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# *TERMINAL AERODROME FORECASTS*

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SIGNED 12/06/02
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**1. General.** This instruction describes Terminal Aerodrome Forecast (TAF) preparation by National Weather Service (NWS) offices. TAFs, also known as Aerodrome Forecasts, are a critical element of NWS aviation weather services because they are a key product in decisions on aircraft movement within the National Airspace System (NAS).

**2. Background.** TAFs are used by a variety of aviation customers, including domestic and international commercial airlines, general aviation (GA), civilian, and military operators. TAFs

will be prepared, issued, and distributed on a timely basis to meet requirements of the U. S. Aviation Authority, the Federal Aviation Administration (FAA), and the International Civil Aviation Organization (ICAO) in a code format designed by the World Meteorological Organization (WMO) for both domestic and international use.

**3. Responsibility.** WFO MICs are ultimately responsible for maintaining a consistent and accurate aviation forecast program. TAFs will be prepared by designated NWS offices for the sites listed in Appendix E. TAF sites are listed alphabetically by region, by WFO within each region, and by TAF sites, indicated by the 4-letter ICAO identifier and the location (either city, town, or airport). The Office of Climate, Water, and Weather Services (OCWWS), NWS Headquarters (NWSH) will update Appendix E at least annually.

**4. Terminal Aerodrome Forecast.** A NWS TAF will consist of the expected meteorological conditions significant to aviation at an airport (terminal) for a specified time period. The U.S. definition of a terminal is the area within five (5) statute miles (SM) of the center of an airport's runway complex. Forecasters will prepare and monitor TAFs using the best professional judgement to optimize timeliness and representativeness, with an awareness of the potential operational impact of each forecast element. Forecasters will also keep in mind the Critical TAF Period Philosophy; defined as hours 2-6 from the current valid time within the TAF.

TAFs in the U.S. will be prepared in the international standard for TAF code, with U.S. modifications, described in WMO Manual on Codes, WMO No. 306, Volume I.l, Part A, FM 51-X Ext. TAF, Aerodrome Forecast. U.S. modifications, or national coding practices in WMO terminology, will be held to a minimum.

**4.1 Guidance and Coordination.** Forecasters should use guidance products from the National Centers for Environmental Prediction (NCEP), Aviation Weather Center (AWC), Alaska Aviation Weather Unit (AAWU), Storm Prediction Center (SPC), Tropical Prediction Center (TPC), Central Pacific Hurricane Center (CPHC), and Model Development Laboratories (MDL). Other sources of information useful in preparing TAFs include Pilot Reports (PIREP), climatology, local effects, and locally derived forecast rules.

Forecasters should coordinate with adjacent NWS offices to prevent inconsistencies between TAFs. TAFs will be synoptically consistent with public and other aviation products. However, since the TAF describes conditions in a very small area relative to public zone forecasts or sections of an aviation area forecast, some small scale differences can occur. NWS WFOs should call local FAA facilities and/or Center Weather Service Units (CWSU) to solicit PIREPs. CWSU forecasters should relay PIREPs of conditions pertinent to TAFs, along with other PIREP information as duties permit, to appropriate NWS offices. However, the forecaster is the final authority and is ultimately responsible for the forecasts they issue.

**4.2 Composing the TAF.** A complete TAF will include a forecast of surface wind (speed and direction), visibility, weather, obstructions to vision (if any), clouds (or vertical visibility into a surface-based obscuration), Low Level Wind Shear (LLWS), and any expected significant change(s) to one or more of these elements during the specified time period, which will

ordinarily be 24 hours. Under some circumstances, however, a TAF may be issued for a shorter valid period. For example, if essential observational data are not available at the time of scheduled forecast preparation, a TAF issuance may be delayed, resulting in a valid period of less than (LT) 24 hours.

Forecasters will keep the following in mind when composing a TAF:

a. Do not provide a great level of detail on operationally insignificant expectations.

b. Be aware of amendment criteria when formulating the forecast, but do not forecast just to satisfy criteria.

c. Severe thunderstorms (TSTM) are difficult to describe in the significant weather (SIGWX) portion of the TAF. However, a severe TSTM may be indicated by the forecast winds (GTE 50 knots with TSTMs in significant weather).

d. The Critical TAF Period is the most important time frame for operationally significant weather.

TAFs will also include specified significant meteorological phenomena expected to occur in the airport's vicinity (VC) during any part of the valid period as VC weather codes (VCFG, VCSH, VCTS). In the United States, vicinity is defined as an area between circles (a donut) with radii of 5 and 10 SM from the center of the runway complex of an airport. NOTE: VC has less stringent operational impacts on users than PROB30 groups.

TAFs for Automated Surface Observing System (ASOS) and Automated Weather Observing System (AWOS) sites will contain the element value(s) and the type(s) and intensity of weather and/or obstructions the forecaster expects, regardless of whether the automated system can report or differentiate between those conditions and other, similar conditions. For example, if the forecaster expects clouds above 12,000 feet, zero visibility, ice pellets, or snow showers, the TAF should reflect these conditions. Even when an automated system reports CLR (which indicates clear below 12,000 feet AGL), M1/4SM (which indicates visibility of LT 1/4 SM), or rain or snow when ice pellets or snow showers may be occurring, the TAF will be representative of what is expected to occur.

The forecaster will maintain a watch of weather conditions for all pertinent TAF sites, including sites with scheduled part-time observation, automated observing sites requiring part-time augmentation, and non-augmented automated observing sites.

**4.3 Sub-dividing the TAF Valid Time Period**. The valid time period of the TAF may be sub-divided into two or more smaller segments of time to describe significant changes to the forecast conditions. The terms used to sub-divide the valid time period are described in Appendix C, Section 1.2.9.

TAFs should be as simple and straightforward as possible. Changes indicated in the forecast should be kept to the minimum number needed to describe operationally significant changes.

The following sub-subsections describe factors which will impact decisions on sub-dividing the forecast valid period.

**4.3.1 Flight Categories.** Low Instrument Flight Rules (LIFR), Instrument Flight Rules (IFR), Marginal Visual Flight Rules (MVFR) and Visual Flight Rules (VFR) flight categories define sets of operating procedures, aviator qualifications and aircraft capability requirements. Further, NWS has added an additional category: Very Low IFR (VLIFR), with criteria of ceilings LT 200 feet and/or visibility LT ½ mile, whose results are tracked using the Aviation Verify program. Forecasters will be familiar with these flight categories and understand the impact changes across these categories have on aviation operations.

The flight categories and corresponding ceiling and visibility values are listed below, using the category dividers of Less Than (LT), Less Than or Equal To (LTE), Greater Than (GT), and Greater Than or Equal To (GTE):

| FLIGHT CATEGORY | CEILING (feet) | VISIBILITY (statute miles) |
|---|---|---|
| VLIFR | LT 200 | and/or LT ½ SM |
| LIFR | GTE 200 to LT 500 | and/or GTE ½ to LT l SM |
| IFR | GTE 500 to LT 1,000 | and/or GTE 1 to LT 3 SM |
| MVFR | GTE 1,000 to LTE 3,000 | and/or GTE 3 to LTE 5 SM |
| VFR | GT 3,000 | and/or GT 5 SM |

**4.3.2 Critical Thresholds for Significant Operational Impacts.** Other ceiling (CIG) and visibility (VIS) thresholds which have operational impact, i.e., significant safety, capacity, and/or efficiency impact on aviation operations, include:

CIG LT 2,000 ft/VIS LT 3 SM: Alternate destination and increased fuel required for IFR planning. May restrict visual approaches which lead to reducing airport arrival rates.

CIG LT 800 ft/VIS LT 2 SM: Non-precision approach airports cannot be used as an IFR flight planning alternate.

CIG LT 600 ft/VIS LT 2 SM: Airport cannot be used by most operators as an IFR flight planning alternate.

CIG LT 200 ft/VIS LT ½ SM: These forecast conditions would preclude dispatch/release to the airport as a destination or alternate for most operators. Operators approved for approach Category II/III could dispatch as a destination airport.

NOTE: Category II approach limits are Decision Height (DH) as low as 100 feet, and Visibility or Runway Visual Range (RVR) between 1200 and 1800 feet. Category III approach limits are DH of 50 feet with an RVR as low as 700 feet. DH is not a ceiling category, but rather the height at which the pilot makes the decision to land. Source: FAA Advisory Circular 120-29A.

**4.3.3 Other Events Having Significant Operational Impact.** Thunderstorms, non-convective LLWS, start or stop of freezing precipitation and ice pellets, moderate or greater rain, snow accumulation, sustained winds GT 15 knots, wind direction changes of 30 degrees or more with speeds GTE12 knots or wind gust spread (the difference between mean wind speed and maximum gusts) GTE 10 knots all significantly impact aviation operations.

**4.3.4 Length of TAF Change Groups.** From (FM) will always be a single time, generally a whole hour. FM may be encoded to the minute if the expected change can be forecast to that degree of accuracy. Becoming (BECMG) will never exceed two (2) hours in a TAF, and in most cases should be only one (1) hour. Temporarily (TEMPO) groups will not exceed four (4) hours. Moreover, a TEMPO forecast in effect for more than two (2) hours without an occurrence of the TEMPO conditions will be reviewed for amending. Probability (PROB) groups will be six (6) hours or less.

**4.4 PROB and TEMPO Groups.** PROB and TEMPO are defined as follows:

a. PROB: Probability of occurrence of a thunderstorm or other precipitation event, with associated weather elements as necessary (wind, visibility, and/or sky condition) whose occurrences are directly related to, and contemporaneous with, the thunderstorm or precipitation event. Only PROB30 (30% probability of the specified element occurring) groups will be used in NWS TAFs.

b. TEMPO: Temporary fluctuations in forecast meteorological conditions which are expected to last LT one (1) hour in each instance and, in the aggregate, to cover LT half of the indicated period. Use TEMPO groups for high probability (GT 50%) expectations only.

Forecasters should remember the lowest meteorological condition contained in a TAF, regardless of any conditional language (e.g., PROB30 or TEMPO) will drive operational decisions. PROB30 and TEMPO should describe forecast weather changes short in duration. Therefore, use of either group as a primary means of constructing a TAF is discouraged.

**4.4.1 NWS PROB30 Term Use Restriction.** PROB30 groups will not be used in the first nine (9) hours of every TAF's valid period, including amendments. TEMPO groups will not be used as a substitute to indicate a low probability event during the restricted time period.

RATIONALE: The TAF is a point forecast, not a zone or area forecast. Forecasters are expected to have sufficient knowledge and forecast tools to avoid PROB30 groups in the first nine (9) hours. While the PROB30 group in the TAF should not differ significantly with the zone Probability of Precipitation (PoP), it is not necessarily the same because the PROB30 group usually includes the probability of lower ceilings and restricted visibilities with the precipitation. Further, the TAF can accommodate hourly PoP intervals while the public zone must use PoPs for 6- or 12-hour periods.

Example: A 70% PoP for showers is forecast for a zone in the afternoon. At a TAF site in that zone, a 30% chance of showers is forecast for early afternoon and a 70% chance for late

afternoon. The corresponding TAF would not include a PROB30 group in the first nine (9) hours for a 30% PoP, then may include showers in the prevailing or TEMPO group as the probability increases later in the day.

NOTE: When a PROB30 group is warranted in an amended or delayed TAF, it is recommended the PROB30 group become effective on the next whole hour following the end of the nine (9) hour period which begins after the amended or delayed TAF's issuance time. The use of intermediate times as beginning times for forecast groups, just for the purpose of including a PROB30 group, is discouraged.

**4.5 TAF Amendments.** Amendments are an effective method of optimizing the quality of the TAF. Forecasters must remember the TAF is designed for the end user, and the sooner the forecaster provides an amended TAF to the end user, the better. Unforeseen weather changes can have a rippling affect with delays in the NAS. The decision to amend the TAF relies on the forecaster's assessment of existing conditions and expectations. If conditions change earlier or later than forecast, but the TAF shows the expected trend and will soon recover, an amendment may not be needed. Additionally, small fluctuations in the observation should not result in a minor adjustment to the TAF (chasing the observation). However, amending the TAF for improving observed weather conditions which occur sooner than forecast is recommended. Further, forecasters should exercise good judgment when using automated observations. Because of their sensitivity, AWOS/ASOS observation data are more likely to fall outside the forecast amendment ranges. TAF amendments will be issued promptly when:

a. Conditions meeting amendment criteria are imminent or have occurred and those conditions will, in the forecaster's estimation, persist (30 minutes or longer), or

b. New guidance/information indicates future conditions are expected to be in a different category than originally forecast, especially during the Critical TAF Period.

Forecasters should use application programs designed to alert them when a TAF does not meet current criteria. Forecasters should issue TAF AMDs for significant forecast changes immediately rather than update at the next regularly scheduled TAF release time.

**4.5.1 Amendment Criteria.** Amendment criteria values are operationally significant to aircraft and airports. Discrete flight category value changes for VFR, MVFR, IFR and LIFR have significant operational impact (i.e., fuel requirements, alternates) and the TAF must be especially accurate regarding those values. Further, specific airports may have other values which are locally important to operations. Forecasters should be aware of these values when amendments are required and issued.

U.S. TAF Minimum Amendment Criteria. The following are amendment thresholds for NWS TAFs.

a. Ceiling. If the ceiling decreases to LTE 3000 feet, or LT 2000, 1000, 600, or 200 feet; or increases to GT 3000, or GTE 2000, 1000, 600, or 200 feet.

b. Visibility. If visibility decreases to LTE 5 SM, or LT 3, 2, 1, or ½ SM; or increases to GTE 7 (if forecast is GTE 3 but LTE 5 SM), or GTE 3, 2, 1, or ½ SM.

c. Weather. If TSTMs, freezing precipitation or ice pellets occur and are not forecasted, or, if forecasted, do not occur.

d. Wind Direction, Speed and Gusts. Forecast mean refers to the mean wind direction or speed expected for the specified forecast group time period.

(1) Mean wind direction differs by 30 degrees or more, with an accompanying mean wind speed of GTE 12 knots.

(2) Forecast mean wind speed: actual mean wind speed will differ from forecast group mean speed by GTE 10 knots, and:

(a) The original mean wind speed was GTE 12 knots, or

(b) The newly expected mean wind speed is GTE 12 knots.

(3) Forecast peak gust (or forecast of no gust) GTE 10 knots above forecast gust (or above the forecast mean wind speed if no gusts are forecast) occur or are expected

e. Non-Convective LLWS (up to 2,000 feet). Amend the TAF if non-convective LLWS is forecasted and does not occur, or if LLWS occurs and is not forecast.

**4.6 Time References.** The times in TAFs will be stated in Universal Time Coordinated (UTC). Time references should be as detailed and specific as supporting data and present science allow. The letter Z is appended to the end of the date-time group of forecast origin. The contraction UTC does not appear in the WMO abbreviated leading nor the forecast text.

**4.7 Contractions.** The only contractions used in NWS TAFs will be those terms defined in this instruction and its appendices, which have been derived from the WMO Codes Manual and from the ICAO document ICAO Abbreviations and Codes. In a very few cases, plain language English terms may be used. All valid contractions for TAFs are included in Appendix A.

**4.8 Dissemination and Format.** All scheduled and unscheduled TAFs will be disseminated via communications circuits. The National Weather Service Telecommunications Gateway (NWSTG) assembles all TAFs prepared by NWS offices in the Continental U.S. (CONUS) and Puerto Rico into collectives for domestic and international distribution. TAFs prepared by NWS offices in Alaska and Pacific Regions are transmitted to NWSTG in collectives, i.e., several forecasts per communications header. Individual NWS offices will conform to the directives of their respective region's network (i.e., Advanced Weather Interactive Processing System - AWIPS, Alaska Region Operations Network - ARONET, etc.).

The first line of the text of a TAF product will consist solely of TAF or TAF AMD. The contraction TAF (or TAF AMD) is stated only once in each product or collective, whether it contains one or more TAFs. The next line begins with the ICAO 4-letter location identifier at the left margin. Any subsequent FMGGgg group will begin on a new line, indented five spaces. Continuation lines of a forecast group will be indented six spaces.

When a WFO transmits more than one TAF in a collective, each forecast will be started on the line immediately following the previous TAF with the location identifier at the left margin. Each complete TAF will be followed by an end-of-report separator (an equal sign [=]), which denotes the end of a complete TAF for each location. The end-of-report separator will be followed by a return.

The length of a line will not exceed 69 spaces, including typed characters, spaces, returns, and the end-of-report separator.

**4.9 Issuance Times.** Scheduled TAFs prepared by NWS offices are issued four times a day, every six (6) hours, according to the following schedule:

| SCHEDULED ISSUANCE | VALID PERIOD | ISSUANCE WINDOW |
|---|---|---|
| 0000 UTC | 0000 to 2400 UTC | 2320 to 2340 UTC |
| 0600 UTC | 0600 to 0600 UTC | 0520 to 0540 UTC |
| 1200 UTC | 1200 to 1200 UTC | 1120 to 1140 UTC |
| 1800 UTC | 1800 to 1800 UTC | 1720 to 1740 UTC |

Each office with TAF responsibility is required to issue four scheduled TAFs per day, even if one (or more) of the scheduled TAFs are suspended (NIL). Following a NIL TAF, a delayed forecast or scheduled forecast will be issued as soon as possible, following the guidelines in Section 5.2, Minimum Observational Requirements for Routine TAF Issuance and Continuation.

**5. Requests for Preparation of New TAFs or Changing Existing Part-Time TAF Services.** Requests to establish new TAF service or to change the hours of existing part-time TAF service should be sent to the appropriate Regional Aviation Meteorologist (RAM) (or equivalent) for evaluation. The RH will evaluate the request based on availability of data and NWS resources to support the newly requested TAF(s). Upon endorsement, the RH recommendation will be forwarded to OCWWS, NWSH. If the recommendation is approved, a request for change (RC) is completed by the RH and forwarded to the Data Review Group Change Management (DRGCM). A National Technical Information Message (NTIM) is then prepared by the RH, and upon approval by the DRGCM, is transmitted by the Dissemination Branch and forwarded to OCWWS, NWSH.

At locations where part-time manual observations are replaced with 24-hour automated observations, part-time TAF service is not automatically increased to 24 hours. WFOs are encouraged to determine the need for a full-time TAF. If the need exists, the same procedure for establishing a new TAF, except for the step requiring an RC and approval by the DRGCM, is followed.

**5.1 Observation Requirement to Initiate New TAF Service.** The following elements, at a minimum, are required for NWS approval of new TAF locations: wind (speed and direction), visibility, weather and obstructions to vision, sky condition, temperature, dewpoint, and altimeter setting.

These elements can be obtained from commissioned ASOS or AWOS-III observation sites, or manual observer sites with equipment. Augmentation will be provided in accordance with the agency agreements with augmenters (refer to FAA document 7900.5A, Surface Weather Observing - METAR, Chapters 4 and 5).

**5.2 Minimum Observational Requirements for Routine TAF Issuance and Continuation.** The aviation forecaster must have certain information for the preparation and scheduled issuance of each individual TAF listed in Appendix E. Observations or other complementary and/or supplementary data sources must include, at a minimum, the elements listed in Section 5.1.

All weather elements need not be provided completely and/or at all times in the hourly/special observation itself. Forecasters will also make use of supplementary, complementary and/or augmented observational data, as well as other observing systems (satellite, WSR-88D radar, profiler data) in preparing and monitoring TAFs. This approach, to issue and maintain TAFs using multiple, integrated data sets in addition to hourly and special observations, is known as the Total Observation Concept (TOC).

Alternative methods of obtaining the required weather elements should be utilized, at the discretion of the forecaster, in order to continue providing TAFs. However, in the event the forecaster believes the absence of one or more observed elements will lead to a degradation of the quality of the TAF, the TAF will be limited (e.g., NIL AMD, indicating no amendments will be provided) or suspended (NIL).

Once a particular TAF has been suspended (NIL), a delayed or scheduled TAF for that airport will not be issued until two consecutive observations not LT 30 minutes nor more than about one (1) hour apart have been received using the TOC, in order to establish a trend. NOTE: Using TOC does not necessarily require two (2) surface observations (e.g., one surface observation and one satellite observation could be combined).

**5.2.1 Sites With Scheduled Part-Time Observations.** For TAFs with LT 24-hour observational coverage, or for which part-time TAFs are provided, the TAF will be valid to the end of the routine scheduled forecast period even if observations cease prior to that time. The time observations are scheduled to end and/or resume will be indicated by expanding the AMD NOT SKED statement. Expanded statements will include the observation ending time (AFT 02Z), the scheduled observation resumption time (TIL 12Z) or the period of observation unavailability (02Z-12 Z). TIL should be used only when the beginning of the scheduled TAF valid period coincides with the time of the last observation or when observations are scheduled to resume prior to the next scheduled issuance time. When used, these remarks will immediately follow the last forecast group. If a routine TAF issuance is scheduled to be made after observations have ceased, but before they resume, the remark NIL will immediately follow the valid period group of the scheduled issuance. After sufficient data using the TOC has been

received and the forecaster judges the TAF can be resumed, a delayed TAF will be prepared and transmitted. The delayed forecast will be identified in the abbreviated WMO header by the indicator RRx (where x = A-X).

Examples:

TAF AMD
KACV 141410Z 141412 NIL=

TAF AMD
KRWF 150202Z 150224 AMD NOT SKED 05Z-18Z=

TAF AMD
KPSP 190230Z 190324
NIL AMD=

TAF AMD
KRWI 141610Z 141612 NIL=

**5.2.2 Automated Observing Sites Requiring Part-Time Augmentation.** Each NWS office with TAF responsibility will maintain the latest copy of FAA document 7900.5X, Surface Weather Observing - METAR, where "X" is the current version. Chapter Four (4) of this document is entitled "General Procedures at Automated Weather Stations" and Chapter Five (5) is entitled "Augmentation at Automated Weather Stations".

TAFs for AWOS-III sites which have part-time augmentation will be prepared using the procedures for part-time manual observation sites detailed in the previous section, with one exception. This exception is the remark used when the automated system is unattended. Specifically, the time an augmented automated system is scheduled to go into unattended operation and/or the time augmentation resumes will be included in a remark unique to automated observing sites: AMD LTD TO CLD VIS AND WIND (AFT aaZ, or TIL bbZ, or aaZ-bbZ), where aaZ is the time of the last augmented observation and bbZ is the time the second complete observation is expected to be received. This remark, which does not preclude amendments for other forecast elements, will be appended to the last scheduled TAF issued prior to the last augmented observation. It will also be appended to all subsequent amendments until augmentation resumes.

The AMD LTD TO (elements specified) remark is a flag for customers and differs from the AMD NOT SKED AFT Z remark for part-time manual observation sites. AMD LTD TO (elements specified) means customers should expect amendments only for those elements and the times specified. The remark should be by itself as a separate last line of text in the TAF so the customer does not overlook it.

Example:

TAF AMD
KCOE 150202Z 150224 text

AMD LTD TO CLD VIS AND WIND 05Z-18Z=

The amended forecast indicates that between 0500 and 1800Z amendments will only be issued for wind, visibility and clouds.

An amendment will include forecasts for all appropriate TAF elements, even those not reported when the automated site is not augmented. If unreported elements are judged crucial to the representativeness of a TAF and cannot be adequately determined (e.g., fog versus moderate snow), the TAF should be suspended (i.e. issue an amended TAF stating "NIL").

AWOS-III systems with part-time augmentation, which the forecaster suspects are providing unreliable information when not augmented, should be reported for maintenance and treated the same as part-time manual observation sites. In such cases, the AMD NOT SKED AFT Z remark will be used.

**5.2.3 Non-augmented Automated Observing Sites.** The TAF issued for a non-augmented ASOS site may be suspended in the event the forecaster is notified of, or strongly suspects, an outage or unrepresentative data. Forecasters may also consider suspension of TAF service when an element the forecaster judges to be critical is missing from the observation and cannot be obtained using the TOC. The term NIL AMD will be appended, on a separate line and indented five spaces, to the end of an amendment to the existing TAF when appropriate. If the outage occurs within one (1) hour of the next scheduled issuance or if the forecaster believes the existing TAF is unrepresentative of conditions, an amendment or scheduled issuance containing only the statement NIL will be issued.

**6. Terminating TAF Service.** Normally, TAF service will not be terminated. However, if a TAF site experiences a drastic, permanent reduction in aviation services, the MIC may evaluate whether TAF service should continue for that site. If the MIC believes the TAF service should be terminated, they will forward a recommendation with justification through their RAM and RH to OCWWS, NWSH.

NOTE: Because of the FAA's desire to increase the number of sites which have TAF service availability, terminating TAF service for an airport is unlikely to be approved.

**7. Records Retention.** Records of disseminated TAFs, including amendments, corrections, and delayed issuances, will be maintained in accordance with NWSI 10-2003, Records Retention.

**8. Verification of TAFs.** Feedback is an important piece in any process because it tells the process owner how well the process is doing, and also tells them whether their goals are being met. In aviation forecasting, the goal is to continually improve customer service by identifying forecasting weaknesses and developing methods to strengthen those weaknesses. NWS uses the Aviation Verify program as feedback for TAFs. Therefore, WFOs will perform verification on their respective TAFs using NWS's Aviation Verify program. However, verification results should never be used as negative reinforcement against forecasters.

## Appendix A - Contractions Used in NWS TAFS

NOTE: Some of the expressions (short words, in common English for which there are no ICAO contractions) are completely spelled out, e.g., AND and WIND. TO and NIL are both listed in the ICAO contraction manual and both are common words in English.

| | |
|---|---|
| AAx | Code used in the WMO abbreviated heading to indicate an amended TAF, where x is the letter A through X (see Appendix D, Section 1.1). NOTE: AAx is not used in the forecast text. |
| AFT | After |
| AMD | Amended TAF. Used in the forecast text only. AMD is not used in the WMO abbreviated heading. |
| BC | Patches |
| BECMG | Becoming: an indicator of a significant forecast change to prevailing meteorological conditions, occurring at either a regular or irregular rate within the indicated period of time. The indicated conditions persist until the next forecast change indicator. The duration of the change period covered by BECMG, indicated by GGGeGe will never exceed two (2) hours in NWS TAFs. See Appendix C, Section 1.2.9.2. |
| BKN | Broken cloud layer (5 to 7 oktas cloud amount). Clouds may be transparent or opaque. Lowest broken layer is implied to be the ceiling. |
| BL | Blowing |
| BR | Mist |
| CB | Cumulonimbus cloud |
| CCCC | Generic WMO format code group for a four-letter location identifier. Four-letter location identifiers for specific airports are listed in ICAO document 7910, Location Identifiers. |
| CCx | Code used in the WMO abbreviated heading to indicate a corrected forecast, where x is the letter A through X (see Appendix D, Section 1.3). CCx is not used in the forecast text. |
| CLD | Cloud. |
| DR | Low drifting |

| | |
|---|---|
| DS | Dust storm |
| DU | Dust |
| DZ | Drizzle |
| FC | Funnel cloud |
| FEW | Few clouds (GT 0 oktas to 2 oktas cloud amount) |
| FG | Fog |
| FMGGgg | From the time (UTC) indicated by GGgg. Generic WMO format code group, indicating a significant and rapid (in LT one hour) change to a new set of prevailing conditions. GG is in whole hours, gg is in minutes. See Appendix C, Section 1.2.9.1. |
| FU | Smoke |
| FZ | Freezing |
| G (Gust) | Defined as rapid fluctuations in wind speed with a variation of 10 knots or more between peaks and lulls within a 10 minute time period. |
| GR | Hail (largest hailstone diameter GTE 1/4 inch) |
| GS | Small hail and/or snow pellets (largest hailstone diameter LT 1/4 inch) |
| HZ | Haze |
| IC | Ice crystals |
| KT | Knots |
| LTD | Limited |
| MI | Shallow |
| NIL | “No” or “None” or “I have nothing to send you” |
| NSW | No Significant Weather. An indication that significant weather conditions, as expressed by WMO Code Table 4678, are forecast to end. See Appendix C, Section 1.2.6. |
| OVC | Overcast cloud layer [eight (8) oktas cloud amount] |

| | |
|---|---|
| P6SM | Visibility forecast GT six (6) statute miles |
| PL | Ice pellets |
| PO | Well-developed dust/sand whirls |
| PR | Partial |
| PROBC2C2 | Forecaster's assessment of the probability of occurrence of a thunderstorm (and associated precipitation) or precipitation event, along with associated weather elements (wind, visibility, and/or sky condition) whose occurrences are directly related to, and contemporaneous with, the thunderstorm or precipitation event. Only PROB30 is allowed. See Appendix C, Section 1.2.9.4. |
| PY | Spray |
| RA | Rain |
| RRx | Code used in the WMO abbreviated heading to indicate a delayed TAF, where x is the letter A through X (Appendix D, Section 1.2). RRx is not used in the TAF text. |
| SA | Sand |
| SCT | Scattered cloud layer [three (3) to four (4) oktas cloud amount] |
| SG | Snow grains |
| SH | Shower |
| SKC | Sky clear. No clouds; zero oktas cloud amount. The contraction CLR is not used in the TAF. |
| SKED | Scheduled |
| SM | Statute miles |
| SN | Snow |
| SQ | Squall |
| SS | Sandstorm |
| TAF | Terminal Aerodrome Forecast code format. The international standard for the TAF code, FM 51-X Ext. TAF, is included in WMO Manual on Codes, WMO No. 306, Volume I.1, Part A. |

TEMPO Temporarily. Indicator of temporary fluctuations to forecast meteorological conditions which are expected to last LT 1 hour in each instance and, in the aggregate, to cover LT half of the indicated period. The period of time covered by a TEMPO group will not exceed four (4) hours. See Appendix C, Section 1.2.9.3.

TS Thunderstorm

VA Volcanic ash

VC Vicinity - it has two definitions:

NWS: A donut-shaped area encompassed between circles with radii of 5 and 10 SM, respectively, from the center of the runway complex of an airport. VC will only be used in the initial time period, FM, and BECMG groups, all of which forecast prevailing conditions, and will only be used in combination with fog (FG), shower(s) (SH), and thunderstorm(s) (TS).

WMO: (An area encompassed) within eight (8) kilometers [five (5) statute miles] of the aerodrome but not at the aerodrome (Words in parentheses inferred. See Note 1 under WMO Regulation 15.8.10). VC is not used in international TAFs.

VIS Visibility

VRB Variable wind direction. Wind direction is considered variable when it is impossible to forecast a mean wind direction due to its expected variability, e.g., for very light winds [LTE six (6) knots] or during convective activity.

VV Vertical Visibility

Z Indicator letter (an abbreviated symbol for Coordinated Universal Time - UTC) appended to the date-time of forecast origin group.

## Appendix B - TAF Code Format, Terminology, and Significant Weather Matrices

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**1. Generic International TAF Code Format.** The NWS forecaster must be familiar with the International TAF Code Format shown below.

TAF or TAF AMD

| | | | |
|---|---|---|---|
| CCCC [location identifier] | YlYlGlGlG2G2 [date/time of forecast origin] | YYGGggZ [valid period] | dddffGfmfmKT [wind forecast] |

| | | |
|---|---|---|
| VVV or CAVOK [visibility forecast] | w'w' or NSW [significant weather forecast] | NsNsNshshshs, Vvh,h,h, or SKC (NSC) [cloud and obscuration forecast] |

| | | | |
|---|---|---|---|
| 6IcchlhlhltL [icing forecast] | 5BhBhBhBtL [turbulence forecast] | TTFTF / GFGFZ [temperature forecast] | QNHPIPIPIPIINS [lowest altimeter setting] |

| | |
|---|---|
| TTGGgg or TTTTT GGGeGe [forecast change indicators] | PROBC2C2 GGGeGe [probability forecast] |

**2. International Terminology and Forecast Groups Not Used in NWS TAFS.**

a. CAVOK: Ceiling and Visibility OK.

b. NSC: No Significant Clouds.

c. PROBC2C2 GGGeGe in combination with BECMG and/or TEMPO.

d. Optional Groups: 6I (Icing), 5B (Turbulence), TT (Temperature), and QNH (Altimeter). There is no agreement which requires NWS WFOs to use these groups in NWS TAFs.

**3. Significant Weather: WMO Code Table 4678.**

CODE TABLE 4678 --Significant present and forecast weather

The w'w' groups will be constructed by considering columns 1 to 5 from the following table in sequence. For example, heavy rain shower(s) are coded as +SHRA.

| INTENSITY OR PROXIMITY 1 | DESCRIPTOR 2 | PRECIPITATION 3 | OBSCURATION 4 | OTHER 5 |
|---|---|---|---|---|
| -- Light | **MI** Shallow | **DZ** Drizzle | **BR** Mist | **PO** Well-developed dust/sand whirls |
| Moderate (no qualifier) | **BC** Patches | **RA** Rain | **FG** Fog | |
| | **PR** Partial (Covering part of the aerodrome | **SN** Snow | **FU** Smoke | **SQ** Squalls |
| + Heavy (or well developed, in the case of funnel clouds | | **SG** Snow grains | **VA** Volcanic ash | **FC**[8] Funnel (cloud(s) (tornado or waterspout) |
| | **DR** Low drifting | **IC** Ice crystals | **DU** Widespread | |
| | **BL** Blowing | **PL** Ice pellets | **SA** Sand | **SS** Sandstorm |
| **VC**[4] In the vicinity | **SH** Shower(s) | **GR**[5] Hail | **HZ** Haze | **DS** Duststorm |
| | **TS** Thunderstorm | **GS**[6] Small hail and/or snow pellets | **PY** Spray | |
| | **FZ** Freezing | **UP**[7] Unknown precipitation in automated obs | | |

[4]The NWS definition of VC applied to the terminal forecast is: A donut-shaped area encompassed between circles with radii of 5 and 10 statute miles, respectively, from the center of the airport's runway complex

[5]diameter of largest hailstone GTE 1/4"

[6]diameter of hailstones LT 1/4"

[7]UP will not be used in NWS-prepared terminal forecasts

[8] Tornadic activity, including tornadoes, waterspouts, and funnel clouds, should not be included in TAFs because the probability of occurrence at a specific site is very small.

**4. Significant Weather Phenomena Matrix (next page).**

## SIGNIFICANT WEATHER PHENOMENA MATRIX FOR NWS-PREPARED TERMINAL FORECASTS

| WX PHENOMENA | | QUALIFIER | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Intensity or Proximity | | | | Descriptor[1] | | | | | | | |
| Precipitation | | Light - | Moderate | Heavy + | Vicinity VC[2] | Shallow MI | Partial PR | Patches BC | Low Drifting DR[3] | Blowing BL | Shower(s) SH | Thunder-storm TS[4] | Freezing FZ |
| Drizzle | DZ | -DZ | DZ | +DZ | - | - | - | - | - | - | - | - | FZDZ |
| Rain | RA | -RA | RA | +RA | - | - | - | - | - | - | SHRA | TSRA | FZRA |
| Snow | SN | -SN | SN | +SN | - | - | - | - | DRSN | BLSN | SHSN | TSSN | - |
| Snow Grains | SG | -SG | SG | +SG | - | - | - | - | - | - | - | - | - |
| Ice Crystals[5] | IC | - | IC | - | - | - | - | - | - | - | - | - | - |
| Ice Pellets | PL | -PL | PL | +PL | - | - | - | - | - | - | SHPL | TSPL | - |
| Hail[5,6] | GR | - | GR | - | - | - | - | - | - | - | SHGR | TSGR | - |
| Small Hail[5,7] | GS | - | GS | - | - | - | - | - | - | - | SHGS | TSGS | - |
| **Thunderstorms, Showers, Freezing, and their Intensity or Proximity** | | | | | | | - | - | - | - | - | - | - |
| TS | - | - | TS | - | VCTS[8] | - | - | - | - | - | - | - | - |
| TSRA | - | -TSRA | TSRA | +TSRA | - | - | - | - | - | - | - | - | - |
| TSSN | - | -TSSN | TSSN | +TSSN | - | - | - | - | - | - | - | - | - |
| TSPL | - | -TSPL | TSPL | +TSPL | - | - | - | - | - | - | - | - | - |
| TSGS | - | - | TSGS | - | - | - | - | - | - | - | - | - | - |
| TSGR | - | - | TSGR | - | - | - | - | - | - | - | - | - | - |
| SH | - | - | - | - | VCSH[9] | - | - | - | - | - | - | - | - |
| SHRA | - | -SHRA | SHRA | +SHRA | - | - | - | - | - | - | - | - | - |
| SHSN | - | -SHSN | SHSN | +SHSN | - | - | - | - | - | - | - | - | - |
| SHPL | - | -SHPL | SHPL | +SHPL | - | - | - | - | - | - | - | - | - |
| SHGR | - | - | SHGR | - | - | - | - | - | - | - | - | - | - |
| SHGS | - | - | SHGS | - | - | - | - | - | - | - | - | - | - |
| FZDZ | - | -FZDZ | FZDZ | +FZDZ | - | - | - | - | - | - | - | - | - |
| FZRA | - | -FZRA | FZRA | +FZRA | - | - | - | - | - | - | - | - | - |
| FZFG | - | - | FZFG | - | - | - | - | - | - | - | - | - | - |
| **Obscurations** | | - | - | - | - | - | - | - | - | - | - | - | - |
| Mist[10] | BR | - | BR[10] | - | - | - | - | - | - | - | - | - | - |
| Fog[11] | FG | - | FG[11] | - | VCFG[12] | MIFG[13] | PRFG[14] | BCFG[15] | - | - | - | - | FZFG[16] |
| Smoke | FU | - | FU | - | - | - | - | - | - | - | - | - | - |
| Volcanic Ash[17] | VA | - | VA[17] | - | - | - | - | - | - | - | - | - | - |
| Widespread Dust | DU | - | DU | - | - | - | - | - | DRDU | BLDU | - | - | - |
| Sand | SA | - | SA | - | - | - | - | - | DRSA | BLSA | - | - | - |
| Haze | HZ | - | HZ | - | - | - | - | - | - | - | - | - | - |
| Spray | PY | - | - | - | - | - | - | - | - | BLPY | - | - | - |
| **Blowing Phenomena** | | - | - | - | - | - | - | - | - | - | - | - | - |
| BLSN[18] | - | - | BLSN | - | - | - | - | - | - | BLSN | - | - | - |
| BLSA | - | - | BLSA | - | - | - | - | - | - | BLSA | - | - | - |
| BLDU | - | - | BLDU | - | - | - | - | - | - | BLDU | - | - | - |
| **Other** | | - | - | - | - | - | - | - | - | - | - | - | - |
| Sand/Dust Whirls | PO | - | PO | - | - | - | - | - | - | - | - | - | - |
| Squalls[19] | SQ | - | SQ | - | - | - | - | - | - | - | - | - | - |
| Funnel Cloud[20] | FC | - | FC | - | - | - | - | - | - | - | - | - | - |
| Tornado/Waterspo | +FC | - | - | +FC | - | - | - | - | - | - | - | - | - |
| Sandstorm[22] | SS | - | SS | +SS | - | - | - | - | - | - | - | - | - |
| Duststorm[23] | DS | - | DS | +DS | - | - | - | - | - | - | - | - | - |

FOOTNOTES FOR WEATHER PHENOMENA MATRIX FOR NWS TAFS

1. Only one descriptor will be used for each weather phenomena group, e.g., BCFG.

2. In NWS TAFs, vicinity (VC) is defined as a donut-shaped area 5SM to 10SM from the center of the runway complex of an airport. In NWS TAFs, vicinity will be combined only with fog (VCFG), showers (VCSH), or thunderstorms (VCTS), and only when forecasting prevailing conditions (i.e., initial time period, FM or BECMG groups).

3. Raised by wind to LT six (6) feet above the ground.

4. TS may be forecast by itself if no precipitation is associated with the thunderstorm.

5. No intensity is ever given to hail (GR/GS [snow pellets]) or ice crystals (IC).

6. Largest forecast hailstone has a diameter of GTE 1/4 inch.

7. Forecast hailstone diameter is LT 1/4 inch.

8. VCTS is a valid combination for all airports for which NWS offices prepare TAFs. [In the METAR code, VCTS is only reported by automated stations connected to FAA ALDARS]

9. In NWS TAFs, VCSH will be used to forecast showers 5-10SM from the center of the airport. [In the METAR code, VCSH will be used to report any type of precipitation not at point of observation, but within 10SM.] The type and intensity of showers in the vicinity will not be specified, i.e., +VCSHRA is not allowed.

10. BR will only be used when the visibility is forecast to be GT 1/2SM, but LTE 6SM.

11. For FG to be forecast with any qualifiers, visibility will be LTE 1/2SM.

12. VCFG may be used to forecast fog at any visibility value between 0 and 6SM in the vicinity (5 - 10SM) of the airport.

13. For MIFG to be forecast, the visibility at 6 feet above ground level will be GT 1/2SM and the apparent visibility in the fog layer will be expected to be LTE 1/2SM.

14. PRFG indicates that a substantial part of the airport is forecast to be covered by fog (visibility LTE 1/2SM) while the remainder of the airport is expected to be clear of fog.

15. BCFG indicates that patches of fog (visibility LTE 1/2SM) are forecast to randomly cover the airport.

16. FZFG is fog (visibility LTE 1/2SM) consisting predominately of water droplets at temperatures LTE 0C, whether or not the fog is expected to deposit rime ice.

17. Volcanic Ash (VA) is always included in the forecast when expected. Visibility is not a factor.

18. SN BLSN indicates a combination of snow falling from clouds and blowing snow.

19. SQ (squall) is a sudden increase in wind speed of GTE 16 knots, the speed rising to 22 knots or more and lasting for GTE one minute.

20. Generally, Funnel Clouds should not be forecast in TAFs.

21. Generally, Tornadoes and Waterspouts should not be forecast in TAFs.

22. SS is forecast if visibility is GT 1/4SM and LTE 1/2SM. Forecast +SS if visibility is expected to be LTE 1/4SM.

23. DS is forecast if visibility is GT 1/4SM and LTE 1/2SM. Forecast +DS if visibility is expected to be LTE 1/4SM.

No more than three significant weather groups will be used to forecast weather phenomena at or near the airport. If more than one significant weather phenomena is expected in the forecast, separate weather groups will be included. If more than one form of precipitation is forecast, the appropriate contractions will be combined in a single group with the predominant type of precipitation included first. One exception to this is in Appendix C, Section 1.2.6. In such a single precipitation group, the intensity will refer to the total precipitation and be used with one or no intensity qualifier, as appropriate.

# Appendix C - TAF Code Elements

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**1. Terminal Forecast Coding.** Each group of the TAF code used in NWS TAFs is described in the following sections. Each section includes partial or complete examples of one or more TAFs to clarify descriptions in the text.

**1.1 Bulletin Headings.** TAF bulletins begin with a WMO heading where the four letter ICAO identifier is the issuing office. For example:

FTUS42 KMFL 141100 AAx
TAFFLL
TAF (AMD)
KFLL 141123Z 141212 etc…

| | |
|---|---|
| FT | TAF whose valid period exceeds 12 hours |
| US | Denotes CONUS airport location |
| 42 | Conus group location (usually by geographical area) |
| KMFL | Issuing WFO |
| 141100 | First 2 digits are issuance date; the last four are cardinal hour prior to forecast valid hour, required to meet international requirements for scheduled TAFs. |
| AAx | Used to identify a non-scheduled TAF (corrections, delayed TAFs, amendments, etc.). If not used, simply omit (as in regularly scheduled TAFs). The indicators |

| | |
|---|---|
| | used are AAx for TAF amendments, RRx for delayed routine TAFs, and CCx for corrections of previously transmitted TAFs. The x is the letter A through X, used sequentially which indicate the subsequent use of the heading. For example, the first correction would be CCA, the second CCB, etc. |
| TAFFLL | First three (3) letters identify a TAF, the last three are the site the TAF is for (this line is deleted when the gateway collects TAFs after transmission for disbursement as a group). |
| TAF (AMD) | Indentifies TAF as the product (AMD indicates an amendment) |
| KFLL | ICAO identifier of the TAF site |
| 141123Z | Time of preparation |
| 141212 | Valid time of new TAF |

ICAO location identifiers in the CONUS begin with the letter K, those in the North Pacific (Hawaii, Alaska, and Guam) begin with a P, those in the Caribbean (Puerto Rico, Virgin Islands, etc.) begin with a T, and those in the South Pacific begin with an N.

**1.2 Forecast Text.** The first line of text in a TAF consists of the contraction TAF or TAF AMD. This indicates if the product is scheduled or amended, respectively. This information appears only once, on a separate line at the beginning of the product, regardless of how many TAFs it contains. Corrected and delayed TAFs are not identified in the text; that information is included at the end of the first line on the WMO header.

The format of text in a NWS TAF is comprised of code groups shown below. Each term and group is described in Sections 1.2.1 through 1.2.9 below, and in the same sequence as they are required to appear in each forecast group.

GENERIC FORMAT OF THE FORECAST TEXT OF A NWS-PREPARED TAF

{TAF or TAF AMD}
CCCC YYGGggZ YlY1G1G1G2G2 dddffGfmfmKT VVVV w'w' (NSW) VVhshshs (SKC)
WShwshwshws/ddd ftKT TTGGgg
FMGG BECMG GGGeGe TEMPO GGGeGe PROB30GGGeGe

**1.2.1 Location Identifier (CCCC).** After the line containing either TAF or TAF AMD, each TAF will begin with its four-letter ICAO location identifier. ICAO Document 7910 contains a complete list of all identifiers.

For NWS WFOs which transmit TAFs in a bulletin (collective), the TAF order should be decided by the respective RH and remain unchanged as much as possible. Newly added airports should generally be placed at the end of the bulletin. Location identifiers remaining after an identifier has been deleted from the bulletin should occupy the same relative order as before the deletion.

**1.2.2 Date/Time of Forecast Origin Group.** The date/time of forecast origin group (YYGGggZ) follows the terminal's location identifier. It contains the day of the month in two (2) digits (YY) and time in four (4) digits (GGgg in hours and minutes) the forecast is completed and ready for transmission, with a Z appended to denote UTC. This time is entered by the

forecaster. Section 4.9 of this instruction contains a table of issuance time windows for scheduled TAFs.

**1.2.3 Valid Period and Routine Issuances.** The TAF valid period (Y1Y1G1G1G2G2) is the next group. Scheduled 24-hour TAFs are issued four (4) times per day, at 0000, 0600, 1200, and 1800Z. The first two digits (Y1Y1) are the day of the month for the start of the TAF. The next two digits (G1G1) are the starting hour, and the last two digits (G2G2) are the ending hour of the valid period. A forecast period that begins at midnight UTC will be annotated as 00. If the end time of a valid period is at midnight UTC, it is annotated as 24. For example, a 00Z TAF issued on the 9th of the month would have a valid period of 090024.

**1.2.4. Wind Group.** The initial time period and any subsequent FM and BECMG groups will begin with a mean surface wind forecast (dddffGfmfmKT) for that period. Wind forecasts will be expressed as the mean three-digit direction (ddd - relative to true north) rounded to the nearest ten degrees and the mean wind speed in knots (ff) for the time period. If wind gusts are forecast (gusts are defined as rapid fluctuations in wind speeds with a variation of 10 knots or more between peaks and lulls), they are indicated immediately after the mean wind speed by the letter G, followed by the peak gust speed expected. KT is appended to the end of the wind forecast group. Any wind speed of 100 knots or more will be encoded in three digits. Encode calm winds as 00000KT.

The prevailing wind direction will be forecast for any speed GTE seven (7) knots. When it is not possible to forecast a prevailing surface wind direction due to its expected variability (variations in wind direction GTE 30 degrees), either for very light wind conditions or during convective activity, the forecast wind direction will be encoded as VRBffKT. Variable wind direction, for other than convective activity, must have a wind speed of one (1) through six (6) knots inclusive. VRB will not be used in the non-convective LLWS group (refer to Section 1.2.8).

The forecaster should strive to forecast a mean or variable wind direction with low wind speeds. There is no amendment criteria for low wind speed conditions (see Section 4.5.1).

When forecasting variable wind direction, there is no requirement to specify direction variability limits in remarks.

Squalls are forecast in the wind group as gusts (G), but must be identified in the significant weather group with the code SQ (Appendix B, Section 4, Footnote 19).

EXAMPLES:

TAF
KPIT 231732Z 231818 23010KT 4SM -SHRA BKN030
FM2200 28020G35KT P6SM OVC020
FM2300 30015KT P6SM SCT060
TEMPO 0104 BKN060
FM0500 30004KT P6SM SCT080=

This example above demonstrates rapid changes in wind associated with a frontal passage. Also note the correct format for gusts.

TAF
KCSG 060537Z 060606 VRB03KT etc.

This example above shows the correct format and use of variable wind direction with light winds at the beginning of the valid period (0600 UTC).

TAF
KGRB 241732Z 241818 11006KT 4SM -SHRA BKN030
FM2300 22006KT 3SM -SHRA OVC030 PROB30 0406 VRB20KT
1SM +TSRA BKN015CB=

This example above shows the correct format and use of variable wind direction because of convective activity in the immediate area. Forecasting wind direction with convective activity is difficult, therefore this is the only time you should consider using VRB with significant wind speeds.

TAF
KROW 021726Z 021818 30008KT 5SM HZ BKN030 PROB30 0406
27020G45KT 1SM TSRA OVC012CB etc.=

This example above depicts using high winds in an organized event.

TAF
KAMA 171130Z 171212 00000KT etc.=

This example above shows the correct format for calm winds.

TAF
PASN 010530Z 010606 080100G140KT etc.=

This example above shows the correct format of wind speed of 100 knots or more (the wind is from 80 degrees at 100 knots gusting to 140 knots).

TAF
KORD 161725Z 161818 27020G35KT P6SM TS FEW020CB
TEMPO 1819 29040G55KT SQ
FM1930 30015G25KT P6SM etc.=

This example shows the correct format for squalls.

**1.2.5 Visibility Group.** The initial time period and any subsequent FM groups will include a visibility forecast (VVVV) in statute miles. The valid values for visibility forecasts in NWS TAFs are shown below. Visibility will be forecast rounded down to the next lowest reported value. The contraction SM is appended to the end of the visibility forecast group.

VALID VISIBILITY FORECAST VALUES

| STATUTE MILES | METERS |
|---|---|
| 0 | 0 |
| 1/4 | 0400 |
| ½ | 0800 |
| 3/4 | 1200 |
| 1 | 1600 |
| 1 ½ | 2400 |
| 2 | 3200 |
| 3 | 4800 |
| 4 | 6000 (1) |
| 5 | 8000 |
| 6 | 9000 (2) |
| P6SM | 9999 (3) |

NOTE: For visibility reduced to LT 5/8 SM strictly because of fog, the code is FG. For visibility GTE 5/8 SM, or when weather is the main factor for reduced visibility of LT 5/8 SM, the code is BR.

1. Rounded down from 6400 meters

2. Rounded down from 9600 meters

3. GT 6 statute miles (10 kilometers or more)

When the prevailing visibility is forecast to be LTE six (6) SM, one or more significant weather groups (see Section 1.2.6) will be included. However, drifting dust (DRDU), drifting sand (DRSA), drifting snow (DRSN), shallow fog (MIFG), partial fog (PRFG), and patchy fog (BCFG) may be forecast with prevailing visibility GTE seven (7) statute miles.

When a whole number and a fraction are used to forecast visibility, a space will always be included between them (e.g., 1 1/2SM). Visibility GT six (6) statute miles will be encoded as P6SM.

If the visibility is not expected to be the same in different directions, prevailing visibility, as described by Federal Meteorological Handbook No. 1 (FMH-l), will be used.

When VA is forecast in the significant weather group, visibility will be included in the forecast, even if it is unrestricted (P6SM). For example, an expected reduction of visibility to 10 statute miles by volcanic ash will be encoded in the forecast as P6SM VA.

**1.2.6 Significant Weather Group.** The significant weather group (w'w') consists of the appropriate qualifier(s) and weather phenomenon contraction(s) (shown in Appendix B, Section 4 and described in FMH-1) or NSW, and Section 5 of the same appendix shows all possible valid combinations of weather phenomena codes and should be used to encode w'w'.

If the initial forecast period and subsequent FM groups do not contain an explicit significant weather group, the significant weather group will be omitted. Do not use NSW in the initial forecast time period or FM groups.

The weather phenomenon code UP (unknown precipitation) will not be used in NWS TAFs. It is reserved for use in automated surface observations.

Tornadic activity (tornadoes, waterspouts, and funnel clouds), should not be forecast in terminal forecasts because the probability of occurrence at a specific site is extremely small.

One or more significant weather group(s) is(are) required when the visibility is forecast to be 6SM or less (see Section 1.2.5). With the exception of VA, DRDU, DRSA, DRSN, MIFG, PRFG, and BCFG, obstructions to vision are only forecast when the prevailing visibility is LT 7 statute miles or, in the opinion of the forecaster, is considered operationally significant.

VA will always be forecast when expected. When VA is included in the significant weather group, visibility will be included in the forecast as well, even if the visibility is unrestricted (P6SM).

NSW will be used in place of w'w' only in a BECMG or TEMPO group (Sections 1.2.9.2 and 1.2.9.3, respectively) to indicate when significant weather (including in the vicinity - VC, Section 1.2.6.1) included in a previous sub-divided group is expected to end.

After NSW is used in a significant weather group, any subsequent significant weather groups will either be omitted or selected from the phenomena listed in Appendix B, Section 4. No two consecutive BECMG or TEMPO groups will contain NSW as the significant weather group.

NOTE: P6SM NSW will be used together in a BECMG or TEMPO group when the significant weather is forecast to end and the visibility is forecast to be GT 6 statute miles after, regardless of visibility before the BECMG or TEMPO event.

EXAMPLES:

TAF
KBOS 050539Z 050606 VRB03KT 5SM SHRA VCFG BKN025
BECMG 1415 28008KT P6SM NSW SCT010 BKN025 etc.=

This example shows the correct use of NSW to indicate that both the rain showers and the fog in the vicinity are forecast to end between 1400 and 1500 UTC.

Forecasters will use their judgement when determining how many weather phenomena groups are included (no more than three at any time). NWS forecasters may include as many w'w' groups as necessary to accurately describe the expected conditions.

When more than one type of significant weather is forecast in the same forecast time period, significant weather will be forecast in the following order:

1. Thunderstorms with/without associated precipitation.

2. Significant weather in order of decreasing dominance is based on intensity, i.e., the most intense type is reported first (see precipitation exception below).

3. Left-to-right in Appendix B, Section 3 (columns 1 through 5).

Forecaster judgement will be used to resolve situations not addressed by these guidelines. Non-precipitation significant weather elements are encoded after any precipitation in separate groups, each separated by a space (e.g., -SHSN BLSN BR). This also applies to the following encoding rules. A w'w' group will be encoded:

1. First, if appropriate, the qualifier for intensity or for proximity, followed without a space by:

2. If appropriate, the contraction for the descriptor followed without a space by:

3. The contraction for the observed weather phenomenon or combinations thereof.

Multiple precipitation elements are encoded in a single group (e.g., -TSRASN). If more than one type of precipitation is forecast, up to three appropriate precipitation contractions can be combined in a single group (with no spaces) with the predominant type of precipitation being first. In this single group, the intensity will refer to the total precipitation and be used with either one or no intensity qualifier, as appropriate. The intensity qualifiers (light, moderate, and heavy) refer to the intensity of the precipitation and not to the intensity of any thunderstorms associated with the precipitation.

**Exception for encoding multiple precipitation types:** When more than one type of precipitation is forecast in a time period, any precipitation type associated with a descriptor (e.g., FZRA) must be encoded first in the precipitation group, regardless of the predominance or intensity of the other precipitation types. Descriptors will not be encoded with the second or third precipitation type in the group. The intensity is associated with the first precipitation type of a multiple precipitation type group. For example, a forecast of heavy snow and light freezing rain is properly coded as -FZRASN, even though the intensity of the snow is GT the freezing rain. This is why the descriptor (FZ) and the intensity is associated with this precipitation type must be encoded first. In this example, since heavy snow is forecast, it would have to be inferred by a visibility forecast of LT 1/4SM.

A qualifier (if relevant) will precede (with no space) the phenomena (including descriptor) to which it applies. There are two categories of qualifiers (see Appendix B, Section 3): intensity/proximity or descriptor. Except for VCSH and VCTS, which are used to forecast showers or TSTMs between radii of 5 and 10 statute miles from the center of the runway complex, only one intensity or proximity qualifier and descriptor will be used for each weather phenomena group. The intensity qualifiers are light (-), moderate (no qualifier), and heavy (+).

Intensity will be coded with precipitation types, except ice crystals and hail, including those associated with TSTMs and those of a showery nature (SH). No intensity will be ascribed to

blowing dust (BLDU), blowing sand (BLSA), or blowing snow (BLSN). Only moderate or heavy intensity will be ascribed to sandstorm (SS) and duststorm (DS). Refer to FMH-l for criteria in determining intensity associated with these weather elements. Some intensity criteria are also described in the footnotes of Appendix B, Section 5.

The only way to depict severe TSTMs in the TAF is to forecast surface winds of 50 knots or more with the TSTMs. This applies to a forecast of severe hail as well, since there is no significant weather contraction for 3/4 inch hail (hail criteria for severe TSTM).

If a significant weather code group has been used and conditions are forecast to change, the significant weather entry in the next BECMG or TEMPO group (Sections 1.2.9.2 and 1.2.9.3, respectively) should be a different code group or NSW. If the significant weather group does not differ in subsequent TEMPO group(s), no change to the significant weather group is necessary, and the current significant weather group will apply to these subsequent group(s).

EXAMPLES (combinations of one precipitation and one non-precipitation weather phenomena):

| | |
|---|---|
| -DZ FG | Light drizzle and fog (obstruction which reduces visibility to LT 5/8 SM) |
| RA BR | Moderate rain and mist (obstruction which reduces visibility to LT 7 SM but GTE 5/8 SM) |
| -SHRA FG | Light rain showers and fog (visibility LT 5/8 statute miles) |
| +SN FG | Heavy snow and fog |

EXAMPLES (showing combinations of more than one type of precipitation:

| | |
|---|---|
| -RASN FG HZ | Light rain and snow (light rain predominant), fog and haze |
| TSSNRA | Thunderstorm with moderate snow and rain (moderate snow predominant) |
| FZRASNPL | Moderate freezing rain, snow, and ice pellets (freezing rain mentioned first due to the descriptor, followed by other precipitation types in order of predominance) |
| SHSNPL | Moderate snow showers and ice pellets |

EXAMPLE TAF:

TAF
KFAR 091739Z 091818 21030G60KT 1/4SM +TSRAGR BKN050CB...

Winds southwest at 30 knots, with gusts to 60 knots. Visibility 1/4 SM with TSTMs (severe because of 60KT gusts) with heavy rain and hail. NOTE: the + qualifier is

associated with the precipitation (RA) and not the TSTM. Broken cumulonimbus (CB) clouds (ceiling) at 5,000 feet.

The TS descriptor is treated differently than other descriptors in the following cases:

1) When dry thunderstorms are forecast, TS may be encoded as the sole significant weather phenomenon; and 2) When forecasting thunderstorms with freezing precipitation (FZRA or FZDZ), include the TS descriptor first, followed by the intensity and weather phenomena.

See the following example:

EXAMPLE:

TAF
KMCI 252335Z 260024 31015KT 1 1/2SM TS -FZRA BKN010CB...

Winds northwesterly at 15 knots. Visibility 1 1/2 SM in thunderstorms and light freezing rain, broken CB clouds (ceiling) at 1,000 feet.

When a TSTM is included in the significant weather group (even in vicinity - VCTS), the cloud group (NsNsNshshshs) will include a forecast cloud type of CB. See the following example for encoding VCTS:

TAF
KMCI 252335Z 260024 31015KT 1 1/2SM -FZRA VCTS BKN010CB...

Winds northwesterly at 15 knots. Visibility 1 1/2 SM and light freezing rain, broken CB clouds (ceiling) at 1,000 feet, TS in the vicinity.

A visibility threshold must be met before a forecast for fog (FG) may be included in the TAF. When forecasting a fog-restricted visibility from 5/8SM to 6SM, the phenomena will be coded as BR (mist). When forecasting a fog-restricted visibility that is LT 5/8SM, use code FG. Never encode weather obstruction as mist (BR) when the forecast visibility is GT 6 statute miles (P6SM).

The following fog-related terms will only be used as described below:

Freezing Fog (FZFG): Any fog (visibility LT 5/8 SM) consisting predominantly of water droplets at temperatures LTE 32° F/0° C, whether or not rime ice is expected to be deposited. FZBR is not a valid significant weather combination and will not be used in TAFs.

Shallow Fog (MIFG): The visibility at 6 feet above ground level is GTE 5/8 SM and the apparent visibility in the fog layer is LT 5/8 SM.

Patchy Fog (BCFG): Fog patches covering part of the airport. The apparent visibility in the fog patch or bank is LT 5/8 SM, with the foggy patches extending to at least 6 feet above ground level.

Partial Fog (PRFG): A substantial part of the airport is expected to be covered by fog while the remainder is expected to be clear of fog (e.g., a fog bank).

NOTE: MIFG, PRFG and BCFG may be forecast with prevailing visibility of P6SM.

EXAMPLES:

TAF
KLWS 020530Z 020606 27010KT 1/2SM FG VV008
BECMG 1011 27010KT 3SM BR BKN010...

This example shows the proper use of FG and BR.

TAF
KPVD 041132Z 041212 27006KT 1/2SM FG VV008
BECMG 1617 30010KT P6SM NSW FEW035
FM0030 18006KT P6SM OVC035...

This example shows the proper use of NSW (no significant weather). NSW is only used in BECMG and TEMPO groups, to indicate that the significant weather forecast in an earlier time period is expected to end. When significant weather is not expected in a FM group, the significant weather group is omitted.

TAF
KBIL 211140Z 211212 04005KT 1SM -RA BR OVC008
BECMG 1617 34008KT 3SM -RA BKN050 etc.=

Change is expected between 1600 and 1700Z with the forecast becoming valid after 17Z. NOTE: The light rain is repeated in the BECMG 1617 group to indicate that light rain remains in the forecast. The mist is omitted from the BECMG 1617 group, which indicates it is forecast to end between 1600 and 1700Z.

TAF
KMPV 021130Z 021212 04006KT 3SM -DZ OVC008
BECMG 1718 36010KT P6SM NSW SCT025...

Improvement between 1700 and 1800Z to winds from 360 degrees at 10 knots, visibility GT 6SM (unrestricted), no significant weather. NSW indicates the drizzle will end by 18Z with scattered clouds at 2,500 feet.

**1.2.6.1 Vicinity.** In the United States, vicinity (VC) is defined as a donut-shaped area between 5 and 10SM from the center of the airport's runway complex. The FAA requires TAFs to include certain meteorological phenomena which may directly affect flight operations to and from the

airport. Therefore, NWS TAFs will include in the significant weather section of the TAF prevailing condition forecasts of fog, showers and TSTMs in the airport's vicinity (GTE 50% probability and expected to occur for more than ½ of the sub-divided forecast time period). Prevailing conditions are forecast in the initial time period, FM, and BECMG groups. Significant weather in the vicinity will not be included in TEMPO or PROB groups.

The following significant weather phenomena are valid for use in prevailing portions of NWS TAFs in combination with VC:

| Phenomenon | Coded as |
|---|---|
| Fog* | VCFG |
| Shower(s)** | VCSH |
| Thunderstorm | VCTS |

* Always coded as VCFG regardless of visibility in the obstruction, and without qualification as to intensity or type (frozen or liquid)

** The VC group, if used, should be the last entry in any w'w' group.

In BECMG or TEMPO groups (see Sections 1.2.9.2 and 1.2.9.3, respectively), NSW will be used in place of w'w' to indicate that weather in the vicinity (e.g., VCSH) previously included in the TAF is expected to end.

EXAMPLES:

TAF
KSPI 050539Z 050606 VRB03KT 1 1/2SM -DZ BR VCSH BKN010
BECMG 1415 23004KT P6SM NSW SCT010 BKN025...

Change between 1400 and 1500Z to visibility GT 6SM (unrestricted), no significant weather (light drizzle, mist and showers in vicinity in initial time period are all forecast to end), scattered clouds at 1,000 feet and broken clouds (ceiling) at 2,500 feet.

TAF
KPKB 121738Z 121818 30012KT P6SM VCSH OVC018
BECMG 2223 30012KT 3SM SHRA SCT020...

Change between 2200 and 2300Z to visibility 3SM, rainshowers (no longer in vicinity, but occurring within 5SM of the airport) and scattered clouds at 2,000 feet.

**1.2.7 Cloud and Vertical Obscuration Groups.** The initial time period and any subsequent FM or BECMG groups will include a cloud or obscuration group (NsNsNshshshs, VVhshshs or SKC), used as appropriate to indicate the cumulative amount (NsNsNs) of all cloud layers in ascending order and height (hshshs), to indicate vertical visibility (VVhshshs) into a surface-based obstructing medium, or to indicate a clear sky (SKC).

All cloud layers and obscurations will be considered opaque, defined as when more than 50% of the sky is hidden by the clouds at any layer.

**1.2.7.1 Cloud Group.** The cloud group (NsNsNshshshs) will be used to forecast cloud amount as follows:

| SKY COVER CONTRACTION | SKY COVERAGE |
|---|---|
| SKC | 0 oktas |
| FEW | GT 0 to 2 oktas |
| SCT | 3 to 4 oktas |
| BKN | 5 to 7 oktas |
| OVC | 8 oktas |

When zero (0) Oktas of sky coverage is forecast, the cloud group will be replaced by SKC. The contraction CLR, which is used in the METAR code, will not be used in TAFs. TAFs for sites with ASOS/AWOS will contain the cloud amount and/or obscurations which the forecaster expects, not what is expected to be reported by an ASOS/AWOS.

Height of cloud (hshshs) will be forecast in hundreds of feet AGL at the following resolution:

| RANGE OF HEIGHT VALUES | REPORTABLE INCREMENT |
|---|---|
| LT 3,000 | To nearest 100 |
| GTE 3,000 but LT 5,000 | To nearest 500 |
| GTE 5,000 | To nearest 1,000 |

In general, the number of cloud layers in each sub-divided time period should not exceed three. However, NWS forecasters should use their judgement to determine how many cloud groups accurately describe the meteorological conditions at that time in the TAF.

Additionally, scattered cloud layers will not be forecast at a higher level than broken or overcast cloud layers, and broken cloud layers will not be forecast at a higher level than overcast layers. Using the principle of at/below, the lowest level at which the cumulative cloud cover equals 5/8 or more of the celestial dome is understood to be the forecast ceiling. For example, VV008, BKN008 or OVC008 all indicate an 800 ft ceiling.

**1.2.7.2 Vertical Obscuration Group.** The vertical obscuration group (VVhshshs) is used to forecast, in hundreds of feet AGL, the vertical visibility (VV) into a surface-based total obscuration. VVhshshs is this ceiling at the height indicated in the forecast. TAFs will not include forecasts of partial obscurations (i.e., FEW000, SCT000, or BKN000).

EXAMPLE:

TAF
KCPR 110537Z 110606 24015KT P6SM SKC
FM0820 24015KT 1SM BR VV008...

Note that the wind in the FM group is the same as in the initial forecast period, but is repeated since all elements are required to be included in a FM group.

**1.2.7.3 Cloud Type.** The only cloud type included in the TAF is CB. CB follows cloud or obscuration height (hshshs) without a space whenever TSTMs are included in w'w', even if TSTMs are only forecast in the vicinity (VCTS). CB can be included in NsNsNshshshs or VVhshshs without mentioning thunderstorm in w'w'. Therefore, there may be situations where nearly identical NsNsNshshshs or VVhshshs appear in consecutive time periods, with the only change being the addition or elimination of CB in the forecast cloud type.

EXAMPLES:

TAF
KORD 110537Z 110606 06008KT P6SM FEW050 SCT100
FM1115 11010KT 2SM -RA OVC012...

Note the initial forecast period (beginning at 0600Z) does not contain w'w'. When significant weather is not expected in the initial period of an FM group, w'w' is omitted.

TAF
KDAY 221730Z 221818 19010G25KT P6SM BKN040
FM2230 26025G45KT 1/2SM TSSN OVC010CB...

Significant change at 2230Z to wind from 260 degrees at 25 knots gusting to 45 knots, visibility ½ SM in a thunderstorm with moderate snow, overcast clouds (ceiling) at 1,000 feet, including CB.

TAF
KUNV 101131Z 101212 30015G25KT P6SM VCTS OVC015CB
BECMG 1415 34006KT P6SM NSW OVC015...

Change between 1400 and 1500Z to NSW (thunderstorms in the vicinity will end or move beyond 10 SM from the center of the runway complex) and overcast clouds (ceiling) at 1,500 feet.

TAF
KSYR 230532Z 230606 29012KT 1/2SM SHSN FZFG OVC003
TEMPO 0609 29014G28KT 1/4SM +TSSNPL BLSN VV004CB
FM1400 36011KT P6SM FEW008 BKN025
BECMG 2223 VRB03KT SKC...

NOTE: The + qualifier is associated with precipitation (SN) and ice pellets (PL) and not the thunderstorm (TS). Significant change at 1400Z to wind from 360 degrees at 11 knots, visibility GT 6 SM (unrestricted), few clouds at 800 feet and broken clouds at 2500 feet. Change between 2200 and 2300Z to variable wind direction (light winds), wind speed 3 knots, and clear skies.

**1.2.8 Non-Convective LLWS Group.** Wind Shear (WS) is defined in NOAA Technical Memorandum NWS FCST-23, as "...a change in horizontal wind speed and/or direction, and/or vertical speed with distance, measured in a horizontal and/or vertical direction." Wind shear is a vector difference, composed of wind direction and wind speed, between two wind velocities. A sufficient difference in wind speed, wind direction, or both, can severely impact airplanes, especially within 2,000 feet AGL because of limited vertical airspace for recovery.

The following, emphasizing the importance of wind shear, is taken from ICAO Circular 186-AN/122:

"Wind shear cannot be calculated by simple scalar subtraction of the wind speeds, except in the specific case where the directions of the two winds concerned are exactly the same or are exact reciprocals...The scalar shear (i.e. direct subtraction of wind speeds taking no account of their directions) is always LT or equal to the vector shear and thus for most cases underestimates the actual shear magnitude." Forecasters may use NOAA Technical Memorandum NWS FCST-23 as a reference for non-convective LLWS forecasting. The procedures described below are based on that study.

Forecasts of LLWS in the TAF will refer only to non-convective LLWS from the surface up to and including 2,000 feet AGL (LLWS is always assumed to be present in convective activity). It will be included in TAFs on an as-needed basis to focus the aircrew's attention on LLWS problems which currently exist or are expected. Non-convective LLWS may be associated with the following: frontal passage, inversion, low-level jet, lee side mountain effect, sea breeze front, Santa Ana winds, etc.

When LLWS conditions are expected, the non-convective LLWS code WS will be included in the TAF as the last group (after cloud forecast). Once in the TAF, the WS group remains the prevailing condition until the next change group (FM or BECMG), or the end of the TAF valid period if there are no subsequent FM or BECMG groups. Forecasts of non-convective LLWS will not be included in TEMPO (see Section 1.2.9.3) or PROB (see Section 1.2.9.4) groups.

The format of the non-convective low-level wind shear group is:

WShwshwshws/dddffKT

| | |
|---|---|
| WS | Indicator for non-convective LLWS |
| hwshwshws | Height of the WS in hundreds of feet AGL |
| ddd | True direction in ten degree increments at the indicated height (see Note below) |
| ff | Speed in knots of the forecast wind at the indicated height |
| KT | Unit indicator for wind |

NOTE: VRB will not be used for direction in the non-convective LLWS forecast group.

EXAMPLE:

TAF

KPUB 181122Z 181212 13012KT 5SM -RA SCT010 OVC035 WS020/27035KT
FM1400 32010KT P6SM FEW008 BKN045

In this forecast, the wind shear is a prevailing condition from1200Z until the beginning of the next FM group.

TAF
KDFW 220539Z 220606 21010KT 3SM BR SCT030 WS020/27035KT
BECMG 1011 24015KT 1SM TSRA BR OVC010CB
FM1830...

A non-convective LLWS forecast will be included in the initial time period or a FM or BECMG group in a TAF whenever:

a. One or more PIREPs are received of non-convective LLWS within 2,000 feet of the surface, at or in the vicinity of the TAF airport, causing an indicated air speed loss or gain of 20 knots or more, and the forecaster determines the report(s) reflect a valid non-convective LLWS event rather than mechanical turbulence, or

b. When non-convective vertical WS of 10 knots or more per 100 feet in a layer more than 200 feet thick are expected or reliably reported within 2,000 feet of the surface at, or in the vicinity of the airport (see Technical Memorandum NWS FCST23, page 21, Table 3 -- Wind Shear Computation Table).

If meteorological conditions are such that non-convective LLWS of intensities similar to those described above are expected and/or could be inferred from less detailed PIREPs or other sources, the forecaster should include a WS group in either the initial time period, or a FM or BECMG group of the TAF.

Other possible tools for detecting or observing non-convective LLWS in the short-term are the Velocity Azimuth Display (VAD) wind profiles from the WSR-88D, data from wind profilers (if available), and data from FAA's Terminal Doppler Weather Radars (if available). The utility of these data sets depends on the elevation and proximity of the sensors to the airport for which TAFs are written. Mountain top WSR-88D radars will not be useful for detecting non-convective LLWS (below 2,000 feet AGL).

**1.2.9 Forecast Change Indicator Groups.** Forecast change indicator groups are contractions which will be used to sub-divide the forecast period (24-hours for scheduled TAFs; less for amended or delayed forecasts) according to significant changes in the weather.

To sub-divide the TAF valid period, forecasters are encouraged to use FM groups (see Section 1.2.9.1) instead of BECMG, TEMPO, and PROB to the extent possible. The FM group is a more definitive and precise forecast, and therefore more useful to the customer. BECMG, TEMPO, and PROB groups should be used sparingly in NWS TAFs.

A FMGGgg forecast group (see Section 1.2.9.1) indicates a change at a specific point in time in hours and minutes (GGgg), and includes a complete set of prevailing conditions beginning at the

indicated time. Both FMGGgg and BECMG GGGeGe (see Section 1.2.9.2) are used to forecast changes in prevailing conditions. The changes described by FMGGgg occur quickly (in LT one (1) hour), while forecast changes in a BECMG GGGeGe group occur more gradually, but never more than two (2) hours in length in NWS TAFs. Having these two options (FMGGgg and BECMG) to describe gradual changes allows the forecaster to clearly convey the forecast timing to the customer.

To keep the forecast intent clear and unambiguous to the aviation customer, forecast groups should be as concise as possible, highlighting significant changes which will affect aviation operations. Overlapping of sub-divided forecast valid periods will be avoided. Further, forecasters must be aware conditions described in TEMPO and PROB groups have just as much effect on those decisions as the prevailing conditions.

For example, a forecast of TEMPO 0507 3SM RA BR OVC015 would require the pilot to file an IFR alternate and carry additional fuel. And a forecast of TEMPO 2302 2SM -FZDZ BR VV005 would, in most cases prevent an airport from being used as an IFR alternate. A more extreme case would be this forecast: PROB30 1923 1/4SM TSRA OVC005CB. The visibility of ¼ SM could, in some circumstances, prevent the airport from being a destination by an air carrier.

The following forecast change indicators will be used when a change in any or all of the elements forecast is expected:

**1.2.9.1 <u>FMGGgg</u>.** The change group FMGGgg (voiced as "from") will be used to indicate when prevailing conditions are expected to change significantly over a period of LT one hour. In these instances, the forecast will be sub-divided into time periods using the contraction FM, followed, without a space, by four digits indicating the time (in hours and minutes Z) the change is expected to occur. While the use of a four-digit time in whole hours (e.g. 2100Z) is acceptable, if a forecaster can predict changes and/or events with higher resolution, then more precise timing of the change to the minute should be indicated. All forecast elements following FMGGgg will relate to the period of time from the indicated time (GGgg) to the end of the valid period of the terminal forecast, or to the next FMGGgg or BECMG GGGeGe if the terminal forecast valid period is divided into additional periods.

The FM group will be followed by a complete description of the weather (i.e., self-contained) and all forecast conditions given before the FMGGgg group are superseded by those following the group. All elements of the TAF (surface wind, visibility, significant weather, clouds, obscurations, and when expected, non-convective LLWS) will be included in each FM group, regardless if they are forecast to change or not. The only exception to this involves significant weather. If no significant weather is expected in the FM time period group, then significant weather is omitted. For example, if forecast cloud and visibility changes warrant a new FM group but the wind does not, the new FM group will include a wind forecast, even if it is the same as the most recently forecast wind.

There may be one or more FM groups, depending on the prevailing weather conditions expected. In the interest of clarity, each FM group will start on a new line of forecast text, indented five spaces.

EXAMPLES:

TAF
KDSM 022336Z 030024 20015KT P6SM BKN015
FM0230 29020G35KT 1SM +SHRA OVC005
TEMPO 0304 30030G45KT 3/4SM -SHSN
FM0500 31010G20KT P6SM SCT025...

Note that significant weather is omitted from the initial forecast period, beginning at 0000 Z, since none was expected.

TAF
KAPN 312330Z 010024 13008KT P6SM SCT030
FM0320 31010KT 3SM -SHSN BKN015
FM0500 31010KT 1/4SM +SHSN VV007...

Note the wind in the FM0500 group is the same as the previous FM group, but is repeated since all elements are required to be included in a FM group.

**1.2.9.2 BECMG GGGeGe.** The change-indicator group BECMG GGGeGe (voiced as becoming) will be used to indicate a change to forecast prevailing conditions expected to occur at a regular rate during the time specified by GGGeGe. Note the change occurs during a period of time defined by four digits. The first two digits are the starting cardinal hour of change and the last two digits are the ending cardinal hour of change, both in Z. The duration of the change period covered by BECMG indicated by GGGeGe, will never exceed two (2) hours in a NWS TAF, and in most cases should only be one (1) hour. The conditions forecast in a BECMG group remain in effect from the end of the defined period of change (GeGe), until the next FM or BECMG group, or if there are no other change groups, to the end of the terminal forecast valid time.

The BECMG group will be followed by a description of all the elements whether they've changed or not. Each new BECMG group will begin on a new line, indented six (6) spaces.

In response to feedback from aviation customers who need more concise and definitive forecasts, TAFs sub-divided by FM groups are preferred because they indicate more specific times of any expected changes. Since BECMG changes have a longer time period to occur, and because the FAA interprets BECMG groups for dispatch purposes very conservatively, forecasters should keep in mind the lower conditions either in FM or BECMG groups are controlling. Therefore, use of BECMG groups should be minimized.

When BECMG is used, forecasters should avoid, if possible, predicting minimum prevailing conditions, especially visibility LT ½ SM. Because of the extended time period of BECMG, situations like this can restrict our customers' operations, at times causing them to file an alternate flight plan or carry extra fuel. Therefore, to help meet their needs, less precise or conditional groups such as BECMG, TEMPO, and PROB, regardless of order, will not be used consecutively in NWS TAFs.

EXAMPLES:

TAF
KHOU 092340Z 100024 22007KT P6SM SCT040 BKN100
BECMG 0203 16012KT 5SM HZ SCT040 OVC200

**1.2.9.3 <u>TEMPO GGGeGe</u>.** The change-indicator group TEMPO GGGeGe will be used to indicate temporary fluctuations to forecast meteorological conditions which are expected to:

a. Have a high percentage (GT 50 %) probability of occurrence and,
b. Last for one hour or less in each instance and,
c. In the aggregate, to cover LT half of the period GG to GeGe

Note that temporary changes described by TEMPO groups occur during a period of time defined by a two-digit beginning and two-digit ending time, both in whole hours Z. If the TEMPO condition is expected to last more than one (1) hour, a FMGGgg or BECMG GGGeGe group should be used to forecast conditions different from those forecast prior to GG. If the TEMPO condition is expected to last more than half the time period indicated (GGGeGe), then the TEMPO condition is considered predominant and should instead be entered in the initial forecast period, or following a FM or BECMG group. TEMPO groups will not exceed four hours.

Each TEMPO group will be placed on a new line in the TAF, indented six (6) spaces from the left margin. The TEMPO identifier will be followed by a description of all the elements in which a temporary change is forecast. A previously forecast element which has no change during the TEMPO period is understood to remain the same. Only those weather elements forecast to temporarily change are required to be included in the TEMPO group. However, when a significant reduction in visibility is forecast in a TEMPO group, the significant weather causing the deterioration will also be included. If a significant change is expected in the cloud forecast, all cloud layers, including any significant layer not expected to change will be given.

Consecutive TEMPO and/or BECMG groups, in any order, will not be used during the initial forecast period or following any subsequent FM group(s).

TEMPO groups will not include forecasts of either significant weather in the vicinity (VC) or non-convective LLWS .

EXAMPLES:

TAF
KDDC 221130Z 221212 29010G25KT P6SM SCT025
TEMPO 1517 30025G35KT 1 1/2SM SHRA BKN010...

TAF
KSEA 091125Z 091212 19008KT P6SM SCT010 BKN020 OVC090
TEMPO 1215 -RA SCT010 BKN015 OVC040...

Note that in the TEMPO 1215 group, all three cloud layers are included, even though the lowest layer is not forecast to change from the initial time period.

TAF
KBOI 091735Z 091818 24007KT P6SM SCT025 BKN040
TEMPO 1822 -SHSN BKN025 BKN040...

**1.2.9.4 PROB30 GGGeGe.** The probability group PROB30 GGGeGe will only be used by NWS WFOs to forecast a low probability occurrence (30% chance) of a thunderstorm or precipitation event and its associated weather and obscuration elements (wind, visibility and/or sky condition) when occurrence of those elements are directly related to the thunderstorm or precipitation event.

The PROB30 group is the forecaster's assessment of probability of occurrence of the weather event which follows it. PROB30 is followed by a space, then four digits (GGGeGe) stating the beginning and ending time (in hours) of the expected condition. PROB30 is the only PROB group used in NWS TAFs.

The PROB30 group will be located within the same line of the prevailing condition group, continuing on the line below if necessary.

If the thunderstorm or precipitation event probability is expected to equal or exceed 50%, the event should be considered a predominant feature and should be entered in the initial forecast period or following a FM, BECMG, or TEMPO group of the TAF.

The PROB30 group will not be used in the first nine (9) hours of the TAF's valid period. Only one PROB30 group will be used following any subsequent FM groups.

The decision to use PROB30 in a TAF should be based on the fact that the TAF is limited to a 5SM radius from the center of the respective airfield complex. This is a significantly smaller area than the zone covered by the corresponding public forecast. The 6- or 12-hour area probability of precipitation (PoP) guidance and the forecaster's hourly expectations of actual occurrence at a TAF site can vary over relatively short periods of time but should be synoptically consistent with the public forecast.

PROB30 groups will not include forecasts of significant weather in the vicinity (VC) or non-convective LLWS.

The PROB30 group will not be used by NWS offices as a direct modifier of BECMG or TEMPO. Similarly, BECMG and TEMPO groups may not be used by NWS offices as a direct modifier of the PROB30 group e.g., BECMG PROB30 2324.

# Appendix D - Unscheduled TAFs.

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**1. Unscheduled TAFs.** Unscheduled TAFs are issued on an as-needed basis as amended, delayed, or corrected messages. They contain the same elements and use the same format as scheduled issuances. The only differences are the date and time of forecast origin (YYGGgg) and beginning valid times (for amended and delayed forecasts only). The entire text of each individual TAF which has not yet expired, not just the amended, corrected, or delayed portion, will be transmitted.

Amended, delayed, and corrected forecasts will include the appropriate BBB group in the WMO abbreviated heading. Amended (AAx), delayed (RRx), and corrected (CCx) forecasts are counted (lettered) independently. For example, the first correction to a scheduled forecast would be CCA. If that same corrected forecast needed to be amended, the amendment would be AAA, indicating it is the first amendment of the scheduled TAF, etc. The following table demonstrates the procedures for multiple combinations of corrected, amended and delayed TAFs:

| TIME (UTC) | FORECAST ISSUED | BBB INDICATOR |
|---|---|---|
| 0530 | Scheduled terminal forecast not available | NIL |
| 0615 | First delayed terminal forecast | RRA |
| 0714 | First amendment to terminal forecast | AAA |
| 1042 | Second amendment to terminal forecast | AAB |
| 1045 | First correction to terminal forecast | CCA |

**1.1 Amended TAFs.** NWS offices that prepare TAFs will keep the current weather and forecasts under continuous review to ensure that necessary TAF amendments are issued promptly. TAFs should be amended whenever they become, in the forecaster's judgement, unrepresentative of existing or expected conditions, particularly regarding those elements and events detailed in Appendix C. Forecasters should strive to amend TAFs prior to the occurrence of changes that meet these criteria. Amendments will be issued promptly whenever conditions meeting one or more of the criteria occur, and in the forecaster's judgement, will persist at least 30 minutes. At a minimum, forecasters will use the criteria in Section 4.5.1 to determine if an amendment is required. The amendment criteria applies to manual and automated observing sites. Amendments will be issued when expected or observed conditions: 1) meet amendment criteria for the specified forecast elements, 2) are expected to persist, and 3) in the forecaster's judgement, there is sufficient, reliable information, using the total observation concept, on which to base a forecast. If this third test is not met, an amendment stating NIL will be issued. Forecasters may amend any portion of a TAF for an unattended part-time site when there is

sufficient information to determine that a criterion has been met or the forecast for that element has become unrepresentative of actual conditions.

An amended TAF should be considered in situations where a TEMPO group has been used and the forecaster determines that (1) the actual probability of occurrence is, and will remain, LT 50%; (2) the occurring TEMPO conditions will account for one half or more of the forecast group's valid period; or (3) the TEMPO conditions last for more than one (1) hour.

An amended TAF will be identified in the WMO abbreviated heading by the contraction AAx following the date/time group, where x is the letter A through X, as described in Section 1. For example, AAA would indicate the first amendment of a particular scheduled terminal forecast, AAB, the second amendment of the same scheduled forecast, etc. An amended forecast will also be identified by TAF AMD (in place of TAF) on the first line of the forecast text. The date/time group in the WMO abbreviated heading of an amended terminal forecast will be the whole hour of issuance.

The amended TAF will cover all of the remaining valid period of the original scheduled forecast. Expired portions of the amended forecast or references to weather occurring before the issuance time will be omitted from the amendment.

In an amended forecast, the date and time of the forecast origin group (YYGGggZ) will reflect the time the amended forecast was prepared. In the forecast valid period group (Y1Y1G1G1G2G2), the first four digits (Y1Y1G1G1) will reflect the UTC date and time of the beginning of the valid period of the amended TAF. With an issuance time (YYGGggZ) of H+00 to H+29, use the current hour (based on UTC) to denote the beginning valid time; for H+30 to H+59, use the next hour (based on UTC). In either case the forecast will be valid from the time of forecast origin (YYGGgg) to the valid period ending time of the original scheduled terminal forecast.

PROB groups are not allowed in the first nine (9) hours of an amended TAF.

Example of amended TAF:

| Original | Amended |
|---|---|
| FTAK31 PAFC 030500 | FTAK31 PAFC 030500 AAA |
| TAF | TAF AMD |
| PAEN 030540Z 030606... | PAEN 031012Z 031006... |

The scheduled forecast was sent, and 4 ½ hours later, the forecaster prepared the first amendment to that forecast (indicated by AAA), at 1012Z on the 3rd day of the month. The amended TAF shows the time of the original scheduled TAF in the WMO abbreviated header (0500Z).

**1.2 Delayed TAFs.** Delayed TAFs will be issued as soon as possible after (1) correction of the problem (electrical, mechanical or other) that caused the delay or, for sites with part-time manual or part-time augmented automated observations, (2) resumption of observations (two consecutive observations not LT 30 minutes nor more than about one hour apart).

A delayed TAF will be identified in the WMO abbreviated heading by the contraction RRx following the date/time group, where x is the letter A through X, as described in Section 1. For example, RRA would indicate the first delayed issuance of a particular scheduled TAF. Only offices issuing TAFs in collectives would need to issue a second (or greater) delayed TAF. There is no contraction in the TAF text to indicate a TAF is delayed; the contraction RRx only appears in the WMO abbreviated heading line.

The delayed TAF is valid from the UTC date/time of actual forecast origin (YYGGggZ) until the end of the previously scheduled TAF valid period. The date and time of actual forecast origin is determined by the UTC date/time of issue of the delayed TAF. With an issuance time of H+00 to H+29, use the current hour (based on UTC) to denote the beginning valid time; for H+30 to H+59, use the next hour (based on UTC). The TAF will be valid from the time of forecast origin to the end of the valid period of the original scheduled TAF.

Example of delayed TAF:

| Original | Delayed |
|---|---|
| FTPA31 PHFO 030500 | FTPA31 PHFO 030500 RRA |
| TAF | TAF |
| PHMK 030540Z 030606 NIL... | PHMK 031012Z 031006... |

The scheduled TAF was sent as a NIL. 4 ½ hours later, the forecaster prepared the first delayed TAF (indicated by RRA) at 1012Z on the 3rd day of the month (as shown in the date/time of forecast origin in the text of the TAF). The delayed terminal shows the time of the original scheduled forecast in the WMO abbreviated header (0500 UTC).

**1.3 Corrected TAFs.** Corrected TAFs will be issued as soon as possible after discovery of an error (typographical or other mistake). A corrected TAF will be identified in the WMO abbreviated heading by the contraction CCx, which follows the date/time group (x is the letter A through X, as described in Section 1). CCA would indicate the first correction of a scheduled TAF, CCB the second correction of the same TAF, etc. There is no contraction in the forecast text to indicate a TAF is corrected; the contraction CCx only appears in the WMO abbreviated heading.

The date/time group in the WMO abbreviated heading of a corrected TAF will be the same as that of the original TAF unless the date/time group in the WMO abbreviated header contained the error. Refer to the example below.

Example of corrected TAF:

| Original | Corrected |
|---|---|
| FTAK31 PAFG 030500 | FTAK31 PAFG 030500 CCA |
| TAF | TAF |
| PAOM 030540Z 030606... | PAOM 030551Z 030606... |

The scheduled TAF was sent and 11 minutes later, the forecaster discovered an error and prepared the first corrected TAF (indicated by CCA), at 0551Z on the 3rd day of the month (typed in by the forecaster). The corrected TAF shows the time of the original scheduled TAF in the WMO abbreviated header (0500Z).

**1.3.1 Correcting Amended or Delayed Forecasts.** If an amended or delayed TAF contains an error, it should be corrected following the same procedures described in Section 1. An example of a corrected amendment is shown below:

Example of corrected amendment

Amendment ( containing an error )
FTUS43 KTOP 271100 AAA
TAF AMD
KMHK 271522Z 271512 VRB03KT P6SM SCT012
TEMPO 1517 BKN012
FM1700 11000KT P6SM SCT035
FM0100 10003KT P6SM SKC
BECMG 0809 14003KT 3SM BR SKC=

Corrected amendment
FTUS43 KTOP 271100 CCA
TAF AMD
KMHK 271602Z 271512 VRB03KT P6SM SCT012
TEMPO 1517 BKN012
FM1700 11005KT P6SM SCT035
FM0100 10003KT P6SM SKC
BECMG 0809 14003KT 3SM BR SKC=

The amended TAF was prepared on the 27th day of the month at 1522Z (date/time of forecast origin in the forecast text of the amended TAF), and valid from 1500Z on the 27th until 1200Z the next day (the 28th). The amendment contains an error in the FM1700 group: winds incorrectly encoded as 110 degrees at 00 knots. The forecaster notices the error, and prepares the first correction (CCA) of the TAF at 1602Z (date/time of forecast origin in the forecast text of the corrected TAF). Note the following in the corrected amendment: 1) the CCA replaces the AAA in the WMO abbreviated heading which appeared in the first amendment; 2) the first line of the forecast text remains TAF AMD; 3) the TAF valid period in the forecast text is the same as the original amendment (1500Z - 1200Z); 4) the error in the FM1700 group has been corrected.

# Appendix E - NWS TAF Locations by Responsible WFO

| WFO | TAF Code | Location |
|---|---|---|
| **Alaska** | | |
| AFC | | Anchorage AK |
| | **PAAQ** | Palmer Municipal Airport |
| | **PABE** | Bethel Airport |
| | **PACD** | Cold Bay Airport |
| | **PACV** | Merle K. (Mudhole) Smith Airport |
| | **PADL** | Dillingham Airport |
| | **PADQ** | Kodiak Airport |
| | **PADU** | Unalaska Airport |
| | **PAEN** | Kenai Municipal Airport |
| | **PAGK** | Gulkana Airport |
| | **PAHO** | Homer Airport |
| | **PAIL** | Iliamna Airport |
| | **PAKN** | King Salmon Airport |
| | **PAMC** | McGrath Airport |
| | **PANC** | Anchorage Int'l. Airport |
| | **PASN** | St. Paul Island Airport |
| | **PATK** | Talkeetna Airport |
| | **PAVD** | Valdez Airport |
| AFG | | Fairbanks AK |
| | **PABI** | Allen AAF (Ft. Greely) |
| | **PABR** | Wiley Post - Will Rogers Memorial Airport |
| | **PABT** | Bettles Airport |
| | **PAFA** | Fairbanks Int'l. Airport |
| | **PAGA** | Edward G. Pitka Sr. Airport |
| | **PAOM** | Nome Airport |
| | **PAOR** | Northway Airport |
| | **PAOT** | Ralph Wien Memorial Airport |
| | **PAQT** | Nuiqsut Airport |
| | **PASC** | Deadhorse Airport |
| | **PATA** | Ralph M. Calhoun Memorial Airport |
| | **PAUN** | Unalakleet Airport |
| AJK | | Juneau AK |
| | **PAGS** | Gustavus Airport |
| | **PAGY** | Skagway Airport |
| | **PAJN** | Juneau Int'l. Airport |
| | **PAKT** | Ketchikan Int'l. Airport |
| | **PAPG** | Petersburg James A. Johnson Airport |
| | **PASI** | Sitka Rocky Gutierrez Airport |
| | **PAWG** | Wrangell Airport |
| | **PAYA** | Yakutat Airport |
| **Central** | | |
| ABR | | Aberdeen SD |
| | **KABR** | Aberdeen Regional Airport |
| | **KATY** | Watertown Municipal Airport |
| | **KPIR** | Pierre Regional Airport |
| APX | | North Central Lower Michigan MI |
| | **KAPN** | Alpena County Regional Airport |
| | **KPLN** | Pellston Regional Airport of Emmet County |
| | **KTVC** | Cherry Capital Airport |
| ARX | | Lacrosse WI |
| | **KLSE** | La Crosse Municipal Airport |
| | **KRST** | Rochester Int'l. Airport |

| | | |
|---|---|---|
| BIS | | Bismark ND |
| | **KBIS** | Bismarck Municipal Airport |
| | **KDIK** | Dickinson Municipal Airport |
| | **KISN** | Sloulin Field Int'l. Airport |
| | **KJMS** | Jamestown Municipal Airport |
| | **KMOT** | Minot Int'l. Airport |
| BOU | | Boulder CO |
| | **KAPA** | Centennial Airport |
| | **KBJC** | Jeffco Airport |
| | **KDEN** | Denver Int'l. Airport |
| CYS | | Cheyenne WY |
| | **KBFF** | William B. Heilig Field |
| | **KCDR** | Chadron Municipal Airport |
| | **KCYS** | Cheyenne Airport |
| | **KLAR** | Laramie Regional Airport |
| | **KRWL** | Rawlins Municipal Airport |
| | **KSNY** | Sidney Municpal Airport |
| DDC | | Dodge City KS |
| | **KDDC** | Dodge City Regional Airport |
| | **KGCK** | Garden City Regional Airport |
| | **KHYS** | Hays Regional Airport |
| DLH | | Duluth MN |
| | **KBRD** | Brainerd - Crow Wing County Regional Airport |
| | **KDLH** | Duluth Int'l. Airport |
| | **KHIB** | Chisholm - Hibbing Airport |
| | **KHYR** | Sawyer County Airport |
| | **KINL** | International Falls Airport |
| DMX | | Des Moines IA |
| | **KALO** | Waterloo Municipal Airport |
| | **KDSM** | Des Moines Int'l. Airport |
| | **KMCW** | Mason City Municipal Airport |
| | **KOTM** | Ottumwa Industrial Airport |
| DTX | | Detroit MI |
| | **KDET** | Detroit City Airport |
| | **KDTW** | Detroit Metropolitan - Wayne County Airport |
| | **KFNT** | Bishop Int'l. Airport |
| | **KMBS** | MBS Int'l. Airport |
| DVN | | Quad Cities IA |
| | **KBRL** | Burlington Regional Airport |
| | **KCID** | The Eastern Iowa Airport |
| | **KDBQ** | Dubuque Regional Airport |
| | **KMLI** | Quad City Int'l. Airport |
| EAX | | Kansas City MO |
| | **KMCI** | Kansas City Int'l. Airport |
| | **KMKC** | Kansas City Downtown Airport |
| | **KSTJ** | Rosecrans Memorial Airport |
| FGF | | Eastern N. Dakota ND |
| | **KBJI** | Bemidji - Beltrami County Airport |
| | **KFAR** | Hector Int'l. Airport |
| | **KGFK** | Grand Forks Int'l. Airport |
| FSD | | Sioux Falls SD |
| | **KFSD** | Joe Foss Field |
| | **KHON** | Huron Regional Airport |
| | **KSUX** | Sioux Gateway Airport |
| GID | | Hastings NE |

| | | |
|---|---|---|
| | **KGRI** | Central Nebraska Regional Airport |
| GJT | | Grand Junction CO |
| | **KASE** | Aspen - Pitkin County Airport (Sardy Field) |
| | **KEGE** | Eagle County Regional Airport |
| | **KGJT** | Walker Field |
| | **KGUC** | Gunnison County Airport (Issued NIL four times daily) |
| | **KHDN** | Yampa Valley Airport (Issued NIL four times daily) |
| | **KMTJ** | Montrose Regional Airport |
| | **KVEL** | Vernal Airport |
| GLD | | Goodland KS |
| | **KGLD** | Goodland Municipal Airport (Renner Field) |
| | **KMCK** | Mc Cook Municpal Airport |
| GRB | | Green Bay WI |
| | **KAUW** | Wausau Downtown Airport |
| | **KCWA** | Central Wisconsin Airport |
| | **KGRB** | Austin Straubel Int'l. Airport |
| | **KOSH** | Wittman Regional Airport (Only issued for annual Oshkosh airshow) |
| GRR | | Grand Rapids MI |
| | **KAZO** | Kalamazoo - Battle Creek Int'l. Airport |
| | **KGRR** | Gerald R. Ford Int'l. Airport |
| | **KJXN** | Jackson County Airport (Reynolds Field) |
| | **KLAN** | Capital City Airport |
| | **KMKG** | Muskegon County Airport |
| ICT | | Wichita KS |
| | **KCNU** | Chanute Martin Johnson Airport |
| | **KHUT** | Hutchinson Municipal Airport |
| | **KICT** | Wichita Mid-Continent Airport |
| | **KRSL** | Russell Municipal Airport |
| | **KSLN** | Salina Municipal Airport |
| ILX | | Central Illinois IL |
| | **KCMI** | Univ. of Illinois - Willard Airport |
| | **KDEC** | Decatur Airport |
| | **KPIA** | Greater Peoria Regional Airport |
| | **KSPI** | Capital Airport |
| IND | | Indianapolis IN |
| | **KHUF** | Terre Haute Int'l. - Hulman Field |
| | **KIND** | Indianapolis Int'l. Airport |
| | **KLAF** | Purdue Univ. Airport |
| IWX | | Northern Indiana IN |
| | **KFWA** | Fort Wayne Int'l. Airport |
| | **KSBN** | Michiana Regional Transportation Center Airport |
| JKL | | Jackson KY |
| | **KLOZ** | London - Corbin Airport (Magee Field) |
| LBF | | North Platte NE |
| | **KLBF** | North Platte Regional Airport - Lee Bird Field Airport |
| | **KVTN** | Miller Field Airport |
| LMK | | Louisville KY |
| | **KBWG** | Bowling Green - Warren County Regional Airport |
| | **KLEX** | Blue Grass Airport |
| | **KSDF** | Louisville Int'l. - Standiford Field Airport |
| LOT | | Chicago IL |
| | **KDPA** | Dupage Airport |
| | **KGYY** | Gary/Chicago Airport |
| | **KMDW** | Chicago Midway Airport |

| | | |
|---|---|---|
| | **KORD** | Chicago O'Hare Int'l. Airport |
| | **KRFD** | Greater Rockford Airport |
| LSX | | St. Louis MO |
| | **KCOU** | Columbia Regional Airport |
| | **KSTL** | Lambert - St Louis Int'l. Airport |
| | **KSUS** | Spirit of St Louis Airport |
| | **KUIN** | Quincy Municipal Airport (Baldwin Field) |
| MKX | | Milwaukee WI |
| | **KMKE** | General Mitchell Int'l. Airport |
| | **KMSN** | Dane County Regional Airport (Truax Field) |
| MPX | | Minneapolis MN |
| | **KAXN** | Chandler Field |
| | **KEAU** | Chippewa Valley Regional Airport |
| | **KMSP** | Minneapolis-St. Paul Int'l./Wold-Chamberlain/Airport |
| | **KRWF** | Redwood Falls Municipal Airport |
| | **KSTC** | St. Cloud Regional Airport |
| MQT | | Marquette MI |
| | **KCMX** | Houghton County Memorial Airport |
| | **KSAW** | Sawyer Int'l. Airport |
| OAX | | Omaha NE |
| | **KLNK** | Lincoln Municipal Airport |
| | **KOFK** | Karl Stefan Memorial Airport |
| | **KOMA** | Eppley Airfield |
| PAH | | Paducah KY |
| | **KCGI** | Cape Girardeau Regional Airport |
| | **KEVV** | Evansville Regional Airport |
| | **KPAH** | Barkley Regional Airport |
| PUB | | Pueblo CO |
| | **KALS** | San Luis Valley Regional - Bergman Airport |
| | **KCOS** | City of Colorado Springs Municipal Airport |
| | **KPUB** | Pueblo Memorial Airport |
| RIW | | Riverton WY |
| | **KCOD** | Yellowstone Regional Airport |
| | **KCPR** | Natrona County Int'l. Airport |
| | **KJAC** | Jackson Hole Airport |
| | **KLND** | Hunt Field |
| | **KRIW** | Riverton Regional Airport |
| | **KRKS** | Rock Springs - Sweetwater County Airport |
| | **KWRL** | Worland Municipal Airport |
| SGF | | Springfield MO |
| | **KJLN** | Joplin Regional Airport |
| | **KSGF** | Springfield - Branson Regional Airport |
| TOP | | Topeka KS |
| | **KFOE** | Forbes Field |
| | **KMHK** | Manhattan Regional Airport |
| | **KTOP** | Philip Billard Municipal Airport |
| UNR | | Rapid City SD |
| | **KGCC** | Gillette - Campbell County Airport |
| | **KRAP** | Rapid City Regional Airport |

**Eastern**

| | | |
|---|---|---|
| AKQ | | Wakefield VA |

| | | |
|---|---|---|
| | **KECG** | Elizabeth City CGAS/Municipal Airport |
| | **KORF** | Norfolk Int'l. Airport |
| | **KPHF** | Newport News - Williamsburg Int'l. Airport |
| | **KRIC** | Richmond Int'l. Airport |
| | **KSBY** | Salisbury - Ocean City - Wicomico Regional Airport |
| ALY | | Albany NY |
| | **KALB** | Albany Int'l. Airport |
| | **KGFL** | Floyd Bennett Memorial Airport |
| | **KPOU** | Dutchess County Airport |
| BGM | | Binghamton NY |
| | **KAVP** | Wilkes-Barre - Scranton Int'l. Airport |
| | **KBGM** | Binghamton Regional/Edwin A Link Field Airport |
| | **KELM** | Elmira - Corning Regional Airport |
| | **KITH** | Tompkins County Airport |
| | **KSYR** | Syracuse Hancock Int'l. Airport |
| | **KUCA** | Oneida County Airport |
| BOX | | Taunton MA |
| | **KACK** | Nantucket Memorial Airport |
| | **KBAF** | Barnes Municipal Airport |
| | **KBDL** | Bradley Int'l. Airport |
| | **KBOS** | General Edward Lawrence Logan Int'l. Airport |
| | **KHYA** | Barnstable Municipal - Boardman - Polando Airport |
| | **KMHT** | Manchester Airport |
| | **KORH** | Worcester Regional Airport |
| | **KPVD** | Theodore Francis Green State Airport |
| BTV | | Burlington VT |
| | **KBTV** | Burlington Int'l. Airport |
| | **KMPV** | Edward F. Knapp State Airport |
| | **KMSS** | Massena Int'l. Airport (Richards Field) |
| | **KSLK** | Adirondack Regional Airport |
| BUF | | Buffalo NY |
| | **KART** | Watertown Int'l. Airport |
| | **KBUF** | Buffalo Niagara Int'l. Airport |
| | **KIAG** | Niagara Falls Int'l. Airport |
| | **KJHW** | Chautauqua County - Jamestown Airport |
| | **KROC** | Greater Rochester Int'l. Airport |
| CAE | | Columbia SC |
| | **KAGS** | Bush Field |
| | **KCAE** | Columbia Metropolitan Airport |
| CAR | | Caribou ME |
| | **KBGR** | Bangor Int'l. Airport |
| | **KCAR** | Caribou Municipal Airport |
| | **KHUL** | Houlton Int'l. Airport |
| CHS | | Charleston SC |
| | **KCHS** | Charleston AFB/Int'l. Airport |
| | **KSAV** | Savannah Int'l. Airport |
| CLE | | Cleveland OH |
| | **KCAK** | Akron - Canton Regional Airport |
| | **KCLE** | Cleveland - Hopkins Int'l. Airport |
| | **KERI** | Erie Int'l. Airport |
| | **KFDY** | Findlay Airport |
| | **KMFD** | Mansfield Lahm Municipal Airport |
| | **KTOL** | Toledo Express Airport |
| | **KYNG** | Youngstown - Warren Regional Airport |
| CTP | | State College PA |
| | **KAOO** | Altoona - Blair County Airport |
| | **KBFD** | Bradford Regional Airport |

| | | |
|---|---|---|
| | **KIPT** | Williamsport Regional Airport |
| | **KJST** | Johnstown - Cambria County Airport |
| | **KMDT** | Harrisburg Int'l. Airport |
| | **KUNV** | University Park Airport |
| GSP | | Greenville-Spartanburg SC |
| | **KAND** | Anderson County Airport |
| | **KAVL** | Asheville Regional Airport |
| | **KCLT** | Charlotte/Douglas Int'l. Airport |
| | **KGMU** | Greenville Downtown Airport |
| | **KGSP** | Greenville-Spartanburg Int'l. Airport |
| | **KHKY** | Hickory Regional Airport |
| GYX | | Gray ME |
| | **KAUG** | Augusta State Airport |
| | **KCON** | Concord Municipal Airport |
| | **KLEB** | Lebanon Municipal Airport |
| | **KPSM** | Pease Int'l. Tradeport |
| | **KPWM** | Portland Int'l. Jetport |
| ILM | | Wilmington NC |
| | **KCRE** | Grand Strand Airport |
| | **KFLO** | Florence Regional Airport |
| | **KILM** | Wilmington Int'l. Airport |
| | **KMYR** | Myrtle Beach Int'l. Airport |
| ILN | | Wilmington OH |
| | **KCMH** | Port Columbus Int'l. Airport |
| | **KCVG** | Cincinnati - Northern Kentucky Int'l. Airport |
| | **KDAY** | James M. Cox Dayton Int'l. Airport |
| | **KLUK** | Cincinnati Municipal Airport (Lunken Field) |
| LWX | | Sterling VA |
| | **KBWI** | Baltimore - Washington Int'l. Airport |
| | **KCHO** | Charlottesville - Albemarle Airport |
| | **KDCA** | Ronald Regan-Washington National Airport |
| | **KIAD** | Washington Dulles Int'l. Airport |
| | **KMRB** | Eastern WV Regional - Shepherd Airport |
| | **KMTN** | Martin State Airport |
| MHX | | Newport-Morehead City NC |
| | **KEWN** | Craven County Regional Airport |
| OKX | | Upton NY |
| | **KBDR** | Igor I. Sikorsky Memorial Airport |
| | **KEWR** | Newark Int'l. Airport |
| | **KHPN** | Westchester County Airport |
| | **KISP** | Long Island MacArthur Airport |
| | **KJFK** | John F. Kennedy Int'l. Airport |
| | **KLGA** | LaGuardia Airport |
| | **KSWF** | Stewart Int'l. Airport |
| | **KTEB** | Teterboro Airport |
| PBZ | | Pittsburgh PA |
| | **KAGC** | Allegheny County Airport |
| | **KBVI** | Beaver County Airport |
| | **KDUJ** | Du Bois - Jefferson County Airport |
| | **KFKL** | Venango Regional Airport |
| | **KHLG** | Wheeling Ohio County Airport |
| | **KLBE** | Westmoreland County Airport |
| | **KMGW** | Morgantown Municipal/Walter L. Bill Hart Field Airport |
| | **KPIT** | Pittsburgh Int'l. Airport |
| | **KZZV** | Zanesville Municipal Airport |
| PHI | | Mount Holly NJ |
| | **KABE** | Lehigh Valley Int'l. Airport |
| | **KACY** | Atlantic City Int'l. Airport |

| | | |
|---|---|---|
| | **KILG** | New Castle County Airport |
| | **KMIV** | Millville Municipal Airport |
| | **KPHL** | Philadelphia Int'l. Airport |
| | **KPNE** | Northeast Philadelphia Airport |
| | **KRDG** | Reading Regional Airport (Carl A. Spaatz Field) |
| RAH | | Raleigh NC |
| | **KFAY** | Fayetteville Regional Airport (Grannis Field) |
| | **KGSO** | Piedmont Triad Int'l. Airport |
| | **KINT** | Smith Reynolds Airport |
| | **KRDU** | Raleigh - Durham Int'l. Airport |
| | **KRWI** | Rocky Mount - Wilson Regional Airport |
| RLX | | Charleston WV |
| | **KBKW** | Raleigh County Memorial Airport |
| | **KCKB** | Clarksburg/Harrison/Marion Regional Airport |
| | **KCRW** | Yeager Airport |
| | **KEKN** | Elkins - Randolph County Airport (Jennings Randolph Field) |
| | **KHTS** | Tri-State Airport (Milton J.Ferguson Field) |
| | **KPKB** | Wood County Airport (Gill Robb Wilson Field) |
| RNK | | Blacksburg VA |
| | **KBLF** | Mercer County Airport |
| | **KDAN** | Danville Regional Airport |
| | **KLWB** | Greenbrier Valley Airport |
| | **KLYH** | Lynchburg Regional/Preston Glenn Airport |
| | **KROA** | Roanoke Regional Airport (Woodrum Field) |

**Pacific**

| | | |
|---|---|---|
| HFO | | Honolulu HI |
| | **NSTU** | Pago Pago Int'l. Airport |
| | **PHJH** | Kapalua Airport |
| | **PHJR** | Kalaeloa Airport (John Rodgers Field) |
| | **PHKO** | Kona Int'l. at Keahole Airport |
| | **PHLI** | Lihue Airport |
| | **PHMK** | Molokai Airport |
| | **PHNL** | Honolulu Int'l. Airport |
| | **PHNY** | Lanai Airport |
| | **PHOG** | Kahului Airport |
| | **PHTO** | Hilo Int't. Airport |
| | **PJON** | Johnston Atoll Airport |
| | **PKMJ** | Marshall Islands Int'l. Airport |
| | **PKWA** | Bucholz AAF |
| | **PMDY** | Henderson Field |
| | **PTSA** | Kosrae Airport |
| | **PWAK** | Wake Island AAF |
| PGUM | | Guam, Island of Guam |
| | **PGRO** | Rota Int'l. Airport |
| | **PGSN** | Saipan Int'l. Airport |
| | **PGUM** | Guam Int'l. Airport |
| | **PGWT** | West Tinian Airport |
| | **PTKK** | Chuuk Int'l. Airport |
| | **PTPN** | Pohnpei Int'l. Airport |
| | **PTRO** | Babelthuap/Koror Airport |
| | **PTYA** | Yap Int'l. Airport |

**Southern**

| | | |
|---|---|---|
| ABQ | | Albuquerque NM |
| | **KABQ** | Albuquerque Int'l. Sunport Airport |
| | **KFMN** | Four Corners Regional Airport |
| | **KGUP** | Gallup Municipal Airport |
| | **KLVS** | Las Vegas Municipal Airport |
| | **KROW** | Roswell Industrial Air Center Airport |
| | **KSAF** | Santa Fe Municipal Airport |
| | **KTCC** | Tucumcari Municipal Airport |

| | | |
|---|---|---|
| AMA | | Amarillo TX |
| | **KAMA** | Amarillo Int'l. Airport |
| | **KDHT** | Dalhart Municipal Airport |
| BMX | | Birmingham AL |
| | **KANB** | Anniston Metropolitan Airport |
| | **KBHM** | Birmingham Int'l. Airport |
| | **KHSV** | Huntsville Int'l. Airport (Carl T. Jones Field) |
| | **KMGM** | Montgomery Regional Airport (Dannelly Field) |
| | **KMSL** | Northwest Alabama Regional Airport |
| | **KTCL** | Tuscaloosa Municipal Airport |
| BRO | | Brownsville TX |
| | **KBRO** | Brownsville - South Padre Island Int'l. Airport |
| | **KHRL** | Rio Grande Valley Int'l. Airport |
| | **KMFE** | McAllen - Miller Int'l. Airport |
| CRP | | Corpus Christi TX |
| | **KALI** | Alice Int'l. Airport |
| | **KCRP** | Corpus Christi Int'l. Airport |
| | **KLRD** | Laredo Int'l. Airport |
| | **KVCT** | Victoria Regional Airport |
| EPZ | | El Paso TX |
| | **KDMN** | Deming Municipal Airport |
| | **KELP** | El Paso Int'l. Airport |
| | **KTCS** | Truth Or Consequences Municipal Airport |
| EWX | | Austin/San Antonio TX |
| | **KAUS** | Austin - Bergstrom Int'l. Airport |
| | **KDRT** | Del Rio Int'l. Airport |
| | **KSAT** | San Antonio Int'l. Airport |
| EYW | | Key West FL |
| | **KEYW** | Key West Int'l. Airport |
| FFC | | Atlanta GA |
| | **KAHN** | Athens - Ben Epps Airport |
| | **KATL** | The William B. Hartsfield Atlanta Int'l. Airport |
| | **KCSG** | Columbus Metropolitan Airport |
| | **KFTY** | Fulton County Airport (Brown Field) |
| | **KMCN** | Middle Georgia Regional Airport |
| FWD | | Fort Worth TX |
| | **KACT** | Waco Regional Airport |
| | **KDAL** | Dallas Love Field |
| | **KDFW** | Dallas - Fort Worth Int'l. Airport |
| | **KFTW** | Fort Worth Meacham Int'l. Airport |
| HGX | | Houston TX |
| | **KCLL** | Easterwood Field |
| | **KGLS** | Scholes Field |
| | **KHOU** | William P. Hobby Airport |
| | **KIAH** | George Bush Intercontinental Airport |
| JAN | | Jackson MS |
| | **KGLH** | Mid Delta Regional Airport |
| | **KGWO** | Greenwood - Leflore Airport |
| | **KJAN** | Jackson Int'l. Airport |
| | **KMEI** | Key Field |
| | **KPIB** | Hattiesburg - Laurel Regional Airport |
| JAX | | Jacksonville FL |
| | **KGNV** | Gainesville Regional Airport |
| | **KJAX** | Jacksonville Int'l. Airport |
| | **KSSI** | Malcolm McKinnon Airport |

| | | |
|---|---|---|
| LCH | | Lake Charles LA |
| | **KAEX** | Alexandria Int'l. Airport |
| | **KBPT** | Jefferson County Airport |
| | **KLCH** | Lake Charles Regional Airport |
| | **KLFT** | Lafayette Regional Airport |
| LIX | | New Orleans LA |
| | **KBTR** | Baton Rouge Metropolitan Airport (Ryan Field) |
| | **KGPT** | Gulfport - Biloxi Regional Airport |
| | **KMCB** | McComb - Pike County - John E Lewis Airport |
| | **KMSY** | New Orleans Int'l. Airport (Moisant Field) |
| LUB | | Lubbock TX |
| | **KCDS** | Childress Municipal Airport |
| | **KLBB** | Lubbock Int'l. Airport |
| LZK | | Little Rock AR |
| | **KHOT** | Memorial Field |
| | **KHRO** | Boone County Airport |
| | **KLIT** | Adams Field |
| | **KPBF** | Grider Field |
| MAF | | Midland/Odessa TX |
| | **KCNM** | Cavern City Air Terminal |
| | **KHOB** | Lea County - Hobbs Airport |
| | **KINK** | Winkler County Airport |
| | **KMAF** | Midland Int'l. Airport |
| MEG | | Memphis TN |
| | **KJBR** | Jonesboro Municipal Airport |
| | **KMEM** | Memphis Int'l. Airport |
| | **KMKL** | McKellar - Sipes Regional Airport |
| | **KTUP** | Tupelo Municipal - C. D. Lemons Airport |
| MFL | | Miami FL |
| | **KAPF** | Naples Municipal Airport |
| | **KFLL** | Fort Lauderdale - Hollywood Int'l. Airport |
| | **KMIA** | Miami Int'l. Airport |
| | **KPBI** | Palm Beach Int'l. Airport |
| MLB | | Melbourne FL |
| | **KDAB** | Daytona Beach Int'l. Airport |
| | **KMCO** | Orlando Int'l. Airport |
| | **KMLB** | Melbourne Int'l. Airport |
| | **KSFB** | Orlando Sanford Airport |
| | **KVRB** | Vero Beach Municipal Airport |
| MOB | | Mobile AL |
| | **KMOB** | Mobile Regional Airport |
| | **KPNS** | Pensacola Regional Airport |
| MRX | | Knoxville/Tri-Cities TN |
| | **KCHA** | Lovell Field |
| | **KTRI** | Tri-Cities Regional TN/VA Airport |
| | **KTYS** | McGhee Tyson Airport |
| OHX | | Nashville TN |
| | **KBNA** | Nashville Int'l. Airport |
| | **KCSV** | Crossville Memorial Airport (Whitson Field) |
| OUN | | Oklahoma City OK |
| | **KGAG** | Gage Airport |
| | **KHBR** | Hobart Municipal Airport |
| | **KOKC** | Will Rogers World Airport |
| | **KPNC** | Ponca City Municipal Airport |
| | **KSPS** | Sheppard AFB/Wichita Falls Municipal Airport |

| | | |
|---|---|---|
| SHV | | Shreveport LA |
| | **KELD** | South Arkansas Regional at Goodwin Field Airport |
| | **KGGG** | Gregg County Airport |
| | **KLFK** | Angelina County Airport |
| | **KMLU** | Monroe Regional Airport |
| | **KSHV** | Shreveport Regional Airport |
| | **KTXK** | Texarkana Regional Airport (Webb Field) |
| | **KTYR** | Tyler Pounds Field |
| SJT | | San Angelo TX |
| | **KABI** | Abilene Regional Airport |
| | **KSJT** | Mathis Field |
| SJU | | San Juan PR |
| | **TIST** | Cyril E. King Airport |
| | **TISX** | Henry E. Rohlsen Airport |
| | **TJBQ** | Rafael Hernandez Airport |
| | **TJMZ** | Eugenio Maria de Hostos Airport |
| | **TJPS** | Mercedita Airport |
| | **TJSJ** | Luis Munoz Marin Int'l. Airport |
| | **TKPK** | Golden Rock Airport |
| | **TNCM** | Princess Juliana Airport |
| TAE | | Tallahassee FL |
| | **KABY** | Southwest Georgia Regional Airport |
| | **KDHN** | Dothan Airport |
| | **KPFN** | Panama City - Bay County Int'l. Airport |
| | **KTLH** | Tallahassee Regional Airport |
| | **KVLD** | Valdosta Regional Airport |
| TBW | | Tampa Bay FL |
| | **KFMY** | Page Field (Ft. Myers) |
| | **KPIE** | St. Petersburg/Clearwater Int'l. Airport |
| | **KRSW** | Southwest Florida Int'l. Airport |
| | **KSRQ** | Sarasota - Bradenton Int'l. Airport |
| | **KTPA** | Tampa Int'l. Airport |
| TSA | | Tulsa |
| | **KFSM** | Fort Smith Regional Airport |
| | **KFYV** | Drake Field |
| | **KMLC** | McAlester Regional Airport |
| | **KRVS** | Richard lloyd Jones Jr. Airport |
| | **KTUL** | Tulsa Int'l. Airport |
| | **KXNA** | Northwest Arkansas Regional Airport |

**Western**

| | | |
|---|---|---|
| BOI | | Boise ID |
| | **KBKE** | Baker City Municipal Airport |
| | **KBNO** | Burns Municipal Airport |
| | **KBOI** | Boise Air Terminal (Gowen Field) |
| | **KMYL** | McCall Airport |
| | **KTWF** | Magic Valley Regional Airport (Joslin Field) |
| BYZ | | Billings MT |
| | **KBIL** | Billings Logan Int'l. Airport |
| | **KLVM** | Mission Field |
| | **KMLS** | Frank Wiley Field |
| | **KSHR** | Sheridan County Airport |
| EKA | | Eureka CA |
| | **KACV** | Arcata Airport |
| | **KCEC** | Jack McNamara Field |
| | **KUKI** | Ukiah Municipal Airport |
| FGZ | | Flagstaff AZ |

| | | |
|---|---|---|
| | **KFLG** | Flagstaff Pulliam Airport |
| | **KGCN** | Grand Canyon National Park Airport |
| | **KINW** | Winslow - Lindbergh Regional Airport |
| | **KPGA** | Page Municipal Airport |
| | **KPRC** | Ernest A. Love Field |
| GGW | | Glasgow MT |
| | **KGDV** | Dawson Community Airport |
| | **KGGW** | Wokal Field/Glasgow Int'l. Airport |
| | **KOLF** | L. M. Clayton Airport |
| | **KSDY** | Sidney - Richland Municipal Airport |
| HNX | | San Joaquin CA |
| | **KBFL** | Meadows Field Airport |
| | **KFAT** | Fresno Yosemite Int'l. Airport |
| | **KMCE** | Merced Municipal Airport (MacReady Field) |
| LKN | | Elko NV |
| | **KEKO** | Elko Municipal Airport (J.C. Harris Field) |
| | **KELY** | Ely Airport (Yelland Field) |
| | **KWMC** | Winnemucca Municipal Airport |
| LOX | | Oxnard CA |
| | **KBUR** | Burbank - Glendale - Pasadena Airport |
| | **KLAX** | Los Angeles Int'l. Airport |
| | **KLGB** | Long Beach Airport (Daugherty Field) |
| | **KPMD** | Palmdale Production Flight/Test Instln AF Plant 42 Plant |
| | **KPRB** | Paso Robles Municipal Airport |
| | **KSBA** | Santa Barbara Municipal Airport |
| | **KSBP** | San Luis Obispo County - McChesney Airport |
| | **KSMX** | Santa Maria Public Airport/Capt G. Allan Hancock Field |
| | **KVNY** | Van Nuys Airport |
| | **KWJF** | General William J. Fox Airfield |
| MFR | | Medford OR |
| | **KLMT** | Klamath Falls Int'l. Airport |
| | **KMFR** | Rogue Valley Int'l. - Medford Airport |
| | **KOTH** | North Bend Municipal Airport |
| MSO | | Missoula MT |
| | **KBTM** | Bert Mooney Airport |
| | **KFCA** | Glacier Park Int'l. Airport |
| | **KMSO** | Missoula Int'l. Airport |
| | **KSMN** | Lemhi County Airport |
| MTR | | Monterey CA |
| | **KMRY** | Monterey Peninsula Airport |
| | **KOAK** | Metropolitan Oakland Int'l. Airport |
| | **KSFO** | San Francisco Int'l. Airport |
| | **KSJC** | San Jose Int'l. Airport |
| | **KSNS** | Salinas Municipal Airport |
| | **KSTS** | Sonoma County Airport |
| OTX | | Spokane WA |
| | **KCOE** | Coeur D'Alene Air Terminal |
| | **KEAT** | Pangborn Memorial Airport |
| | **KGEG** | Spokane Int'l. Airport |
| | **KLWS** | Lewiston - Nez Perce County Airport |
| | **KMWH** | Grant County Int'l. Airport |
| | **KSFF** | Felts Field |
| PDT | | Pendleton OR |
| | **KALW** | Walla Walla Regional Airport |
| | **KDLS** | Columbia Gorge Regional/The Dallas Municipal Airport |
| | **KPDT** | Eastern Oregon Regional at Pendleton Airport |
| | **KPSC** | Tri-Cities Airport |
| | **KRDM** | Roberts Field |

| | | |
|---|---|---|
| | **KYKM** | Yakima Air Terminal (McAllister Field) |
| PIH | | Pocatello ID |
| | **KBYI** | Burley Municipal Airport |
| | **KIDA** | Idaho Falls Regional Airport |
| | **KPIH** | Pocatello Regional Airport |
| | **KSUN** | Friedman Memorial Airport |
| PQR | | Portland OR |
| | **KAST** | Astoria Regional Airport |
| | **KEUG** | Mahlon Sweet Field |
| | **KHIO** | Portland - Hillsboro Airport |
| | **KPDX** | Portland Int'l. Airport |
| | **KSLE** | McNary Field |
| | **KTTD** | Portland - Troutdale Airport |
| PSR | | Phoenix AZ |
| | **KBLH** | Blythe Airport |
| | **KIPL** | Imperial County Airport |
| | **KPHX** | Phoenix Sky Harbor Int'l. Airport |
| | **KYUM** | Yuma MCAS/Int'l. Airport |
| REV | | Reno NV |
| | **KLOL** | Derby Field |
| | **KRNO** | Reno - Tahoe Int'l. Airport |
| | **KTRK** | Truckee - Tahoe Airport |
| | **KTVL** | Lake Tahoe Airport |
| SEW | | Seattle WA |
| | **KBFI** | King County Int'l. Airport (Boeing Field) |
| | **KBLI** | Bellingham Int'l. Airport |
| | **KCLM** | William R. Fairchild Int'l. Airport |
| | **KHQM** | Bowerman Airport |
| | **KOLM** | Olympia Airport |
| | **KPAE** | Snohomish County Airport (Paine Field) |
| | **KSEA** | Seattle - Tacoma Int'l. Airport |
| SGX | | San Diego CA |
| | **KCRQ** | McClellan - Palomar Airport |
| | **KONT** | Ontario Int'l. Airport |
| | **KPSP** | Palm Springs Regional Airport |
| | **KSAN** | San Diego Int'l. Airport (Lindbergh Field) |
| | **KSNA** | John Wayne Airport - Orange County Airport |
| | **KTRM** | Thermal Airport |
| SLC | | Salt Lake City UT |
| | **KBCE** | Bryce Canyon Airport |
| | **KCDC** | Cedar City Regional Airport |
| | **KENV** | Wendover Airport |
| | **KLGU** | Logan - Cache Airport |
| | **KOGD** | Ogden - Hinckley Airport |
| | **KPVU** | Provo Municipal Airport |
| | **KSGU** | St. George Municipal Airport |
| | **KSLC** | Salt Lake City Int'l. Airport |
| STO | | Sacramento CA |
| | **KRBL** | Red Bluff Municipal Airport |
| | **KRDD** | Redding Municipal Airport |
| | **KSAC** | Sacramento Executive Airport |
| | **KSCK** | Stockton Metropolitan Airport |
| | **KSMF** | Sacramento Int'l. Airport |
| TFX | | Great Falls MT |
| | **KBZN** | Gallatin Field |
| | **KCTB** | Cut Bank Municipal Airport |
| | **KGTF** | Great Falls Int'l. Airport |
| | **KHLN** | Helena Regional Airport |

| | | |
|---|---|---|
| | **KHVR** | Havre City - County Airport |
| | **KLWT** | Lewistown Municipal Airport |
| TWC | | Tucson AZ |
| | **KDUG** | Bisbee Douglas Int'l. Airport |
| | **KOLS** | Nogales Int'l. Airport |
| | **KTUS** | Tucson Int'l. Airport |
| VEF | | Las Vegas NV |
| | **KBIH** | Bishop Airport |
| | **KDAG** | Barstow - Daggett Airport |
| | **KDRA** | Desert Rock Airport |
| | **KEED** | Needles Airport |
| | **KLAS** | McCarran Int'l. Airport |
| | **KTPH** | Tonopah Airport |
| | **KVGT** | North Las Vegas Airport |