

■ ■ Ask any general aviation pilot what he believes is the greatest nemesis to flying. Chances are that you will receive a two-syllable answer—weather.

That problem area soon may be alleviated, however, with the help of the National Transportation Safety Board and other governmental elements. Recommendations to improve aviation weather services were transmitted recently from NTSB to both FAA and the Environmental Science Services Administration (ESSA), parent organization of the Weather Bureau. The 26 detailed recommendations largely mirror those that have been made repeatedly by AOPA over the past several years. NTSB's document, however, would appear to have the authority of a pseudo-directive and has already elicited some positive reactions.

Prefaced with a letter from NTSB Chairman Joseph J. O'Connell, Jr., the Safety Board's recommendations proceeded from a continuing study of accident causal factors. "In our investigation and analysis of general aviation accidents, we consider all relevant aspects of meteorological facilities, services and procedures," O'Connell said. During 1966, NTSB studies showed weather as a direct cause in only 2.4% of general aviation accidents, 6% of which were fatal. However, weather was cited as a related causal factor more frequently than any other, he added (13.1% of the total; of these, 22% were fatal.)

"Based upon all the information at our disposal, it is our conviction that improved meteorological facilities, services and procedures could have reduced substantially the degree of hazard involved in these general aviation operations," O'Connell declared. Urging their adoption as part of a long-range program to improve aviation weather services, NTSB offered these specific recommendations:

1. Increase the number of aviation weather observing sites. There are many gaps in the network, NTSB noted. Even taking into account the supplementary aeronautical weather reporting stations, there is only about one observing station for each nine airports and only a portion of them are open 24 hours a day.

2. A vigorous program of quality control of aviation weather observations should be developed, since a basic requirement is detailed, accurate reporting.

3. Cloud height measuring equipment should be provided at all aviation weather observing stations. The practice of estimating cloud heights is not conducive to accurate information or safe aircraft operations.

4. Additional efforts should be made to standardize the location of weather instruments at airports. "We have in mind particularly standard locations for representative measurements of wind and cloud height over the airport and cloud information from that area along the approach path where 'decision height' is involved," NTSB said.

5. Methods should be developed for measuring and forecasting low-level

wind shear, particularly in the airport terminal area.

6. Adequate visibility reference markers (particularly nighttime markers) should be provided for the guidance of observers. According to NTSB, inadequacies have been revealed on numerous occasions during aircraft accident investigations.

7. Continued efforts should be made to expand the upper air observing network and to increase the number of rawinsonde ascents to four a day. Gaps in the network are numerous and two ascents a day are not enough for aviation purposes, NTSB said.

8. The weather radar network should be expanded, particularly in the western states, and weak, obsolete war-surplus equipment should be replaced with up-to-date, long-range weather radar equipment.

9. Staffing revisions or expansions should be made so that a continuous weather watch would be maintained and improved pilot briefing services provided at locations manned by one person during certain hours. NTSB pointed out that at many locations a single person often is faced with a mountainous work load during bad weather and making aviation weather observations in an accurate and timely manner may have to take a lower priority than other assigned duties.

10. Continue expansion of the run-

# The Improving Weather Picture

*Recommendations submitted by National Transportation Safety Board and pending revisions in weather forecast system may portend some long overdue improvements in aviation weather services*

way visual range (RVR) program, including the multiple installation of transmissometers. Additional research also should be pursued into means to adequately assess RVR.

11. Develop a means to measure slant visibility or slant visual range such as that experienced on landing approach.

12. Establish pilot-to-forecaster service as an operational program on a national basis.

13. Expand the transcribed weather broadcast (TWEB) network to provide coast-to-coast coverage.

14. Expand the pilots automatic telephone weather answering service (PATWAS) to provide its service to many additional areas, particularly those where live weather broadcasting may not be available.

15. Establish more pilot weather briefing facilities.

16. All weather briefing facilities should be provided with facsimile equipment, which would improve the quality of briefings and assist in the desired standardization of briefing procedures.

17. Additional avenues should be explored to improve and standardize all aviation weather briefing displays.

18. Additional telephone lines should be provided to weather briefing facilities, coupled with a recorded announcement to stand by for a briefing if necessary. This would lead most pilots to



wait for a slightly delayed briefing instead of being tempted to depart with no information, NTSB believes.

19. Audio recording of pilot weather briefings should be accomplished for ESSA-FAA quality control purposes as well as to assist NTSB in accident investigations.

20. Special efforts should be made to devise refined techniques and procedures for providing aviation-oriented weather satellite information on a national basis.

21. The terminal forecasting program, now available on a routine basis at only about 5% of U.S. airports, should be greatly expanded.

22. Delineation of aviation forecast boundaries should be improved to define more precisely the areas encompassed, perhaps reassigning areas of forecast responsibilities to make the boundaries contiguous with state boundaries.

23. A centralized clear air turbulence (CAT) forecasting center should be established, similar to the severe local storms (SELS) unit.

24. Continued efforts should be made to improve the procedures for obtaining and disseminating in-flight weather information.

25. Terminology used for CAT forecasts and CAT reports now differs greatly, leading to unnecessary confusion. It should be standardized.

26. Research programs should be continued to improve forecasting methods and also should be conducted to develop objective methods for measuring or forecasting the intensity of icing and turbulence.

Those recommendations brought an almost immediate response from ESSA. Administrator Robert M. White told NTSB that his agency already had acted to implement many of them. He disclosed that ESSA and FAA were working on a five-year planning guide that was responsive to most of the recommendations. But he noted that the rate at which those plans could be implemented would be determined by the budgetary support granted by Congress.

Meantime, ESSA officials called a meeting of aviation industry representatives in Washington to conduct a briefing on a reorganization of the Weather Bureau forecasting system. Scheduled to take place between fiscal years 1969 and 1973, the reorganization is intended to improve the quality of field forecast products and services for the benefit of aviation.

The Weather Bureau's existing system of forecast production has continued with little change over many years, ESSA officials pointed out. In broad outline, it consists of a three-echelon operation. The first level (the National Meteorological Center) is concerned with analysis, prediction and interpretation of large-scale atmospheric motions, including hurricanes and severe local storms. The second echelon uses the guidance produced by the first to compare with its own weather watch, independent analysis and prediction of both large-scale and small-scale weather fea-

tures. It then prepares forecast guidance for areas about the size of two average states. The third echelon issues more localized forecasts and bulletins to user groups based on information provided by the second level.

Largely because of advances made at the National Meteorological Center over recent years, the three-tier system has become obsolete, aviation representatives were told. Under the planned reorganization, which will be instituted on a phased basis over the next five years, the forecast system will be expanded and streamlined.

"The essential feature of the new organization consists of a flow of forecast information directly from the first echelon (made up of the National Meteorological Center, National Hurricane Center and National Severe Storm Forecast Center) to a second echelon of weather forecast offices (WFO's) which will prepare and issue forecasts for public use," said ESSA's Dr. George P. Cressman. "In this type of organization the middle guidance echelon has been eliminated."

A problem recognized in the reorganization plans is that of coordination when warning forecasts of a weather condition that moves from the area of one forecast office to that of another. "We expect that the warning coordination function will be undertaken by one office in each region, which will resemble to some extent the present middle echelon, but with a very essential difference," Dr. Cressman said. "The difference is that this regional weather center (RWC) will not provide a regular flow of detailed guidance in series in the chain between the National Meteorological Center and the WFO's. Its main function will be the coordination of warnings on an unscheduled basis, the preparation of area forecasts and in-flight weather advisories for aviation and, to the extent possible, monitoring the performance of the WFO's in a program of quality control."

ESSA has set a goal to establish about 50 WFO's during the five-year period. There are now 24 area forecast centers which will be considered WFO's under the reorganized forecast structure, leaving 26 new ones to be established. "It is evident that if we are to be able to staff these new offices adequately with round-the-clock coverage by meteorologists for a minimum of public and aviation terminal forecasts, additional personnel and more meteorologists will be required," Dr. Cressman said.

The existing 200 Weather Bureau locations not included among the WFO's will be designated weather service offices (WSO's) under the reorganization. Their function will be to disseminate to users—by weather wire, VHF radio, automatic telephone devices, and mass news media—those forecast products received from the WFO. They will also make observations and issue warnings based on known hazards as well as adapting WFO zone forecasts to the preparation of local forecasts.

Aviation weather service specifically is expected to benefit from the reorgani-

zation because it will provide greater forecast consistency by centralizing forecast production at the six RWC's; and will improve the quality of terminal forecasts while providing a framework for an increase in the number of terminal forecasts that can be prepared. It is also expected to reduce the average number of terminals of concern to a forecast office.

Generally, the reorganization is designed to yield these benefits:

- Round-the-clock meteorologist coverage at over 50 locations as opposed to about 30 today.

- Higher quality forecasts and warnings that will be more responsive to user needs, since meteorologists will concentrate their efforts on smaller geographic areas.

- More timely forecast production and less duplication of effort.

- Improved warning coordination, weather watch, product monitoring and quality control functions.

- Improved career opportunities for meteorologists and expansion of the meteorological technician career ladder.

Although the key to all of these projected or recommended improvements to weather services is money, the belief is that Congress may look with increasing leniency on budgetary requests for those purposes. An indication of that was provided by recent consideration of a House Concurrent Resolution related to international weather programs.

The resolution called for the President to cooperate with other nations in five areas of activity. The first was a program to immediately improve the capability of the international weather system to observe the global atmosphere and to communicate, process and analyze worldwide weather data. Second was a program to develop new technology, procedures and techniques so that the needs of operational weather forecasting might be more adequately served.

A third area in which international cooperation was urged was a program of research on the global wind systems of the atmosphere and on the interactions between the atmosphere and the underlying earth and oceans, including the collection of data that may be required for these research activities. Fourth was a program for the training and education of meteorological and related scientists, engineers and technical personnel. Finally, the resolution called for a program to provide appropriate technical and training assistance and facilities to other nations and to international organizations so that they may participate in and fully utilize the data, charts, analyses and other information provided by the worldwide weather system.

Regarded for too long as one of the lesser elements of the Federal Government, the Weather Bureau has invariably received short budgetary shrift. With the concerted attention now being focused on atmospheric phenomena, however, improvements may yet be achieved for the benefit of flight. □