.1.1.1. AFI 36-2201 Volumes 1-6, *Air Force Training Program*.

5.1.1.2. AFMAN 36-2234, *Instructional System Development*.

5.1.1.3. AF Handbook 36-2235V11, *Information For Designers Of Instructional Systems Application To Unit Training.*

5.1.1.4. 1W0X1/A CFETP and 15WQ CFETP.

5.1.1.5. AFMAN 10-100, *Airman's Manual*.

5.1.1.6. Air Force and Command JQSs as applicable.

5.2. Training at Initial Units of Assignment. Graduates of weather Initial Skills Courses will be assigned to 3-level authorizations and upgraded to the 5-skill level as described in the CFETP.

5.3. Operational Weather Squadron Responsibilities : The OWS commander is responsible for ensuring that training programs comply with AF directives and meet the objectives listed below. OWSs will:

5.3.1. Ensure resources and personnel are dedicated to training and training management functions. A Training and Technical Services Flight (WXT) will normally accomplish this within the organization.

5.3.2. Conduct both qualification and upgrade training IAW AF 36-series directives using material developed by the weather functional community (i.e. HQ AFWA/DNT, Q-flight, etc.) specifically for the upgrade and qualification of weather officers and enlisted personnel.

5.3.3. Identify all knowledge and task items associated with each duty position in the unit and establish position qualification standards for each item. Use qualification standards specified in AFI 36-2201 Vol 2, AFMAN 36-2105, AFMAN 36-2108 and the Officer and Enlisted CFETPs as baseline standards.

5.3.4. Develop a Master Training Plan containing a Master Task List, Master Training Outline (see **Attachment 9**), and Lesson Plans IAW AFMAN 36-2234 and AFH 36-2235 Vol II, *Information for Designers of Instructional Systems*.

5.3.5. Ensure all personnel successfully complete positional checkrides (receive a "go" rating) before awarding position qualification. Annual "recertification" is optional; however, personnel identified for AEF deployments will successfully complete a checkride on all 5-level core tasks during the spin-up (training) phase of their respective AEF cycle.

5.3.6. Structure Apprentice/Journeyman upgrade training program to ensure trainees complete upgrade training by week 64 by following the recommended timelines in **Table 5.1.**

Table 5.1. Weather Journeymen Training Objectives.

OWS Training Timeline	
DAS – Week 4	First Term Airmen Center and Base Introduction
Week 5 –8	Initial Trainee Assessment, AOR Orientation, Order CDCs
Week 6-8	Begin Equipment Orientation and Lab/Classroom Training (Analysis, METWATCH, and Forecasting)
Week 16	Latest date to Begin Over-the-Shoulder On-the-Job Training (OJT) and Task Certification
Week 52	Begin OJT on Operational Briefings
Week 70	Upgrade to/Complete 5-skill Level

5.3.7. Establish qualification training programs for personnel who periodically rotate through the unit (e.g., Individual Mobilization Augmentee, Air Force Reserve (AFR), etc.). These personnel will successfully complete a positional checkride before working independently.

5.3.8. Maintain a Continuation Training (CT) program. The CT program will focus on enhancing the technical capabilities, techniques, and tools predominantly employed by all personnel regardless of skill level. Meteorological CT will encompass both knowledge and task items, focus on forecasting challenges, and will be seasonal/regime-based.

5.3.9. Make CT material readily available to other weather units through direct delivery, posting to a web page, or any other commonly accessible means.

5.4. Strategic Centers and CWT Responsibilities. Commanders in strategic centers and CWTs are responsible for ensuring training programs provide qualification training for all personnel, and that 7-level upgrade training for enlisted personnel complies with Air Force training directives and meets the objectives listed below. In rare cases, personnel may transfer to CWTs or Strategic Centers before completing 5-level upgrade training. Gaining units will complete the training and upgrade process. Units will:

5.4.1. Conduct both qualification and upgrade training IAW AF 36-series directives using material developed by the weather functional community (i.e. HQ AFWA/DNT, Q-flight, etc.) specifically for the upgrade and qualification of weather officers and enlisted personnel. Elements in **Table 5.2.** are recommended for CWT Operations.

Table 5.2. CWT Master Training Outline Major Objectives.

Block 1: Orientation.
In-processing/base orientation
AOR familiarization
Mission: Service organization/structure
Mission: Weapon systems and tactics
Mission: Weather impacts to operations
Mission: Common Operating Areas (Peacetime/Wartime)
Introduction to CWT systems and equipment (i.e. N-TFS, METSAT, Radar, VSAT, etc.)
Block 2: Airfield Service Element Weather Operations
Observing / Augmentation Procedures
Eyes Forward Procedures / Airfield MEF
(Special Operations Forces Operations (if applicable)
PMSV / Radio / Phone Patch / L-Band Operating Procedures
Severe Weather Procedures
Block 3: Mission Service Element Weather Operations
MEF Process for Parent/Host Unit (Procedures and Tools)
Forecasting mission-limiting weather elements
Electro-Optics (if applicable)
Post Mission Analysis/Debriefing Procedures
Block 4: Tactical/Expeditionary Operations
AOR Orientation (Regimes/OWS Products/Climo)
Setup, Tear Down and Packing of Tactical Meteorological Equipment (TACMET)
Operate TACMET
Tactical communications
Forecasting Weather Impacts to Ops from Limited Data
Army Field skills (if applicable)

5.4.2. Identify all knowledge and task items associated with each duty position in the unit for both in-garrison and expeditionary operations and establish position qualification standards for each item. Use qualification standards specified in applicable AF and Command JQSs as a minimum standard for Weather Journeymen. Locally developed standards for Commissioned Officers and Weather Craftsmen will meet or exceed those specified in AFJQS 1W0X1A.

5.4.3. Ensure all personnel successfully complete positional checkrides (receive a “go” rating) before awarding position qualification.

5.4.4. Ensure personnel identified for AEF deployments complete the following during the spin-up phase of their AEF cycle:

5.4.4.1. A checkride on all 5-level core tasks. Personnel failing checkrides (no-go) will be de-certified on the task, re-entered into task qualification training and must successfully complete a checkride prior to deploying.

5.4.4.2. Proficiency (hands-on) training on assigned TACMET and Tactical Communications (TACCOM) equipment expected to be used in the deployment AOR. For non-assigned or unavailable equipment, individuals will attend just-in-time training or complete familiarization training using references and material available from AFWA/DNT.

5.4.5. Establish qualification training programs for personnel who periodically rotate through the unit (e.g., Individual Mobilization Augmentee, AFR, etc.). These personnel will successfully complete a positional checkride before working independently.

5.4.6. Maintain a CT program. The CT program will include training on the following as a minimum:

5.4.6.1. Tactics, techniques, and procedures employed by the parent/host unit's weapons system(s), impact of space and terrestrial weather on operations, and weather processes/procedures to mitigate impact.

5.4.6.2. Improving meteorological skills and techniques commonly employed by all personnel in both a garrison and expeditionary environment.

5.4.6.3. Unique meteorological phenomena/regimes for identified or likely expeditionary locations.

5.4.6.4. Setup and operation of assigned tactical meteorological and tactical communications equipment at least annually. Operators will be familiar with siting and set-up, tear down, and operator-level maintenance IAW Operator's Manuals and Technical Orders for all equipment available for deployment.

5.5. HQ AFWA Responsibilities. As field operating agency for the weather career field, HQ AFWA is responsible for development of weather-unique training material and standards evaluation of field units.

5.5.1. Training Development.

5.5.1.1. HQ AFWA/DNT is an extension of the weather career field manager's (CFM) staff and will assist in managing the Utilization and Training Workshop (U&TW) process and developing training resources.

5.5.1.2. HQ AFWA/DNT will write, publish, and distribute meteorological technique applications and technology exploitation publications. AFWA TN-98/002, *Meteorological Techniques*, is the definitive source for Air Force approved meteorological techniques.

5.5.1.3. HQ AFWA/DNT will manage the COMET program as a source to develop technical training materials.

5.5.1.4. HQ AFWA/DNT will develop, maintain, and operate the main web site for weather training and field support information and services.

5.5.1.5. HQ AFWA/DNT, under direction of the weather CFM, will manage AFJQS 1W0X1A and QTPs identified in the 1W0X1A CFETP. **Note:** Local or MAJCOM-unique items may be

added to the AFJQS or QTPs as appropriate. Mandatory items cannot be deleted or modified without weather CFM approval.

5.5.1.6. HQ AFWA/DNT is the weather functional community's focal point for advanced distance learning. HQ AFWA/DNT will identify specific technical and professional development training material for hosting on Air Force distance learning systems. Management of training material will be conducted IAW separate Memorandums of Understanding or Letters of Agreement with Air Force agencies responsible for distance learning.

5.5.1.7. The Air Force Combat Weather Center (AFCWC) assists HQ AFWA/DNT in developing training materials on AF weather systems, and conducts just-in-time training courses for tactical systems.

5.6. Miscellaneous Training. The unit commander/OIC and NCOIC are responsible for planning, conducting, and tracking miscellaneous training required by the parent/host unit.

5.7. Mission Readiness Training (MRT). MRT is obtained/managed by MAJCOM functional managers. Requirements for MRT are identified on a 5-year planning cycle and funded 1-2 years before the class start dates. Personnel placing requests for MRT quotas must consider personnel turnover when requesting advance quotas. Since course attendance is tied to unit funding, ensure the Operational Weather Squadron Commander, or Operations Support Squadron Commander (OSS/CC)/Air Support Operations Squadron Commander (ASOS/CC) are notified of all requests. MAJCOM weather functional managers will assist in the budgeting process for unit-funded training.

5.8. Unique Training Requirements. The OWS Training and Technical Services Flight OIC or Unit Training Managers at Strategic Centers and CWTs will identify unique training needs not met by standard AF training materials/programs to the MAJCOM weather functional manager. MAJCOM Functional Managers will evaluate the training requirement and forward it to the MAJCOM Training Manager or the weather CFM for validation. The CFM will forward the validated training requirement to HQ AFWA/DNT for resolution.

5.9. Documenting Training for Weather Officers. Document training for all new Commissioned Officer Initial Skills Courses graduates and Combat Weather Team Operations Course graduates using AF Form 623, the CTS, AF Form 1098, and AF Form 797, unless otherwise specified in the Officer CFETP.

5.10. Forms Prescribed: AF Form 623, On-the-Job Training Record; AF Form 797, Job Qualification Standard Continuation/Command JQS; AF Form 1098, Special Task Certification and Recurring Training; AF Form 3806, Weather Watch Advisory Log and AF Form 3807, Watch/Warning Notification and Verification.

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Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

NOTE: Publications marked with an asterisk (*) are recommended for most weather units.

References

All applicable DoD FLIPs*

DoD Instruction 4000.19, *Interservice and Intergovernmental Support*

Joint Publication 3-59, *Joint Doctrine, Tactics, Techniques, and Procedures for Meteorological and Oceanographic Operations*

AFI 10-229, *Responding to Severe Weather Events**

AFI 10-403*, Deployment Planning And Execution*

AFI 11-202, Vol. 3, *General Flight Rules**

AFI 13-102, *Air Support Operations Center (ASOC) and Tactical Air Control Party (TACP) Training And Evaluation Procedures*

AFI 15-114, *Functional Resource and Weather Technical Performance Evaluation**

AFI 15-128, *Air and Space Weather Operations - Roles and Responsibilities**

AFI 15-180, *Air Force Weather Standardization and Evaluation Program*

AFJI 15-157, *Weather Support for the US Army*

AFI 25-201, *Support Agreement Procedures*

AFI 31-207, *Arming and Use of Force by Air Force Personnel*

AFI 33-101, *Communications and Information Management Guidance and Responsibilities*

AFI 33-112, *Computer Systems Management*

AFI 33-118, *Radio Frequency Spectrum Management*

AFI 33-202, *Computer Security*

AFI 36-507*, Mobilization of the Civilian Workforce*

AFI 36-2201, *Developing, Managing, and Conducting Training (Volumes 1 through 6)*

AFI 36-2238, *Self-Aid and Buddy Care Training*

AFI 51-401, *Training and Reporting to Ensure Compliance with the Law of Armed Conflict*

AFMAN 10-100, *Airman's Manual**

AFMAN 10-206, *Operational Reporting*

AFMAN 15-111, *Surface Weather Observations**

AFMAN 15-124, *Meteorological Codes**

AFMAN 36-2105, *Officer Classification*

AFMAN 36-2108, *Enlisted Classification*

AFMAN 36-2234, *Instructional System Development*

AFMAN 37-123, *Management of Records*

AFMAN 37-139, *Records Disposition Schedule*

AFOSH Standard 91-66, *General Industrial Operations*

AFOSH Standard 91-100, *Aircraft Flight Line - Ground Operations and Activities*

AFSSI 5024, Volume 1*, The Certification and Accreditation (C&A) Process*

AFTO 31P1-4-108-61, *Operator's Manual - PUP Workstation* (WSR-88D Doppler Radar)

AFTO 31P1-4-108-58-1, *User's Guide - Unit Control Position*

AFTO 31P1-4-108-51, *Operator's Manual - Unit Control Position WSR-88D Radar*

AFVA 15-136, *Weather Support Areas of Responsibility-CONUS*

AFVA 15-137, *Weather Support Areas of Responsibility-OCONUS*

AFW ECHOES #18, *Radar Program*

AFWA TN-98/002, *Meteorological Techniques*

AF Handbook 36-2235V11, *Information For Designers Of Instructional Systems Application To Unit Training*

AF Handbook 36-2235 Vol II, *Information for Designers of Instructional Systems*

Army Field Manual 3-6*, Field Behavior of Nuclear Biological Chemical Agents*

Army Field Manual 34-81-1, *Battlefield Weather Effects*

Army Field Manual 100-27, *US Army/US Air Force Doctrine for Joint Airborne and Tactical Airlift Operations*

Army Regulation 95-1, *Aviation Flight Regulations*

Army Regulation 115-10, *Meteorological Support for the US Army*

AWS/AFSPC FYI #37, *Space Environmental Impacts on DoD Operations*

AWS 300-Series/001, 002, 004, and 005, *Single Station Analysis and Forecasting*

AWS/TN-79/002, *Forecast Reviews and Case Studies*

AWS/ Technical Report 79/006, *Use of the Skew-T, Log P Diagram in Analysis and Forecasting*

DODD 3025.1, *Military Support to Civil Authorities (MSCA)*

FAA *Aeronautical Information Manual*

FAA Order 7110.10, *Flight Service*

FAA Order 7340.1, *Contractions Handbook**

FYI #44, *Air Force Weather Communications*

HQ USAF Program Action Directive (PAD) 97-10, *Reengineering Actions for Air Force Weather*

Joint Meteorology and Oceanography *(METOC)* Training Handbook*

JP 3-59, *Tactics, Techniques, and Procedures for Meteorological and Oceanography (METOC) Operations*

NOAA Publication #202-512-1707, *Worldwide Marine Weather Facsimile Broadcast Schedule*

Operator Handbook UCP, *Job Sheets,* 01 Aug 98

PACAFI 15-102, *Tropical Cyclone Reconnaissance*

Satellite Meteorology, *Case Studies Using Goes Imager Data* (COMET)

Satellite Meteorology, *Using the GOES Sounder* (COMET)

TOs for tactical equipment (as applicable)*

T-TWO#18*, Analysis, Initialization, and Model (AIM) Run*

Weather Service Operations Manual Chapter D-31, *Aviation Terminal Forecasts* *

Abbreviations and Acronyms

ACC—Air Combat Command

AEF—Air and Space Expeditionary Force

AFCCC—Air Force Combat Climatology Center

AFCWC—Air Force Combat Weather Center

AFI—Air Force Instruction

AFJQS—Air Force Job Qualification Standard

AFMAN—Air Force Manual

AFNWC—American Forces Network Weather Center

AFOSH—Air Force Occupational Safety and Health

AFP—Analysis and Forecast Process

AFPD—Air Force Policy Directive

AFR—Air Force Reserve

AFVA—Air Force Visual Aid

AFW—Air Force Weather

AFWA—Air Force Weather Agency

AFWWS—Air Force Weather Weapon System

AGL—Above Ground Level

AIREP—Air Report

ALT—Altimeter

ALTN—Alternate

AMC--—Air Mobility Command

AMD—Amendment

AOL—Alternate Operating Location

AOR—Area of Responsibility

AR—Air Refueling

ATC—Air Traffic Control

ATE—Allowed to Expire

ATF—After the Fact

AWC—Aviation Weather Center

BKN—Broken

C2—Command and Control

CAT—Clear Air Turbulence

CB—Cumulonimbus

CDC—Career Development Course

CFP—Computer Flight Plan

CFM—Career Field Manager

CFETP—Career Field Education and Training Plan

CMEF—Controlling Mission Execution Forecast

COMET—Cooperative Program for Operational Meteorology, Education, and Training

CONUS—Continental United States

CT—Continuation Training

CWT—Combat Weather Team

DLT—Desired Lead-time

DoD—Department of Defense

DOW—Directorate of Weather

DSN—Defense Switched Network

DTG—Date-Time Group

DZ—Drop Zone

ETA—Estimated Time of Arrival

ETD—Estimated Time of Departure

EZ—Extraction Zone

FAA—Federal Aviation Administration

FLIP—Flight Information Publication

FTP—File Transfer Protocol

FWA—Forecast Weather Advisory

HF—High Frequency

IAW—In Accordance With

ICAO—International Civil Aviation Organization

IFM—Integrated Flight Managed

IFR—Instrument Flight Rules

IMETS—Integrated Meteorological System

IR—Infrared

IRC—Instrument Refresher Course

IWEDA—Integrated Weather Effects Decision Aid

IWWC—Integrated Weather Warning Capability

JA/ATT—Joint Airborne/Air Transportability Training

JAAWIN—Joint Air Force and Army Weather Information Network

JAAWIN-S—Secure Joint Air Force and Army Weather Information Network

JMFU—Joint Meteorological and Oceanographic Forecast Unit

JMO—Joint Force Meteorological and Oceanographic Officer

JOAF—Joint Operation Area Forecast

JTWC—Joint Typhoon Warning Center

LAN—Local Area Network

LLWS—Low Level Wind Shear

LOI—Letter of Instruction

LYRD—Layered

LZ—Landing Zone

MAJCOM—Major Command

MEF—Mission Execution Forecast

MEFP—Mission Execution Forecast Process

METAR—Meteorological Aviation Report

METCON—Meteorological Conference or Discussion

METOC—Meteorological and Oceanographic

METSAT—Meteorological Satellite

METWATCH—Meteorological Watch

MIRF—METSAT Imagery Reference File

MISSIONWATCH—Mission Meteorological Watch

MOA—Memorandum of Agreement

MOAF—Military Operation Area Forecast

MRT—Mission Readiness Training

MSL—Mean Sea Level

MWR—Morale, Welfare, and Recreation

NA—Not Applicable

NBC—Nuclear, Biological, Chemical

NCOIC—Noncommissioned Officer in Charge

NEXRAD—Next Generation Weather Radar

NIPRNET—Non-secure Internet Protocol Router Network

NLT—No Later Than/Negative Lead Time

NM—Nautical Mile

NOAA—National Oceanic and Atmospheric Administration

NOTAM—Notice to Airmen

NOWS—NVG Operations Weather Software

N-TFS—New Tactical Forecast System

NVG—Night Vision Goggles

NWP—Numerical Weather Prediction

NWS—National Weather Service

OCONUS—Outside Continental United States

OIC—Officer-in-Charge

OJT—On-the-Job Training

OPLAN—Operation Plan

OPSEC—Operations Security

OSS—Operations Support Squadron

OTS—On the Spot

OVC—Overcast

OWA—Observed Weather Advisory

OWS—Operational Weather Squadron

PACAF—Pacific Air Force

PGS/S—Program Generation Server/Scheduler

PI—Projection Indicator

PIREP—Pilot Report

PLT—Positive Lead Time

PMSV—Pilot-to-Metro Service

POC—Point of Contact

PT—Point

PUP—Principal User Processor

QA—Quality Assurance

QTP—Qualification Training Package

RCR—Runway Condition Reading

RH—Relative Humidity

ROT—Rule of Thumb

RPS—Routine Product Set

RSC—Runway Surface Condition

SAR—Support Assistance Request

SATCOM—Satellite Communications

SEC—Space Environment Center

SIGMET—Significant Meteorological Information (A NWS In-Flight Weather Advisory)

SIPRNET—Secret Internet Protocol Router Network

SITREP—Situation Report

SOF—Supervisor of Flying

SOFWOC—Special Operations Forces Weather Operations Center

SOP—Standing Operating Procedures

SPC—Storm Prediction Center

SPECI—Aviation Selected Special Weather Report

SWAP—Severe Weather Action Procedures

TACC—Tanker Airlift Control Center

TACCOM—Tactical Communications

TACMET—Tactical Meteorological Equipment

TAF—Aerodrome Forecast

TAWS—Target Acquisition Weapons Software

TDA—Tactical Decision Aid

TN—Technical Note

TO—Technical Orders

T-VSAT—Tactical Very Small Aperture Terminal

UCP—Unit Control Position

UTC—Coordinated Universal Time (Zulu)

VCP—Volume Coverage Pattern

VFR—Visual Flight Rules

VR—VFR Military Training Route

VSAT—Very Small Aperture Terminal

VT—Valid Time

VWP—WSR-88D Velocity Azimuth Display Wind Profile

WA—Weather Advisory

WATCH—Weather Watch

WF—Weather Flight

WMO—World Meteorological Organization

WSR-88D—Next Generation Doppler Radar

WSS—Weather Subscription Service

WW—Weather Warning

XOP—AFWA Field Support Division

XOW—Director of Weather (United States Air Force)

Terms

Actual Lead-time (ALT)—The elapsed time between issue time of an advisory or warning and the first occurrence of the event.

After-the-Fact (ATF) Quality Assurance (QA)—A quality assurance process used to evaluate the quality of a small portion of weather support provided to customers to identify areas that might require additional training or better procedures.

Air Force Weather Agency (AFWA)—A strategic weather center at Offutt AFB NE, providing strategic atmospheric data and strategic analysis/forecast products required by the regional OWSs and the CWTs worldwide. AFWA provides the centralized repository for global observations and forecasts that are data based at AFWA and, in turn, disseminated to DoD weather data users worldwide. In addition to global observations and forecasts collected from worldwide sources, AFWA collects meteorological satellite data from multiple sources. Based on global analysis of available data, AFWA creates global analysis and forecast products to meet the strategic forecast requirements of its customers.

Airman's Meteorological Information (AIRMET)—NWS in-flight weather advisories issued only to amend the area forecast concerning weather phenomena which are of operational interest to all aircraft and potentially hazardous to aircraft having limited capability because of lack of equipment, instrumentation, or pilot qualification. AIRMETs concern weather of less severity than that covered by SIGMETs or convective SIGMETs.

Air Report (AIREP)—An AIREP is an in-flight evaluation usually made over areas where weather information is limited or nonexistent (for example, over an ocean). It is encoded in accordance with AFMAN 15-124.

Amendment (AMD)—Used as a message modifier when transmitting an aerodrome forecast amendment.

Analysis and Forecast Process (AFP)—A systematic and consistent approach to weather forecasting. The AFP identifies techniques and tools used to forecast individual weather elements, describes requirements for locally prepared work charts/composites, and explains refinements and application of centralized products.

Aviation Routine Weather Report (METAR)—METAR is a routine scheduled observation as well as the primary observation code used by the United States to satisfy requirements for reporting surface meteorological data. METAR contains a complete report of wind, visibility, runway visual range, present weather and obscurations, sky condition, temperature, dew point, and altimeter setting collectively referred to as "the body of the report." In addition, encoded and/or plain language information that elaborates on data in the body of the report may be appended to the METAR. The contents of the remarks will vary according to the mode of operation (i.e. manual, automated, or augmented). Scheduled METAR observations taken hourly are called *record observations*.

Aviation Selected Special Weather Report (SPECI)—SPECI is an unscheduled observation completed and transmitted when special weather criteria are observed at manual observing stations, or determined by sensor equipment at automated stations. SPECI observations contain all data elements found in a METAR plus additional remarks that elaborates on data in the body of the report. SPECI observations are prepared and transmitted as soon as possible after the relevant criteria are observed or sensed.

Automated Weather Network—A global communications network used for collecting and distributing alphanumeric terrestrial and space weather data throughout the Air Force Weather Weapon System; Navy and Army weather systems; and federal and foreign meteorological, space, and aviation centers.

Climatology—The historical records of weather conditions measured or observed at a specific location is knows as climatology. Some data go back over 100 but generally a 10- to 25-year history is more common. Climatology is useful in planning operations beyond 5 to 7 days. It usually describes the average (or mean) conditions such as high and low temperatures and extremes.

Combat Weather Team (CWT)—An umbrella term covering any military weather organization tailoring operational and strategic level weather products and providing decision-quality environmental information for an operational user's military decision-making processes. In addition to designated weather units, (OSS weather flights, Weather Detachments and Squadrons, Air National Guard Weather Flights), specialized sections in an OWS (flight weather briefing or contingency cell), Air Operations Center or AFWA also operate as CWTs.

Controlling MEF (CMEF)—The CMEF is the forecast provided by a lead weather unit for the common operations area of military operations involving multiple units or composed of multiple unit missions. The

lead weather unit issues or arranges for a CMEF (e.g., Air Combat Command Weather Support Unit CORONET forecast) and the supporting weather units will not deviate from mission-critical thresholds without prior coordination with the issuing agency.

Desired Lead-time (DLT)—The amount of advance notice a supported agency desires before the onset of a particular weather phenomenon.

Eyes Forward—CWT forecasters are the eyes forward for the forecasters in the OWS and integrate weather radar data, meteorological satellite imagery, lightning detection readouts, and non-standard weather data systems (vertical profilers, mesonet data, etc.) to create an integrated weather picture and near-term trend forecasts for the OWS. Eyes forward yields meaningful meteorological information not contained in coded observations to the servicing OWS and is an integral part of the meteorological watch for an installation or contingency operating location.

False Alarm—When a WW or FWA is issued and the specified criteria do not occur during the specified valid time.

Forecast Funnel—Is a conceptual model depicting the hierarchy and relationship among different AF weather organizations, air and space weather operations, processes, scales in weather features, and levels of military operations.

Forecaster-In-the-Loop (FITL)—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 resulting in forecaster-created weather products such as graphical forecast products or mission specific environmental impacts decision aids.

FITL Graphics (Standard)—A suite of weather products depicting standardized criteria, created by forecasters in an Operational Weather Squadron for a specific geographic region. These products represent the sum of the forecasting activities for basic weather parameters necessary for creation of mission execution forecasts.

Forecast Reference Notebook (FRN)—An informal publication containing information on forecasting for locations for which the unit has forecast responsibilities.

Forecast Review—A written review of the meteorological data and reasoning used to develop the forecast.

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

Forecast Worksheet—Tool used to document, track, and evaluate past and future weather events. It may contain forecast rules-of-thumb, question and answer discriminators, decision logic trees, etc., to help develop a forecast.

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 current observation, WWs and 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 customers 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.

Initialization—The process of comparing numerical prediction model output to the actual state of the atmosphere at the valid time of the model. OWSs perform this function.

Instrument Flight Rules (IFR)—An aircraft operational term indicating that the weather conditions have deteriorated to the point that navigational instruments on board the plane must be used in flying from one place to another.

Integrated Meteorological System (IMETS)—An Army-fielded system that uses satellite communications to ingest AF weather model data to create an internal database, which is linked to Army Command and Control. IMETS is used to provide weather support and tactical decision aids to the Army in a wartime environment.

Integrated Weather Effects Decision Aids (IWEDA)—IWEDA is the Integrated Weather Effects Decision Aid, which is available to weather and non-weather users in Digital TOCs served by the IMETS Weather Effects Workstation. IWEDA uses a hierarchy of systems (typically platforms, for instance, a helicopter) subsystems, (for instance a missile) and components, (for instance, the missile's target acquisition system); each element has weather effects rules. The user selects a system or several systems to be examined, and views a Weather Effects Matrix, which provides the worst weather effects for each selected system, as a function of time. By clicking on a particular weather effects matrix element, the operator can display red, amber, and green weather effects on a map, and by clicking on a particular map location, find the weather effects rules which "fired" at that particular location and time.

Intelligence Preparation of the Battlefield (IPB)—IPB is the Armies 4-step systematic, continuous process of analyzing the threat and environment in a specific geographic area. It is designed to support staff estimates and military decision-making. Applying the IPB process helps the commander selectively apply and maximize his or her combat power at critical points in time and space on the battlefield.

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

Infrared Target Scene Simulation System Software (IRTSS)—A UNIX-server, (hosted by AFWA and the OWSs) full-physics, tactical decision aid capability that illustrates the weapons-eye (sensors spectral response) view of the target area.

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 Operations Area Forecast (JOAF)—The JOAF, as approved by the JMO, is the official planning forecast for all components of the joint force. It is issued at the JFC level to ensure that all components are aware of what the JFC is using to plan the coordinated battle. Significant deviations from the JOAF will be coordinated with the JMO. 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 JOAF may include a forecast database when needed for tactical decisions used in planning.

Lead Weather Unit—The weather unit having overall responsibility for coordinating air and space weather support, issuing the weather support LOI, and providing or arranging forecasts for the Controlling MEF.

Limited Duty Station—A weather station that provides less than 24-hour a day forecast service.

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).

METAR—See Aviation Routine Weather Report.

METWATCH (Meteorological Watch)—A deliberate process for monitoring terrestrial weather or the space environment in an area or region. The purpose of a METWATCH is to identify when and where observed conditions significantly diverge from forecast conditions and determining courses of action to update or amend a forecast product or group of products and designated agencies notified. Strategic and Operational level weather units typically conduct METWATCH activities.

Military Operating Area Forecast (MOAF)—A forecast guidance product that provides the weather or space environmental conditions for a specific area in which military operations are occurring.

Missed WW or FWA—When specified WW or FWA criteria occur but a WW or FWA is not issued during the entire event.

Mission Execution Forecast (MEF)—Mission tailored environmental information describing a specific impact to an operational mission. CWTs conduct deliberate forecast processes to develop, deliver, monitor and amend mission execution forecasts by fusing perishable data with operational and strategic level weather forecast products into decision quality information for an operational end user.

Mission Execution Forecast Process (MEFP)—A systematic, repeatable process for tailoring weather products 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 customer's tactics which will be applied to any mission their customer 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.

MISSIONWATCH (Mission Meteorological Watch)—A deliberate process for monitoring terrestrial weather or the space environment for specific mission-limiting environmental factors. The MISSIONWATCH process identifies and alerts decision-makers to changes affecting mission success.

Military Operating Area Forecast (MOAF)—A suite of forecaster-in-the-loop graphics or a specific alphanumeric forecast guidance product that provides the weather or space environmental conditions for a specific area in which military operations are occurring.

Multi-Unit Mission—A mission with more than one unit operating together, supported by multiple CWTs, to accomplish a specific objective.

Negative Lead-Time (NLT)—Watches, WW, or FWA issued after specified criteria have already occurred, and the specified criteria are expected to reoccur (persist). NLT equals the elapsed time between the first occurrence and the issue time of the Watches, WW, or FWA.

New Tactical Forecast System (N-TFS)—The computer system and associated interfaces that provide an automated weather support and communications capability to the CWT.

Notice to Airmen (NOTAM)—A notice containing information concerning the establishment, condition, or change in any aeronautical facility, service, procedures, or hazard, the timely knowledge of

which is essential to personnel concerned with flight operations.

Numerical Weather Prediction (NWP)—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.

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

Observed Weather Advisory (OWA)—A weather advisory issued when a particular weather event first occurs and the customer does not require advanced notification of the observed weather phenomenon.

Observed WW—A weather warning issued when a particular weather event first occurs and the customer does not require advanced notification of the observed weather phenomenon.

On-the-Spot (OTS) QA—A quality assurance process to ensure customers receive accurate and timely weather support (i.e. information, products, and services). Successful OTS QA will identify and correct weather support deficiencies BEFORE delivery to the customer.

Operation Plan (OPLAN)—A plan for the conduct of joint operations that can be used as a basis for development of an Operations Order.

Operational Weather Squadron (OWS)—An organization comprised of management, technician, and training personnel responsible for providing regional weather support. Their mission is to produce fine-scale tailored weather forecast products and services to customers within their area of responsibility (AOR).

Pilot Report (PIREP)—A report of in-flight weather provided by an aircrew member.

Positive Lead-Time (PLT)—Watches, WW, or FWA issued before specified criteria occur, and the specified criteria are expected to reoccur (persist). PLT equals the elapsed time between the issue time and the first occurrence of the Watches, WW, or FWA.

Potential—Conditions indicate a given weather phenomenon is capable of development within a specified amount of time.

Principal User Processor (PUP)—Next Generation Weather Radar (NEXRAD) remote workstation.

Program Generation Server/Scheduler (PGS/S)—A web-based program to facilitate filing and distribution of flight weather briefings.

Regime—A synoptic and/or mesoscale weather pattern that describes weather patterns known to produce a defined set of environmental effects for a region or specific location.

Rule of Thumb—A concise, empirical forecast rule providing a specific answer that can be verified objectively.

Senior Meteorological and Oceanographic (METOC) Officer—Officer responsible for assisting the combatant commander and staff in developing and executing operational and oceanographic service concepts in support of a designated joint force.

Severe Thunderstorm—A thunderstorm presenting a threat to lives or property that requires agencies to enhance force protection measures. Generally, thunderstorms producing hail greater than or equal to ¾ inch diameter and/or surface wind greater than or equal to 50 knots.

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

Severe Weather Action Procedures (SWAP)—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.

Significant Meteorological Information (SIGMET)—NWS in-flight weather advisories issued concerning weather significant to the safety of all aircraft. There are convective and non-convective SIGMETs.

SPECI—See Aviation Selected Special Weather Report.

Staged Missions—Aviation missions originating from an airfield other than the flying unit's base of assignment. Staged missions occur when a crew ends a duty day at a location other than home station and continue the overall mission at a later date. Units operating temporarily from a location other than home station for training purposes (Operational Readiness Evaluation/AMC Large Package airdrop exercises) are considered staged. Staged missions generally involve relocation of some home station support activities (maintenance, intelligence), where as "transient" missions usually do not. Aircraft operating from AEF locations or away from home station for extended periods (runway maintenance, strategic dispersal) are considered "deployed," rather than "staged."

Strategic Centers—There are three AF weather Strategic Centers: the Headquarters Air Force Weather Agency (AFWA), AFCCC, and the JTWC. They provide a spectrum of centralized weather products and services. Each has the mission to provide specified large-scale (campaign or global) support.

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

Support Assistance Request (SAR)—Used to request specialized weather, space environmental, or climatological support from the Air Force Weather Agency (AFWA), AFCCC, MAJCOMs, or Operational Weather Squadrons (OWS).

Surface Observations—Weather and environmental observations measured or estimated on the land or water surface, and usually reflecting surface conditions. Cloud cover is an exception.

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 (TAF)—Is a standard text forecast containing the cloud cover, cloud heights, and visibility for general flight rule conditions (IAW AFI 11-202, Volume 3, *General Flight Rules*; and AR 95-1, *Flight Regulations*), as well as wind, altimeter, and other weather parameters needed to sustain the landing and takeoff of aircraft.

Timing Error—The difference between the forecast time of occurrence and the actual time of occurrence. Timing error is positive (+) if the event occurred later than forecast and negative (-) if it occurred earlier than forecast.

Transient Missions—Aviation missions passing through an airfield other than the flying unit's home station. Missions are considered transient when the mission aircraft lands or conducts pattern work at an airfield and subsequently departs to another location (or home station) in the same crew duty day. Usually this intermediate stop in the overall mission occurs for fuel and services, or to drop off/pick up duty

passengers or equipment. See Staged Missions for crews remaining overnight at a location other than home station.

Unit Control Position (UCP)—The master computer terminal that controls all function of the NEXRAD.

Valid Time (VT)—The time in which a weather watch, warning, or advisory is in effect. The start time of the VT is when the phenomenon is expected to first occur. The end time of the VT is when the phenomenon is expected to cease and no longer occur.

Very Small Aperture Terminal (VSAT)—An economical and reliable means for transmitting a large volume of weather data to multiple recipients. VSAT is used in conjunction with other communications methods, including common user communications, dedicated communications, mobile satellite systems (such as Iridium satellite phone), and high frequency radio to provide weather data to fixed and tactical units supporting the war-fighter in areas where the capability exists.

Visual Flight Rules (VFR)—In aviation a set of regulations that must be adhered to when the weather is sufficiently clear to allow the pilot to fly using ground features for navigational aids.

Weather Advisory (WA)—A special product notifying an end user when an established environmental condition effecting operations is occurring or is expected to occur.

Weather Subscription Service (WSS)—A web-based subscription service that allows customers to dynamically change their subscriptions to products.

Weather Warning (WW)—A special notice to notify operational commanders when an established weather condition of such intensity as to pose a hazard to life or property is occurring or is expected to occur. Weather warnings provide concise information outlining environmental threats and are used by operational commanders to make force protection decisions.

Weather Watch (WATCH)—A special notice to notify operational commanders of a potential for environmental conditions of such intensity as to pose a hazard to life or property. Weather Watches indicate a potential for environmental threats and are used by operational commanders to make force protection and risk management decisions.

Attachment 2

DOCUMENTING WEATHER SUPPORT

Figure A2.1. OWS Formal Agreement Preparation Items.

SECURITY CLASSIFICATION, AUTHORITY, AND ADMINISTRATIVE INSTRUCTIONS

1. **Classification**: Does the MOA include the proper security classification and reproduction instructions, if applicable?
2. **Authority**: Does the MOA list the Authority documents by which the MOA was developed (i.e. DoD Instruction 4000.19 and AF weather Reengineering directives)? List the authority documents in the Reference List.
3. **Operations Security (OPSEC)**: Does the MOA include applicable OPSEC instructions and protection instructions, if applicable?
4. **Precedence**: Does the MOA include the precedence of the document? This will be NONE for initial agreements, or list the superseded version.
5. **Agreement and Administration**: Does the MOA explain the agreement and administrative procedures (i.e. effective date, review instructions, the initiator, and termination terms)?
6. **Office of Primary Responsibility (OPR)**: Does the MOA identify the OPR and provide change instructions? The OPR will typically be the OWS Training and Standardization Flight.
7. **Record of Changes**: Does the MOA include a Record of Changes (i.e. Change/Supplement Number, Date Posted, Posted By)?
8. **Record of Review**: Does the MOA include a Record of Review (i.e. Reviewed By, Date Reviewed, Remarks)?

PURPOSE AND SCOPE

1. **Purpose**: Does the MOA have a purpose statement to define mutually agreed-upon weather operations responsibilities, policies, and procedures the OWS-CWT team will follow to develop and deliver information, products, and services to the base/post customers?
2. **Background**: Does the MOA provide background information on reengineered weather operations and describe how the OWS-CWT team will carry out the intent and vision of the Air Force Weather Strategic Plan?
3. **Scope**: Does the MOA explain that the scope is to provide guidance and document agreement on weather information, products, and services for the OWS-CWT team operations in support of base/ post activities? Does it explain that the actions and agreements in the MOA complement existing weather regulations, instructions, plans, agreements, or similar directives and apply only to the participating parties?
4. **Requirements**: Does the MOA state that the requirements established between the OWS-CWT team and applicable agencies are based on valid requirements for weather information, products, and services? Valid requirements are those linked to instructions, manuals, mission orders, or similar directives and, as such, exist out of mission necessity. A MOA will not include non-substantiated support requests.

5. **Assumptions**: Does the MOA assume that adequate resources and communications will be available to execute the MOA and that sufficient weather intelligence will be available from various sources on which to base weather operations and production?

GENERAL INFORMATION

1. **OWS Mission**: Does the MOA describe the OWS mission?
2. **OWS Location**: Does it include the full address of the OWS?
3. **OWS Operating Hours:** Are the operating hours and telephone numbers of the OWS staff provided? Are the operating hours and telephone numbers of the OWS weather personnel provided?
4. **OWS Duty Priorities**: Does the MOA include a list of the OWS duty priorities along with explanatory verbiage, if used?
5. **CWT Mission**: Does the MOA describe the CWT mission?
6. **CWT Location**: Does the MOA include the full address of the CWT?
7. **CWT Operating Hours**: Are the operating hours and telephone numbers of the CWT staff provided? Are the operating hours and telephone numbers of the CWT weather personnel provided?
8. **CWT Duty Priorities**: Does the MOA include a list of the CWT duty priorities along with explanatory verbiage, if used?

RESPONSIBILITIES (Include only those responsibilities not mandated in other higher-level directives.)

1. **OWS Responsibilities**: Does the MOA fully describe the applicable OWS responsibilities in providing weather support to the base/post?
2. **CWT Responsibilities:** Does the MOA fully describe the applicable CWT responsibilities in providing weather support to the base/post?
3. **Team Assignments and Specific Responsibilities:** Does the MOA fully describe task responsibilities and specify (if necessary) when the OWS and the CWT are required to assume responsibility? There are a variety of tasks that require the OWS and the CWT to work together (e.g., metrics, resource protection, ground/aircraft mishap). This section spells out who does what and when.

WEATHER FORECAST OPERATIONS

1. **Terminal Aerodrome Forecast (TAF)**: Does the MOA include the OWS procedures for issuing and disseminating the TAF? Does the MOA state that, unless otherwise specified, the forecast elements in the main body of the TAF will apply to the area within a 5 statute mile radius of the base/post airfield complex? Are any non-standard specification/amendment criteria defined?

2. **OWS Flight Weather Briefings**: Does the MOA describe how the OWS will provide and document flight weather briefings and include any applicable web page addresses and instructions for accessing the OWS briefing information? Does the MOA state that aircrews should request routine flight weather briefings a minimum time prior to briefing time to give the OWS adequate time to examine the weather conditions and complete the required documentation? Does the MOA include all telephone numbers, fax numbers, web pages, etc., aircrews can use to request routine briefings? The MOA should state that the OWS will complete no-notice and short-notice briefings as time permits depending on the current workload, available manpower, and duty priorities. The MOA should also state that the OWS will prioritize no-notice flight weather briefing requests behind existing requests unless special circumstances warrant a higher priority (e.g., alert, search and rescue, medical evacuation).

3. **Regional and Operational-Level Weather Products and Information**: Does the MOA describe the regional and operational-level products and information produced by OWS as agreed upon by the OWS-CWT team? The OWS-produced regional and operational-level products and information must support the CWT in their development of tactical-level weather products for specific points and areas, such as drop zones, landing zones, and air refueling routes. Does the MOA reference where the OWS products and information are listed and described?

4. **Tactical-Level Weather Products and Information**: Does the MOA state that tactical-level weather products are provided by the unit where command and control resides for the mission (normally the supporting CWT)? Does it explain situations in which the OWS will produce tactical-level MEFs for the supported CWT's operators/war-fighters?

5. **Space Weather Support**: Does the MOA describe space weather products provided or tailored by the OWS, as agreed upon by OWS-CWT team members?

Weather Watches, Warnings, and Advisories

1. **Forecast Weather Watches**: Does the MOA provide the criteria and desired lead-times of the forecast weather watches that the OWS will issue for the base/post agencies, as mutually agreed upon by the CWT, the supporting OWS, and all base/post customers? Are the watch areas of coverage defined?

2. **Forecast Weather Warnings (WWs)**: Does the MOA provide the criteria and desired lead-times of the forecast WWs that the OWS will issue for the base/post agencies, as mutually agreed upon by the CWT, the supporting OWS, and all base/post customers? Does it explain the CWT's authority to issue or supersede OWS-issued WWs when imminent weather conditions could impact operations, or pose a hazard to life and property? Are the forecast warning areas of coverage defined?

3. **Observed Weather Warnings**: Does the MOA provide the criteria of the observed WWs that the CWT will issue for the base/post agencies? Does it explain situations in which the OWS will assume responsibility for issuing observed warnings for the supported CWT's base/post agencies? The OWS must have remote sensing capability to provide this support. Are the observed warning areas of coverage defined?

4. **Forecast Weather Advisories**: Does the MOA provide the criteria and desired lead-times of the forecast weather advisories that the OWS will issue for the base/post agencies, as mutually agreed upon by the CWT, the supporting OWS, and all base/post customers? Does it explain the CWT's authority to issue or supersede OWS-issued weather advisories when mission-limiting, non-severe weather conditions are affecting or could affect operations, or pose a hazard to life and property? Are the forecast advisory areas of coverage defined?

5. **Observed Weather Advisories**: Does the MOA provide the criteria of the observed weather advisories that the CWT will issue for the base/post agencies? Does it explain situations in which the OWS will assume responsibility for issuing observed advisories for the supported CWT's base/post agencies? The OWS must have remote sensing capability to provide this support. Are the observed advisory areas of coverage defined?
6. **Weather Watch, Warning, and Advisory Numbering and Text**: Does the MOA describe the numbering system the OWS-CWT team will use for forecast weather watches, warnings, advisories, and observed WWs and advisories?
7. **Dissemination of Weather Watches, Warnings, and Advisories**: Does the MOA describe the primary dissemination system the OWS-CWT team will use to notify base/post agencies of weather watches, warnings, and advisories? Does it list the key agencies (if required) that will receive backup calls by the OWS-CWT team to verify receipt? Does the MOA include the notification chain (i.e. flow chart or diagram) as an attachment to the MOA?

WARTIME, CONTINGENCY, AND EXERCISE WEATHER OPERATIONS (Include only if not described in other higher-level directives, OPLANs, etc.).

Does the MOA describe the information, products, and services the OWS will provide a team deployed from the supported CWT during wartime, contingency, and exercise operations? The following is an example of the information, products, and services the OWS may be required to provide for CWT operations at a deployed location:

a. TAFs.
b. CMEFs.
c. MOAFs.
d. Forecast weather watches, WWs, and advisories.
e. Short-term regional and operational-level weather products and information.
f. Area familiarization briefings (if required).
g. Outlook forecasts for planning.
h. Climatology.

CWT SUPPORT DURING OWS OUTAGES/EVACUATIONS (Do not include OWS and CWT responsibilities already defined in OWS Back-up Plans).

1. Does it list the critical products and services the CWT requires during an OWS outage? (See **Chapter 1**.)
2. Does it state the sources of the products and services?

Figure A2.2. Sample MOA Cover Page, Table of Contents, and Coordination Letter.

SAMPLE ONLY
(AFI 25-201, *Support Agreement Procedures*)

MEMORANDUM OF AGREEMENT XX-X

BETWEEN

XXth Operations Support Squadron
XXX Sample St
Sample Air Force Base USA

AND

XXth Operational Weather Squadron
XXX Nameless Dr
OWS Air Force Base USA

FOR

Reciprocal weather information, products, and services to support the operations of Sample AFB and associated agencies.

XX Month XXXX

Table of Contents

6.2. Forecast Weather Warnings
6.3. Observed Weather Warnings
6.3. Forecast Weather Advisories
6.4. Observed Weather Advisories
6.5. Weather Watch, Warning, and Advisory numbering and text
6.6. Dissemination of Weather Watches, Warnings, and Advisories
6.7. Severe Weather Action Procedures.

7.0. SPACE WEATHER SUPPORT AND SERVICES
7.1. Space Weather Alerts and Warnings
7.2. Space Weather Forecasts

8.0. WARTIME, CONTINGENCY, AND EXERCISE WEATHER OPERATIONS
8.1. OWS weather information, products, and services for deployed operations

9.0. BACK-UP DISSEMINATION PROCEDURES
9.1. XX OWS weather information, products, and services backup dissemination procedures
9.2. CWT weather information, products, and services backup dissemination procedures

10.0. CWT support During OWS Outages/evacuations
10.1. CWT required products and services
10.2. Sources of products and services to CWTs

Attachments
1. Reference List
2. Notification Chain

DISTRIBUTION

Organization Number of Copies

MAJCOM/DOW	1
XX OSS/CC	1
XX OWS/CC	1
Other Sample AFB associated agencies	1

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS XX AIR FORCE (MAJCOM)
OWS AIR FORCE BASE USA

Date

MEMORANDUM FOR XXth OSS/CC

FROM: XXth OWS/CC

SUBJECT: Memorandum of Agreement (MOA) XX-X

1. This MOA provides guidance concerning weather operations and the development and delivery of associated weather information, products, and services between the XXth OSS Weather Flight and the XXth Operational Weather Squadron. This MOA is implemented IAW Air Force Instruction 15-128 and Air Force Manual 15-129. The undersigned representatives of the XXth OSS and the XXth OWS have reviewed and agreed on the conditions set forth in this MOA. This MOA becomes effective on the date of the second signature below.

2. This MOA does not supersede any existing agreements between CWT and flying units not collocated on xxxx (CWT base/post). This MOA will be reviewed on a triennial basis or upon concurrence of the signatories based on mission changes.

FIRST MI. LAST, RANK, USAF
Commander
XXth Operations Support Squadron

Date:_____

FIRST MI. LAST, RANK, USAF
Commander
XXth Operational Weather Squadron

Date:_____

cc:
See Distribution

Attachment 3

EXAMPLE MOAF AND CONTROLLING MEF (CMEF)

A3.1. General. **Figure A3.1.** contains suggested weather parameters for various A/N MOAFs. The CMEF in **Figure A3.2.** contains several different MOAFs for specific missions conducted within one large multiple-unit operation. In this example, the individual MOAFs are combined to form the official CMEF developed by the lead weather unit. The lead weather unit aligned with the C2 element will coordinate the CMEF with all weather units supporting missions participating in the multiple-unit operation. These weather units will produce a MEF from the information in the CMEF. See **Chapter 1,** Coordinated Weather Operations, for detailed guidance.

A3.1.1. **Figure A3.3.** and **Figure A3.4.** provide examples of MOAFs functioning as the official CMEF for a multiple-unit operation.

Figure A3.1. Suggested Weather Parameters for A/N MOAFs.

Higher-Altitude MOAFs	***Weather Parameters***
Air Refueling (AR) Tracks, High-Altitude Orbits Air Combat Maneuver/Training Areas IFR Military Training Routes (Instrument Route)	- Degree of cloud cover, and heights of cloud bases and tops of layers. - In-flight visibility (AR and other MOAFs), as required. - Turbulence (catagory II) & Icing. - Thunderstorm coverage and MAX tops. - Winds and temperatures (at flight level). - Minimum altimeter for duration of mission (as required).
Lower-Altitude MOAF	***Weather Parameters***
Drop Zone (DZ), Landing Zone (LZ), VFR Military Training Routes (VR), Slow-Speed Low-Altitude Training Routes, Forward Arming and Refueling Point (FARPs), Training Ranges (e.g., Nellis Range, Eglin Range, National Training Center at Ft Irwin, etc.), Extraction Zones (EZ), Target Areas, Low-Altitude Orbits	- Degree of cloud cover, and heights of cloud bases and tops of layers. - Surface visibility. - Surface weather. - DZ winds and temperatures at the surface, 200, 500, 700, 1000, 1,500, 2,000, and 3,000 or a specified drop altitude (AGL). Include wind and temperature forecasts for additional altitudes as required. - Turbulence (catagory II) & Icing. - Thunderstorm coverage and MAX tops. - Minimum altimeter for duration of mission (as required). - MAX/MIN temperature F° or C° (as required). - Low Level Wind Shear (LLWS) (as required).

NOTES:

1. Route, Orbit, and Air Combat Maneuver/Training Area MOAFs. Provide forecasts for weather parameters at the route/orbit altitude for the duration of the mission. Provide forecasts for weather parameters within 25 miles either side of the planned route/orbit, and within 1,000 feet above and below the route/orbit (or as specified by the customer for VR/Instrument Route missions).

2. AR MOAFs. Provide forecasts for weather parameters within 25 miles either side of the AR track and within 1,000 feet above and below the AR track. Provide forecasts for weather parameters valid for 30 minutes before entering the AR track to 1 hour after exiting.

3. LZ MOAFs. Prepare LZ MOAFs for the specific location in TAF format, or as required by the customer. Valid time will be 1 hour before and 1 hour after period of the mission.

4. EZ MOAFs. Prepare EZ MOAFs for the specific location in TAF or DZ format, depending on the extraction altitude and customer requirements. Valid time will be 1 hour before and 1 hour after period of the mission.

5. Format MOAFs for Target Areas, FARPs, Combat Maneuver Areas, Instrument/Low Level Routes, Tactical Ranges, and Gunnery Ranges as required by the customer. Valid time will be 1 hour before and 1 hour after period of the mission.

Figure A3.2. Example CMEF for an Operation with Multiple Missions.

FXUS 1 KXXX (if entered in the AWN).

CMEF FOR MISSION NUMBER & DEPARTURE STATION

PART 1. SYNOPTIC DISCUSSION: VT: XX/XXXXZ - XXXXZ JULY XXXX. A STATIONARY COLD FRONT EXTENDS FROM THE GREAT LAKES INTO CENTRAL IL, IA, AND SOUTH-CENTRAL NE AND REACHES WESTWARD TO A LOW IN CENTRAL CO. A HIGH PRESSURE RIDGE DOMINATES THE SOUTHEAST US.

PART 2. ROUTE X FORECAST: VT: XX/XXXXZ - XXXXZ JULY XXXX.

ALL FORECAST HEIGHTS MSL.

CLOUDS:	180	260
	FEW	BKN
	150	240
TURBC:	NONE	
ICING:	NONE	
TSTMS:	ISOLD, MAX TOPS 360	

PART 3. CLEAR TARGET DZ FORECAST: VT: XX/XXXXZ - XXXXZ JULY XXXX.
ALL FORECAST HEIGHTS AGL.

	WINDS:	TEMPS:
SFC:	28010/18	P23C
200 FT:	28011	P22C
500 FT:	28012	P21C
700 FT:	28012	P20C
1,000 FT:	28013	P19C
1,500 FT:	30014	P18C
2,000 FT:	32015	P17C
3,000 FT:	33017	P15C
SFC VIS/WX:	6 HZ	
TSTMS:	NONE	
ICING:	NONE	
TURBC:	NONE	
CLOUDS:	SKC	
MIN ALSTG:	29.92 INS	

PART 4. ORBIT X FORECAST: VT: XX/XXXXZ - XXXXZ JULY XXXX.
ALL FORECAST HEIGHTS AGL. (Low altitude example).

CLOUDS:	050
	BKN
	025
SFC VIS/WX:	4 HZ
WIND/TEMP:	2,500 FT AGL: 27019/P16C
TSTMS:	NONE
ICING:	NONE
TURBC:	OCNL LGT 030 TO 060

PART 5. AR XXX FORECAST: VT: XX/XXXXZ - XXXXZ JULY XXXX.

ALL FORECAST HEIGHTS MSL.

FLIGHT LEVEL 240 MSL		
CLOUDS:	260	350
	SCT	BKN
	180	300
VIS:	1 Nautical Mile (NM) IN CLD, 7+ OUT	
FL WINDS:	25030KTS	
TSTMS:	ISOLD, MAX TOPS 380	
ICING:	LGT MXD 180 TO 220	
TURBC:	LGT TURBC 180 TO 240 WESTERN 1/3 OF TRACK	

PART 6. CONFIRMATION: PLEASE ACKNOWLEDGE RECEIPT BY PHONE (DSN XXX-XXXX), E-MAIL, FAX, OR SERVICE MESSAGE.

Figure A3.3. Example CMEF for a JA/ATT Mission.

JA/ATT CMEF FOR MSN NUMBER XXX – KAAA (Mission Number & Departure Station).

1. MISSION DESCRIPTION: ON 17 JULY XXXX, ONE XXX AW C17 WILL DEPART KAAA AND FLY THE FOLLOWING ITINERARY.

2. ITINERARY: ALL DATES JULY XXXX/ALL TIMES UTC.

ARRIVAL	STATION	DEPARTURE	REMARKS
	KAAA	17/1500	ORIGIN
17/1900	FIRST TARGET DZ PA	17/1950	DROP
17/2020	KBBB	17/2235	OFF LOAD
17/2335	KCCC	19/1400	REST
19/1500	KDDD	19/1715	LOAD
19/2200	SECOND TARGET DZ NJ	19/2230	DROP
19/2300	KEEE	20/2230	REST
20/2359	KFFF	21/0215	LOAD
21/0300	THIRD TARGET DZ NY	21/0340	DROP
21/0410	KFFF	21/2140	REST
22/0310	KAAA		TERMINATE

3. COORDINATION:

A. KAAA: WILL PROVIDE INITIAL CREW BRIEFING TO FIRST TARGET DZ AND KBBB.

B. KBBB: PLEASE PROVIDE FIRST TARGET DZ FORECAST TO KAAA WITH INFO COPIES TO KCCC NLT 17/1300Z AND CREW BRIEF TO KCCC.

C. KCCC: PLEASE PROVIDE CREW BRIEFING TO KDDD, SECOND TARGET DZ, AND KEEE.

D. KEEE: PLEASE PROVIDE FORECAST FOR SECOND TARGET DZ TO KCCC WITH INFO COPIES TO KAAA AND KDDD NLT 19/1200Z AND CREW BRIEF TO KFFF.

E. KFFF: PLEASE PROVIDE CREW BRIEFING TO THIRD TARGET DZ, AND RETURN MISSION BRIEF TO KAAA.

F. KGGG: PLEASE PROVIDE THIRD TARGET DZ FORECAST TO KFFF WITH INFO COPIES TO KAAA AND KDDD NLT 20/2215Z.

4. MISSION PRODUCTS:

(1). FIRST TARGET DZ FORECAST – KBBB.

3X.XXN 9X.XXW (Lat/Long).

TOT: 17/1950Z DROP ALTITUDE 1000 AGL.

VT: 17/1850Z - 2050Z JULY XXXX.

(2). SECOND TARGET DZ – KEEE.

3X.XXN 7X.XXW.

TOT: 19/2230Z DROP ALTITUDE 800 AGL.

VT: 19/2130Z - 2330Z JULY XXXX.

(3). THIRD TARGET DZ – KGGG.

4X.XXN 7X.XXW.

TOT: 21/0300Z DROP ALTITUDE 800 AGL.

VT: 21/0200Z - 0400Z JULY XXXX.

5. POINTS OF CONTACT:

A. 12 OSS/OSW (KAAA): TSGT DOE, DSN 123-4567.

B. 45 OSS/OSW (KBBB): SSGT RAY, DSN 234-5678.

C. 67 OSS/OSW (KCCC): MSGT MEE, DSN 345-6789.

D. 89 OSS/OSW (KDDD): TSGT FAAH, DSN 456-7890.

E. 101 OSS/OSW (KEEE): 1 LT SOW, DSN 567-8910.

F. 68 OSS/OSW (KFFF): SSGT LAAH, DSN 678-9101.

G. 15 0SS/OSW (KGGG): 2 LT TEA, DSN 789-1011.

6. REMARKS: PLEASE NOTIFY KAAA POC OF ANY PROBLEMS IN PROVIDING SUPPORT TO THIS MISSION. 12 OSS/OSW SENDS, 2 LT GREEN.

Figure A3.4. Example CMEF for Range Control.

VALID TIME VT: XX/XXXXZ - XXXXZ JULY XXXX.
ALL FORECAST HEIGHTS AGL.

AVERAGE RANGE SURFACE ELEVATION: +190 FEET MSL.

CLOUDS:	040	120
	SCT	BKN
	020	070 (LYRD)
AFT 17Z:	040	120
	BKN	OVC
	020	070 (SOLID)
SFC VIS/WX:	7+/NONE	
SFC WINDS:	32008KTS	
MIN ALSTG:	30.02INS	
TSTMS:	ISOLD, MAX TOPS 350	
TURBC:	LGT SFC TO 130	
ICING:	LGT RIME 070 TO 120	
LLWS:	NONE	
MAX/MIN TEMP:	P21C/P18C	
REMARKS:	NONE	

WINDS/TEMPS ALOFT:

200 FT:	28010KTS/P16C	3,000 FT:	33030KTS/P09C
500 FT:	30010KTS/P15C	5,000 FT:	34035KTS/P03C
700 FT:	31015KTS/P14C	7,000 FT:	35040KTS/00C
1,000 FT:	32015KTS/P13C	9,000 FT:	35045KTS/M03C
1,500 FT:	34020KTS/P12C	11,000 FT:	35050KTS/M06C
2,000 FT:	33025KTS/P11C	13,000 FT:	35055KTS/M09C

NEAREST METAR SITE: KXXX (4 NM W).

FCSTR: TSGT CARES, QA: 1LT CHECKS.
DSN 321-5678, EXT 222.

Attachment 4

CHEMICAL DOWNWIND MESSAGE (CDM) FORMAT

A4.1. CDM Format. The weather information in the CDM is formatted as in **Table A4.1.**. Weather data that is unavailable or for which no code exists is represented by a dash.

A4.1.1. The first part of the CDM consists of the DTG. The DTG is the time from which the CDM forecast begins (e.g., 310600Z would indicate the beginning of the forecast period). Then, the forecast is broken down into three consecutive two-hour increments, each with its own alphanumeric designator. The increments are:

A4.1.1.1. Line ***Whiskey Mike*** **(WM)** is used for the first two-hours of the forecast (e.g., this would be from 310600Z to 310800Z.

A4.1.1.2. Line ***X-Ray Mike*** **(XM)** for the second two hours of the forecast (e.g., from 310800Z to 311000Z).

A4.1.1.3. Line ***Yankee Mike*** **(YM)** for the final two hours of the forecast (e.g., from 311000Z 311200Z).

A4.1.1.4. A fourth group, **Zulu Mike (ZM)**, may be added for Air Force customers receiving CDM products synchronized with TAF support.

Table A4.1. Chemical Downwind Message Format.

Weather Parameters	*Example of Basic Data Format*
Surface Downwind Direction (direction **towards**)	WM**120**010418742
Surface Downwind Speed in Kilometers per Hour	WM20**010**418742
Air Stability Category	WM20010**4**18742
Average Ambient Temperature	WM120010**18**742
Average Relative Humidity	WM12001041**8**742
Significant Weather Phenomena	WM12001041874**2**
Cloud Cover	WM12001041874**2**

A4.1.2. Surface downwind direction (direction towards). Add 180 degrees to the wind forecast in the TAF since TAF code gives winds in direction “from” which wind is blowing. **Table A4.2.** contains a conversion chart.

Table A4.2. Wind Conversion Chart.

360	010	020	030	040	050	060	070	080	090	100	110	120	130	140	150	160	170	180
180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	360

A4.1.3. Surface downwind speed in kilometers per hour (KPH). Convert the wind speed forecast (mean) in knots to kilometers per hour. **Table A4.3.** is a knots to kilometer conversion chart.

Table A4.3. Knots to Kilometer Conversion Chart.

KNOTS	0	1	2	3	4	5	6	7	8	9
	KPH									
0	0	2	4	6	7	9	11	13	15	17
10	19	20	22	24	26	28	30	32	33	35
20	37	39	41	43	45	46	48	50	52	54
30	56	58	59	61	63	65	67	69	70	72
40	74	76	78	80	82	83	85	87	89	91
50	93	95	96	98	100	102	104	106	108	109

A4.1.4. Air Stability Category. **Table A4.4.** contains generic guidelines on stability categories. Figure 1-2 in Army Field Manual 3-6, *Field Behavior of Nuclear Biological Chemical Agents,* provides a detailed decision tree to determine stability.

Table A4.4. Air Stability Categories.

Lapse Rate	*Sun Angle*	*Cloud Cover*	*Weather/Terrain*
1 – Very unstable to absolutely unstable	> 46°	CLR - SCT	Dry to slightly moist
2 – Unstable to conditionally unstable	40° - 46°	SCT - BKN	Dry to slightly moist
3 - Slightly unstable to conditionally unstable	> 32°	BKN - OVC	Wet, wind > 9 knots
4 - Neutral to conditionally unstable	< 32°	BKN - OVC	Continuous rain, wind > 9 knots
5 - Slightly stable to conditionally stable	< 32°	CLR - SCT	Haze, fog, wet
6 - Stable	< 32°	CLR - SCT	Haze, fog, snow cover
7 - Very stable to stable	< 4°	CLR - SCT	< 1,000 feet in fog; < 6,000 meters in haze/ snow; snow cover or frost

A4.1.5. Average Ambient Temperature. Average Celsius temperature forecast for the period in simple code. To encode, simply enter the Celsius temperature in 2 digits for positive temperatures, add 50 to negative temperatures, for example: 05°C = 05, -03°C = 53.

A4.1.6. Average Relative Humidity. Calculate from temperature/dewpoint forecasts using **Table A4.5.**.

Table A4.5. Average Relative Humidity.

Code	0	1	2	3	4	5	6	7	8	9
Relative Humidity (RH) Range	0-9%	10-19%	20-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-89%	90-100%

A4.1.7. Significant Weather Phenomena. Use the symbol as listed in **Table A4.6.**

Table A4.6. Significant Weather Phenomena Codes.

3 = Blowing snow or sand
4 = Fog, ice fog, or haze (vis < 4mi)
5 = Drizzle
6 = Rain (moderate or heavy)
7 = Light rain or snow and rain mixed
8 = Showers of rain, snow, hail, or a mixture
9 = Thunderstorms

A4.1.8. Use **Table A4.7.** to determine the code for sky cover.

Table A4.7. Sky Cover Conversion Chart.

0 = sky less than half covered by clouds (CLR-SCT/ 0-4 octants coverage)
1 = sky more than half covered by clouds (BKN/5-7 octants coverage)
2 = sky overcast (OVC/8 octants coverage)

Table A4.8. Example CDM.

310500Z (Obs Time) 310600Z (Fcst Time)
1 Corps
WM 120010418742 XM 125019416742 YM 130005518642

Attachment 5

STANDARD WEATHER REPRESENTATION AND SYMBOLOGY

A5.1. General Instructions. Line types and colors for commonly used isopleths are depicted in **Figure A5.1.** The standard depictions for bounded areas of specific weather parameters are illustrated in **Figure A5.2. Figure A5.3.** contains the standard symbols for frontal zones and other weather features.

Figure A5.1. Recommended Line Types and Colors for Commonly Used Isopleths.

Isobars (Surface) BLACK solid

Contours (upper air) BLACK solid

Isotherms RED dashed

Isotachs PURPLE dashed

Isodrosotherms GREEN solid

Thickness RED dashed*

(* Only on products without isotherms)

Figure A5.2. 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, Duststorms, 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.

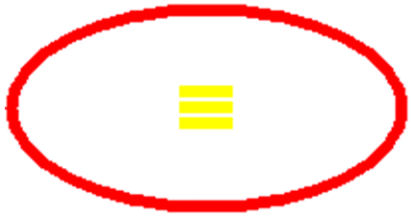
(BLUE dots or dashes: Clear Air Turbulence & Mechanical Turbulence)

(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.

Areas of Ceilings less than 3,000 feet but greater than or equal to 1500 feet and/or Visibility less than 5 miles but greater than or equal to 3 miles: Outline in BLUE scalloped line.

Cloud Forecasts greater than or equal to 3000 feet and above: Outline in BROWN scalloped line and place bases/tops inside cloud areas.

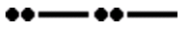
$$\frac{200}{140}$$

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 A5.3. 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 Tradewind Convergence Zone, formerly called the Inter-Tropical Convergence Zone. See Note.	

NOTE: **The separation of the two horizontal lines gives a quantitative representation of the width of the New Equatorial Tradewind 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 BLUE Negative Vorticity Centers	Shade BLUE BLUE ridge symbol BLUE X

Attachment 6

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

A6.1. 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.

A6.1.1. **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).

A6.1.2. **Block 2. Location.** Enter the location (installation or area) for which the watch/warning is valid.

A6.1.3. **Block 3. Date.** Enter the issue date of the watch/warning.

A6.1.4. **Block 4. Issued By.** Enter the name or initials of the individual who issues the watch/warning.

A6.1.5. **Block 5. Verified By.** Enter the name or initials of the individual who verifies the warning.

A6.1.6. **Block 6. Criteria:**

A6.1.6.1. **Watches/Warnings Are Issued For The Following.** Enter the watch/warning criteria.

A6.1.6.2. **Desired Lead-Time.** Enter the desired lead-time.

A6.1.6.3. **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.

A6.1.6.4. **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.

A6.1.6.5. **Verification.** See paragraph **3.4.7.4.** for verification procedures.

A6.1.6.5.1. **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.

A6.1.6.5.2. **Did Not Occur.** Check those weather elements that did not occur.

A6.1.6.5.3. **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.

A6.1.6.5.4. **Timing Error.** Enter the timing error if a lead-time was computed.

A6.1.6.6. **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:

THUNDERSTORMS WITH _____ WINDS AND _____ INCH HAIL

OR

WINDS _____ KNOTS NOT ASSOCIATED WITH THUNDERSTORMS

This space may also be used to document extension information.

A6.1.6.7. **Block 7. Dissemination:**

A6.1.6.7.1. **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.

A6.1.6.7.2. **Contact.** List primary and secondary means of contacting the agencies, for example, N-TFS/x1234.

A6.1.6.7.3. **Agency Criteria.** Mark the watch/warning criteria for each agency.

A6.1.6.7.4. **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.

A6.1.6.7.5. **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."

A6.1.6.7.6. **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.

A6.1.6.7.7. **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."

A6.1.6.8. **Block 8. Remarks.** Use for miscellaneous information.

A6.1.6.9. **Block 9. Pertinent Observations** (back of form). List all pertinent observations, both "official" and "unofficial," radar information if available, and other information that verifies and/or justifies the watch/WW, or provides reasoning why the warning was not cancelled when it did not verify. Include available information (i.e. radar information, off-duty observer reports, locally reported weather conditions) used to verify warnings for winds greater than or equal to 50 knots or hail greater than or equal to 3/4 inch (or the substituted local severe weather thresholds where different) that are reported or observed within *10 nautical* miles rather than in the area covered by the warning.

A6.1.6.10. **Block 10. Forecast Review and Comments** (back of form). Use for forecast review information. AF weather leaders can use this space to include written comments on weather watches and warnings.

Attachment 7

INSTRUCTIONS FOR COMPLETING AF FORM 3806, WEATHER WATCH ADVISORY LOG

A7.1. General Instructions. Unit leaders may use these instructions as guidance in preparing local procedures for logging forecast and observed weather advisories. Enter all times in UTC.

A7.1.1. **Date.** Enter the month and year.

A7.1.2. **Issued.** Enter the issue DTG.

A7.1.3. **Valid.** Enter the valid time of the WA. Leave blank for observed WAs.

A7.1.4. **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).

A7.1.5. **Text.** Enter the text of the advisory.

A7.1.6. **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.

A7.1.6.1. **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.

A7.1.6.2. **Time.** Enter the time each agency was notified.

A7.1.6.3. **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.

A7.1.6.4. **Forecaster.** Enter the name or initials of the forecaster issuing, extending, or canceling the WA.

A7.1.7. **Remarks.** Use as required.

A7.1.8. **Verification.** Verify all forecast WAs either objectively or subjectively as determined by unit leaders. For WAs containing multiple phenomena, verify each phenomenon separately.

A7.1.8.1. **Occurred.** Check "Yes, No, or Not Applicable."

A7.1.8.2. **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.

A7.1.8.3. **Timing Error.** Enter the calculated timing error, if required.

A7.1.8.4. **Verified By.** Enter the initials of the individual verifying the advisory.

A7.1.8.5. **Comments/Remarks.** Enter enough meteorological reasoning and information, such as observations, radar reports, and PIREPs, to verify and/or justify the WA. This includes information to verify the WA objectively or subjectively.

Attachment 8

DD FORM 175-1, FLIGHT WEATHER BRIEFING INSTRUCTIONS

A8.1. 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."

A8.2. PART I - TAKEOFF DATA. Enter the general forecast for takeoff 1 hour either side of the estimated time of departure (ETD).

A8.2.1. 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).

A8.2.2. Block 2. **ACFT TYPE/NO.** Enter aircraft type (F117, B52, C5) and radio call sign, mission number, or the last three digits of the tail number.

A8.2.3. 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.

A8.2.4. Block 4. **RWY TEMP.** Enter the runway temperature (prefixed with a “+” or “-” as applicable) and designate degrees Celsius or Fahrenheit used.

A8.2.5. Block 5. **DEW POINT.** Enter the runway temperature (prefixed with a “+” or “-” as applicable) and designate degrees Celsius or Fahrenheit used. .

A8.2.6. 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.

A8.2.7. Block 7. **PRES ALT.** Enter the pressure altitude in feet with algebraic sign. Primarily used by USAF aviators. Army aviators usually use density altitude.

A8.2.8. Block 8. **DENSITY ALT.** Enter in feet with algebraic sign. Primarily used by Army aviators in mountainous terrain only.

A8.2.9. 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.

A8.2.10. 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.

A8.2.11. 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.

A8.2.12. Block 12. **Runway Surface Condition (RSC)/Runway Condition Reading (RCR).** Enter the latest reported Runway Surface Condition/Runway Condition Reading (RSC/RCR) for the departure airfield, if available (e.g., WR//, RCRNR, IRPSR10, P DRY). When RSC/RCR is not available, enter "N/A."

A8.2.13. 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 A8.1. 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** **TAKEOFF ALTN KSUX** **VALID 1410-1540Z 08012 4 –SN OVC018 ALSTG 29.95 TEMPO 1 SN OVC009**							

A8.3. 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.

A8.3.1. Block 14. **FLT 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.

A8.3.2. 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 175-1. Indicate there are attachments by writing "SEE ATTACHED" in block 15 and check "Yes" in block 34.

A8.3.3. 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).

A8.3.4. Block 17. **CLOUDS AT FLT 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.

A8.3.5. Block 18. **OBSCURATIONS AT FLT 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.

A8.3.6. 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."

A8.3.7. 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.

A8.3.8. 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 Mean Sea Level. If the lowest freezing level is at the surface, enter "SFC" and geographical location.

A8.3.9. Block 22. **THUNDERSTORMS.** Enter the name and DTG of the thunderstorm product used (e.g., AFWA/OWS products, 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 AFWA and OWS thunderstorm products. Never use the terms "cumulonimbus" or "CB." Instead, use "thunderstorm."

A8.3.10. Block 23. **TURBULENCE** (not associated with thunderstorms)**.** Enter the name and DTG of the turbulence forecast product used (e.g., AFWA/OWS products, NWS or foreign In-Flight Weather Advisories). Enter the type, intensity, levels, and locations of turbulence affecting the route or specific mission.

A8.3.11. Block 24. **ICING** (not associated with thunderstorms)**.** Enter the name and DTG of the icing forecast product used (e.g., AFWA/OWS products, NWS or foreign In-Flight Weather Advisories). Enter the type, intensity, levels, and locations of icing affecting the route or specific mission.

NOTE: Like AFWA and OWS forecast products, 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 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.

A8.3.12. 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 A8.2. Example PART II – EN ROUTE & MISSION DATA.

PART II – ENROUTE & MISSION DATA

14. FLT LEVEL/WINDS/TEMP		SEE ATTACHED	15. SPACE WEATHER				16. SOLAR/ LUNAR	LOCATION
			UHF 20N180W to Paya Lebar					
				NO IMPACT	MARGINAL	SEVERE	BMNT 0600 Z	
100	KOFF – KSUX 21035/-10		FREQ		X		SR 0628 Z	MR 2023 Z
	KSUX – Nrn MN 17050/-05		GPS	X			SS 1836 Z	MS 0755 Z
			RAD	X			EENT 1904 Z	ILLUM 92 %

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				
CHART 15 OWS 20 / 12Z				CHART 15 OWS 20 / 12Z			CHART 15 OWS 20 / 12Z				CHART				
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			X	
	FEW 3-15%					MODERATE			LIGHT				MODERATE			X	
	SCATTERED 16-45%					SEVERE			MODERATE	X			HEAVY				
	NUMEROUS > 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 Ern NE – Srn SD			LOCATION NE, IA, Srn SD				LOCATION NE, IA, Srn SD				

A8.4. 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 AFI 11-202V3, *General Flight Rules,* Army Regulation 95-1, *Flight Regulations*, 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.

A8.4.1. 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.

A8.4.2. 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.

A8.4.3. 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.

A8.4.4. 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.

A8.4.5. 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.

A8.4.6. 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.

Figure A8.3. 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

A8.5. PART IV - COMMENTS/REMARKS.

A8.5.1. 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.

A8.5.2. Block 33. **PMSV.** Enter the PMSV frequency and/or phone patch number of the weather unit providing the briefing. If PIREPs are requested for specific areas, enter the areas in Remarks (e.g., Request PIREP DURGC).

A8.5.3. Block 34. **ATTACHMENTS.** Check the appropriate block indicating if attachments are provided with the briefing.

A8.5.4. 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 web page, 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 28OWS at DSN 965-0588 or toll free at 1-877-297-4429."

Figure A8.4. 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.					

A8.6. PART V - BRIEFING RECORD.

A8.6.1. Block 36. **WX BRIEFED TIME.** Enter time the briefing was provided. For briefings sent electronically, this will be the time the briefing was faxed, posted on a web page, local LAN, or passed to a central dispatch facility (TACC, AMOCC, etc.). Append an "E" in front of the time (e.g., E1015Z) if the crew was not verbally briefed. 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).

A8.6.2. 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.

A8.6.3. Block 38. **FORECASTER'S INITIALS.** Enter the initials of the weather briefer or the forecaster preparing and disseminating the briefing.

A8.6.4. Block 39. **NAME OF PERSON RECEIVING BRIEFING.** (Remote briefings only). If available, enter receiver's name and, if applicable, military grade.

A8.6.5. 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 (paragraph A6.6.1). 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 2 hours of ETD. Adjust the void time if the ETD changes.

A8.6.6. 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, rebrief, and indicate the required changes (i.e. highlight/bold if electronic, green ink if paper) and enter the initials of the forecaster providing the extension. Extensions follow the same rule as for void times.

A8.6.7. Block 42. **WX REBRIEFED TIME/INITIALS.** (Not required for Army, Army equivalent is "Extended To") If weather rebriefed is different than originally briefed, indicate the changes to original weather entries as specified in Block 41 and enter the rebriefing time and initials of the forecast providing the rebrief.

A8.6.8. Block 43. **WX DEBRIEF TIME/INITIALS.** Enter the time the aircrew debriefed and the initials of the forecaster receiving the debriefing.

Figure A8.5. Example PART V - BRIEFING RECORD.

PART V – BRIEFING RECORD			
36. WX BRIEFED TIME **E1329/1345** Z	37. FLIMSY BRIEFING NO.	38. FORECASTER'S INITIALS **LM**	39. NAME OF PERSON RECEIVING BRIEFING
40. VOID TIME **1459/1515** Z	41. EXTENDED TO / INITIALS Z	42. WX REBRIEFED TIME / INITIALS Z	43. WX DEBRIEF TIME / INITIALS **1930/SB** Z

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Attachment 9

EXAMPLE OWS MASTER TRAINING OUTLINE

Time	OWS MASTER TRAINING OUTLINE	OJT	LECTURE	LAB	STC	QTP	CDC	Technical Reference
1 DAY	***Major Objective 1:*** **OWS Familiarization**							
	Lesson 1-1: Concept of Operations.							
	Lesson 1-2: Organizational Structure, Pyramid Recall Procedures, Commander Policies, etc.							
	Lesson 1-3: Production Floor Functions.							
	Lesson 1-4: Communication and Computer System Architecture.							
	Lesson 1-5: Operating Instructions (OIs).							
	Lesson 1-6: Training Program Overview.							
3 DAYS	***Major Objective 2:*** **Theater or Region Area of Responsibility (AOR) Familiarization**							
	Lesson 2-1: Geopolitical Boundaries (e.g., resource protection area coverage, flight training ranges, drop zones, air refueling routes, etc.).							
	Lesson 2-2: Memorandum of Agreement (MOA) with each CWT, Air National Guard, Air Force Reserve Unit.							
	Lesson 2-3: Mission Overview of Support to each Base/Post in the AOR (e.g., fighters, bombers, tankers, airlift, helicopters, ground vehicles, infantry, morale/ welfare/recreation services, etc.).							
	Lesson 2-4: Mission Critical Air and Space Weather Thresholds at each Base/ Post in the AOR.							
	Lesson 2-5: Back-up Support.							

Attachment 10

EXAMPLE MOBILITY CHECKLISTS

Table A10.1. Example Pre-deployment Checklist.

1. Determine time and location of briefings. Perform them as required.
2. Contact indigenous weather personnel. Determine what support they can provide, and what support we can provide them. Remember OPSEC.
3. Conduct outdoor site survey. Determine locations for:
a. TACMET.
b. TACCOM.
c. TRT antenna.
d. Lightning Detector antenna.
4. Coordinate with Communication personnel.
a. Explore possibility of 2 phone lines installed.
b. Location of other communications options.
5. Coordinate with civil engineering on power requirements.
6. Set up work area. Determine locations for:
a. Satellite Computer.
b. Computer workstations.
c. Technician work areas.
7. Determine:
a. Where we will sleep?
b. Where we will eat?
c. Is transportation available?
d. Are Morale, Welfare, and Recreation (MWR) facilities available?
8. Obtain a phone listing and maps of local area.
9. Identify the chain of command.
10. Determine evacuation site.
11. Perform any other duties as directed by Deployed Commander.
12. Call home station with initial (Situation Report) SITREP and phone number. Remember OPSEC.

Table A10.2. Example Employment Checklist.

1. Determine time and location of briefings. Perform them as required.
2. Contact indigenous weather personnel. Determine what support they can provide, and what support we can provide them. Remember OPSEC.
3. Conduct outdoor site survey. Determine locations for:
a. TACMET.
b. TACCOM.
c. TRT antenna.
d. Lightning Detector antenna.
4. Coordinate with Communication personnel.
a. Explore possibility of 2 phone lines installed.
b. Location of other communications options.
5. Coordinate with Civil Engineering for power requirements.
6. Set up work area. Determine locations for:
a. Satellite Computer.
b. Computer Workstations.
c. Technician work areas.
7. Determine:
a. Where we will sleep?
b. Where we will eat?
c. Is transportation available?
d. Are MWR facilities available?
8. Obtain a phone listing and maps of local area.
9. Identify the chain of command.
10. Determine evacuation site.
11. Perform any other duties as directed by Deployed Commander.
12. Call home station with initial SITREP and phone number. Remember OPSEC.

Table A10.3. Example Re-deployment Checklist.

Event Title:	**Deploying Team Members:**
Projected Deployment Dates: _____ to _____	
Administrative Actions	1. Identify personnel for re-deployment. Structure re-deployment to minimize effects on operations. Coordinate with the Mission Commander on final station shutdown. 2. Inform higher echelon and co-located weather units of re-deployment. 3. Cancel SAR. 4. Write Joint Universal Lessons Learned as needed. Provide inputs to the Commander as required. 5. Begin After Action Report. 6. Clean the work area of all trash and debris. 7. Use appropriate software to remove all classified information from the laptop. 8. Notify home unit of approximate return time as soon as possible.

Cargo Preparation	1. Inventory all equipment. Cross reference against initial load list. Identify equipment needing repair. 2. Clean all equipment and pack equipment according to load lists. 3. Mark Containers as required (e.g., TCN, Unit, Dimensions). 4. If returning with hazardous cargo, complete DD Form 1387-2. 5. Destroy all non-essential classified material. 1. Protect classified materials at all times. The classified courier will either hand-carry the material or coordinate with the Intelligence flight to use their safe (recommend using Intel personnel). 7. Palletize/marshal equipment according to Logistics' direction.

Table A10.4. Example Post-deployment Checklist.

Event Title:	**Deploying Team Members:**
Projected Deployment Dates: _____ to _____	
After Actions Report	1. Complete the After Actions Report according to the TSOPs. 2. First draft goes to the Mobility OIC/ NCOIC to check for sensitive/ classified information. 3. The NCOIC must review the report. 4. The OIC must approve the report and distribute to the appropriate people. 5. SUSPENSE: have first draft completed upon arrival at home station.
Mobility Equipment	1. Return all issued equipment. 2. Ensure possession of hand receipts. 3. SUSPENSE: within 10 days of return to home station.
Tactical Weather Equipment	1. Set up all equipment to operations check; clean and carefully repack. 2. Return equipment to the warehouse and pick up hand receipts from the Mobility OIC/NCOIC. 3. Replenish any depleted, broken, or missing supplies. 4. Report operational status of all equipment to Mobility OIC/NCOIC. 5. SUSPENSE: within 10 days of equipment's return to home station.

Event Title:	Deploying Team Members:
Leave and Compensation Days	1. Compensation days will be awarded at the OIC's discretion. 2. Leave upon return must be coordinated with NCOIC prior to deployment. 3. SUSPENSE: time off will be authorized only after completion of this checklist.