TERMINAL FORECAST PHILOSOPHY

Terminal forecasting must be focused on operationally significant weather events and changes. **Forecaster judgement**, particularly with regard to amendments, plays a key role in the terminal forecast program.

1. USE OF THE TERMINAL FORECAST

The terminal forecast serves the pre-flight and in-flight meteorological service requirements of domestic and international aviation operations by providing a forecast of weather conditions at an airport. The terminal forecast is principally used for flight planning, but the product is not designed to contain *all* information pertaining to aviation weather at that location. For a pilot weather briefing, the terminal forecast is used with other important aviation weather products such as: SIGMETS, AIRMETS, Convective SIGMETS, Center Weather Advisories, Severe Weather Outlooks (AC), Area Forecasts (FA), pilot reports (PIREPs), and Surface and Radar Observations.

When pilots are briefed for a planned flight, they are given applicable hazardous weather products issued by the Aviation Weather Center (or Alaska Aviation Weather Unit) which may contain actual or anticipated convective activity or instrument flight rules (IFR) conditions. In addition to the terminal forecast, convective weather information may be obtained from the Severe Weather Outlook (AC), the Area Forecast (FA), and radar observations and imagery. IFR condition information, as well as convective information, may be obtained from PIREPs, surface observations, and visually interpreted satellite imagery.

If the aviation weather products contain information on possible convection or IFR conditions for an area and a terminal forecast for an airport within that area does *not* contain the lower probability of IFR conditions in convection, pilots can still be advised of the risk of those convection conditions near that airport using the other aviation products.

2. **COMPOSING THE TERMINAL FORECAST**

Forecasters should consider the following recommendations when composing a terminal forecast:

* The terminal forecast should be consistent with other forecasts prepared within the NWS office

* Forecast a concise description of the expected sequence of events. The forecasts are often obtained verbally and are manually transcribed.

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

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

3. **AMENDMENT CRITERIA**

If an unexpected weather event occurs at a terminal site which is not expected to persist (i.e., brief shower or thunderstorm), and the forecast still represents the forecaster's best professional judgement on expected conditions, there is little or no need to amend. En route pilots will be using current weather information (i.e., observations and radar) to make short term in-flight decisions. They may use terminal forecasts for longer term decisions. Amended terminal forecasts, addressing only a temporary change in the forecast, occurring *within* the next hour, will not help en route pilots nor those making pre-flight arrangements.

The threshold values chosen as amendment criteria are those which impact aircraft and airport operations. When selecting forecast values, forecasters should remain aware of the operationally-oriented amendment criteria, but the terminal forecast values should not be selected solely to satisfy the criteria.

Discrete flight category value changes for visual flight rules (VFR), marginal visual flight rules (MVFR), IFR, and low IFR (LIFR) have significant operational impact (i.e., fuel requirements, alternates) and the terminal forecast must be responsive to those changes. Ceiling and visibility values of 600 feet and 2 miles, respectively, impact airport use as a flight planning alternate. Ceiling values of 2000 feet, 200 feet, and a visibility value of 1/2 mile impact arrivals, takeoffs, and landings particularly at hub and large airports. Significant weather and wind conditions have an operational impact at all airports.

4. **AMENDMENT PHILOSOPHY**

Terminal forecast amendment criteria are based on two principles;

1) Specific thresholds which are significant to aviation operations **and**;

2) A forecaster's determination that the new conditions are likely to persist long enough to actually be significant.

The requirement for issuing amendments is driven by customers needing to know when significant weather conditions, liable to affect their operations, are expected; and when those expectations change. Forecasters have expressed concern that the terminal forecast amendment criteria are too restrictive and thus, too many amendments are required. Forecasters perceive that forcing amendments of essentially good forecasts seems unnecessary because it requires as much effort as amending unrepresentative forecasts. The increased number of amended terminal forecasts has directly impacted forecasters' workload. There is also a concern that the increased number of amendments has reduced customer confidence in the integrity of the forecast.

The frequency of issuing amendments can be effectively controlled by exercising the second terminal forecast amendment principle. The decision to amend the forecast relies on the forecaster's judgement to determine whether it is actually warranted by assessing the combination of existing conditions and forecaster expectations. However, terminal forecast amendments must be issued promptly whenever the forecaster becomes aware that conditions meeting the amendment criteria have occurred and judges that those conditions will persist.

Forecasters are encouraged to use application programs that flag a terminal forecast which does not satisfy the first terminal forecast amendment principle. Forecasters amending every terminal forecast alarmed by such programs may be just "chasing the observation" and not applying the second terminal forecast amendment principle. As AWOS and ASOS observations become more prevalent at terminal forecast sites, the frequency of observations are likely to increase as well as the probability that the observations may occur outside of the forecast amendment ranges. Increased emphasis on forecaster judgement should throttle the urge to "chase the observations".

Brief changes in observed weather, which are not expected to persist and are not within the forecast ranges, do not require amendments if the forecast still represents expected conditions for the period.

Example: A terminal forecast does not contain "PROB40 (times) TSRA" because the inclusion of the group is prohibited in the first 6 hours. An unexpected thunderstorm occurs at the terminal forecast site during this period and no amendment was issued prior to its occurrence. The forecaster expects the thunderstorm to last about 30 minutes and does not foresee any other thunderstorms at the terminal. If the other forecast parameters are expected to remain representative, then the original terminal forecast is still valid and no amendment should be issued. However, a terminal forecast for a site downwind from the thunderstorm may need to be amended. If the thunderstorm was detected and expected to affect the site, then the terminal forecast should have been amended to reflect the anticipated conditions.

Both the timing and duration of the actual weather event and the forecast of the event must be considered when deciding to amend. If the conditions change earlier or later than forecast and the terminal forecast shows the expected trend and will soon recover, an amendment may not be needed. In addition, small fluctuations in the observation should not result in a minor adjustment to the terminal forecast. Forecasters should use their best judgement on deciding when to amend.

With the above guidance in mind, forecasters are encouraged to amend terminal forecasts whenever necessary to keep them representative.

5. **PROBABILITY TERM USE RESTRICTION**

PROB30 and PROB40 are not permitted in the first 6 hours of each new terminal forecast’s valid period, including amendments. These restrictions relieve forecasters of responsibility for describing low probability events in the first 6 hours of the forecast period and relieves customers from having to respond operationally to forecasts of events which, by definition, probably will not occur.

There is an understandable forecaster concern that forecasts of convective events, particularly possible hazardous conditions within severe weather watch areas, are not adequately portrayed in the first 6 hours of the terminal forecast. This concern is based on the questionable premise that the customer is better off if the potentially hazardous weather conditions are stated in the terminal forecast, regardless of the operational impact when it doesn’t occur. *The low Probability of Precipitation (PoP) event (less than 50 percent) forecast in a terminal forecast, regardless of the associated conditions, exerts a disproportionate influence on the operations associated with the terminal forecast and thus its use has been disallowed in the first 6 hours of the forecast.*

NOTE: When a PROB30 or PROB40 group is warranted after the first 6 hours of an amended or delayed terminal forecast, it is recommended that the PROB group become effective on the next whole hour following the end of the exact 6 hour period under consideration. The 6 hour period begins at the issuance (effective) time of the amended or delayed terminal forecast. The use of intermediate times as beginning times for forecast groups, just for the purpose of including a PROB group, is discouraged.

At times when forecasters do not have rapid access to real-time radar imagery, other methods of quickly detecting convective activity near terminal forecast sites must be used. Besides observations, forecasters should rely on satellite imagery and lightning display graphics. For determining short term convective potential, forecasters must keep abreast of hourly mesoscale analyses.

The use of PROB in the terminal forecast should reflect the fact that the terminal forecast area is limited to a 5-statute mile radius around the airport. This is usually a significantly smaller area than the corresponding public forecast zone. The PROB group in the terminal forecast should be *consistent* with the zone PoP, but not necessarily the same because the PROB group often includes the probability of lower ceilings and restricted visibilities with the precipitation instead of just the statistical PoP. The terminal forecast has the advantage of being able to accommodate the PoP for hourly intervals, whereas the public zone must use PoPs for 6- or 12-hour periods. The terminal forecast PoP can refine the zone PoP for a terminal forecast site by providing more specific timing and details on precipitation type.

Example: A 70 percent chance of showers is forecast for a zone for the afternoon. At a terminal forecast site in that zone, a 30 percent chance of showers is forecast for the early afternoon and a 70 percent chance for late in the afternoon. The corresponding terminal forecast *would not* include a probability group in the first 6 hours for a 30 percent PoP. The terminal forecast PROB group reflecting the 70 percent PoP may only be a 40 percent PoP when the possibility of low ceilings and visibilities in the showers are taken into account. Conversely, if the situation warrants, the 70 percent PoP forecast may be carried as the prevailing group (FM or BECMG) instead of in a PROB30 or PROB40.

6. **LENGTH OF BECMG, TEMPO, AND PROB TIME PERIODS**

BECMG: The duration of the change period covered a by BECMG group, indicated by GGG_eG_e, shall never exceed 2 hours in an NWS-prepared terminal forecast.

TEMPO: In general, the period of time covered by a TEMPO group should not exceed 4 hours. In addition, a TEMPO forecast that is in effect for more than 2 hours without an occurrence of the stated conditions should be *reviewed* for amending.

PROB30 and PROB40: The period of time covered by a PROB group should generally be 6 hours or less, excluding widespread or self-sustaining convective systems.

These recommended practices should help satisfy the customer requirement that the terminal forecast be as specific as possible and representative of conditions which are occurring and those which may be expected.

7. **LIABILITY CONCERNS**

Forecasters are concerned that they will be personally accountable for their terminal forecast if an aircraft accident occurs at or near the terminal forecast site, and it is followed by an investigation and subsequent litigation. If the forecaster has followed NWS operational policies and procedures, which include the use of professional judgement, then the agency, and not the forecaster, will assume the responsibility for any legal implications. Therefore, forecasters should keep current with the observed weather and consider the need for amendments using agency policies and guidelines in the decision process. If an unexpected condition occurs at an airport, which, due to procedures or judgement, is not specifically addressed in the terminal forecast, and a weather related accident occurs at that airport, then the agency policy will be accountable and not the forecaster applying the policy.