STATEMENT OF MARTIN T. POZESKY, ASSOCIATE ADMINISTRATOR FOR NAS DEVELOPMENT, FEDERAL AVIATION ADMINISTRATION, BEFORE THE COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION, SUBCOMMITTEE ON AVIATION, ON MODERNIZATION OF FAA WEATHER PROGRAMS. MARCH 1, 1990.

Mr. Chairman and Members of the Subcommittee:

It is indeed a pleasure to appear before you today to discuss with you ongoing and future modernization efforts that will better enhance our ability to observe and forecast aviation weather and disseminate that information in a timely and clear manner to all users of the national airspace system. Appearing with me today is Norbert A. Owens, our Deputy Associate Administrator for Air Traffic.

As you undoubtly know, one of the greatest causes of frustration and inconvenience to airline passengers today is delays. Nearly 70 percent of air traffic control delays are weather induced. Adverse weather in one part of the country oftentimes has a ripple effect in other parts, further contributing to delays and increased fuel costs for the airlines. What is not generally understood by airline passengers is that weather delays imposed by the air traffic control system are done for one reason -- the threat weather poses to aviation safety.

The consequences of hazardous weather, particularly windshear, are well known. National Transportation Safety Board data indicates

that, between 1983 and 1988, weather was a causal factor in 26 percent of all aviation accidents in the United States.

The FAA's challenge is to develop and implement technology to observe and forecast meteorological conditions of interest to aviation and disseminate that information in a timely, clear, and concise manner to all users of the national airspace system. It is not an easy challenge.

There are three elements to the challenge: improving observations and detection; improving forecasts; and improving weather information dissemination. On the first element, the FAA, National Weather Service (NWS), and others have made significant progress in learning how to observe and detect weather conditions hazardous to aviation.

Our progress, however, has been slower in aviation weather forecasting, the second element. While significant progress has been made in numerical forecasting of weather one or more days in advance, relatively little progress has been made in forecasting very short range and local scale weather. Since most flights take between 1 and 5 hours, it is the 0-3 and 3-6 hour forecast, covering localized areas such as terminals, that is of primary interest to aviation.

The final critical element in aviation weather is dissemination. We have made significant progress in a number of NAS Plan weather programs in this area, but important work remains to be done.

Let me start by quickly reviewing our current observation and detection programs. Two sensors, Terminal Doppler Weather Radar (TDWR) and an enhanced Low Level Wind Shear Alert System (LLWAS), have been tested during recent summer storm seasons and shown to be highly reliable in detecting low level wind shear associated with downbursts and storm gust fronts. Equally reliable have been the software systems that translate the signals from each sensor system directly into microburst alerts on the controller's console.

For example, during the summers of 1988 and 1989, operational tests of these systems in Denver detected several major microbursts and issued automatic microburst alerts to controllers. The warnings were issued in time for controllers to give advance warning to incoming pilots which enabled them to avoid the microburst altogether or be in a full power, go-around configuration to more safely cope with the phenomena. Our current plans call for implementing a minimum of 17 enhanced LLWAS and 45 TDWR units by the mid-1990s.

Another crucial storm detection system, especially for en-route segments of flight, is the Next Generation Radar (NEXRAD). Under a joint FAA, NWS, Department of Defense (DOD) procurement, 113 NEXRAD units will be installed in the continental U.S. and another 13 in Alaska, Hawaii, and the Caribbean. These radars will detect and track tornadoes and severe thunderstorms and the associated heavy precipitation and turbulence, which are critically important to aviation, with a much higher detection rate and a much lower false alarm rate than current weather radars.

The ASR-9 radars, the first of which was commissioned in May 1989, will also provide severe weather detection. In addition to their primary air traffic surveillance, ASR-9 digital radars have a separate weather channel capable of detecting precipitation and intensity with much greater accuracy than present surveillance radars. By the mid-1990s, about 100 ASR-9 radars will be implemented at airports throughout the nation.

With regard to continuous airport weather observations, the FAA is moving to automated systems. Automated weather observation systems measure wind speed and direction, cloud height, visibility, barometric pressure, and precipitation amounts and report the measurements minute-by-minute via radio broadcasts or

telephone directly to pilots and controllers. Since these systems are fully automated, they can be installed at remote, unmanned sites thereby providing observation services at previously unserved airports.

We currently have two automated observation programs underway. The first, now being implemented, is called the Automated Weather Observation System (AWOS). Thirty-five of 160 commercial AWOS have been delivered to date. The second program, the Automated Surface Observation Systems (ASOS), is a joint effort with the NWS. It is similar to AWOS, except that it has a sensor that can discriminate among different types of precipitation. ASOS will be implemented beginning next year.

Several systems to improve dissemination of weather information to all users will be implemented by the mid-1990s. These systems include Direct User Access Terminal Service (DUATS), Flight Service Automation Systems (FSAS), Aeronautical Data Link, Central Weather Processor (CWP), and the Weather Message Switching Center (WMSC).

Earlier this month, DUATS became operational. Available to pilots in the continental United States, DUATS enables pilots to acquire

the latest weather and NOTAM information and file their flight plans from their home computers by dialing a toll free or local access telenet number. Basic information is provided free of charge, and flight plans are filed directly into FAA computers. The commercial vendors of DUATS can supplement the FAA basic information with value added services at competitive fees.

Implementation of the FSAS and associated consolidation of Flight Service Stations into 61 Automated Flight Service Stations (AFSS) will also be accomplished by the mid-1990s. In conjunction with DUATS, FSAS will improve user access to weather information and NOTAMs, simplify flight plan filing, and provide a flight service station automation system that will meet the projected increases in demand for services without proportional increases in staff.

Implementation of a leased commercial Meteorological Weather Processor (MWP) is already underway and will be completed by the end of the next fiscal year. The MWP is an interactive meteorological data processing system to aid Center Weather Service Units and Central Flow Weather meteorologists in their weather analysis and forecasting functions in each en-route center and Central Flow Control. The MWP will greatly shorten the time required to process weather data from various sensors and NWS

circuits into aviation products for direct use by controllers and relay to pilots.

A second component, the Real-Time Weather Processor (RWP), will be developed and implemented later this decade. The RWP will mosaic data from multiple NEXRAD radars and provide these products and other time critical and operationally significant weather information for use by air traffic controllers. The RWP will also transmit a subset of its weather products to pilots via the Aeronautical Data Link. In combination with MWP, the RWP constitutes the CWP.

The Aeronautical Data Link will be developed and implemented at our en-route centers and major tower facilities to digitally transmit weather products such as surface observations, terminal forecasts, winds aloft forecast, pilot reports, and hazardous weather advisories to pilots on a request/reply basis. We also plan to replace the Weather Message Switching Center and upgrade the National Airspace Data Interchange Network to increase the capacity of these critical weather communication systems for more rapid dissemination of existing and new weather products.

We will work with NWS to improve forecasts in two important areas. The first, initiated this year and planned to run for five years, is to develop improved forecasting techniques for aircraft icing. The second is to develop a data base of automated Pilot Report data gathered and transmitted by data link equipped aircraft as they fly through our airspace to use in improving winds aloft forecasts.

Looking beyond the NAS Plan, the challenge for the latter half of the 1990s and beyond is to greatly improve aviation weather forecasts and the dissemination of all aviation weather information to end users to further enhance safety, improve utilization of capacity, and reduce delays. Aviation weather information needs to be disseminated to end users where and when they need it and in a usable format.

We envision three program efforts to meet this challenge. The first is an idea to develop a system for the terminal area to produce a uniform set of airport weather products that include warnings of the most severe forms of wind shear, thunderstorms, wake vortex tracking, heavy snow and ground icing. The data will be compiled from a variety of airport weather sensors like TDWR, enhanced LLWAS, ASR-9, AWOS/ASOS, and NEXRAD. This system will

automatically insure that controllers and pilots receive hazardous weather products that are timely and fully integrated, even though the input data stems from multiple sources.

The second major new effort is greatly improved forecasting of short term (0-6 hour) and local scale aviation weather including aircraft icing, thunderstorm severity, heavy snowfall, changes in ceiling and visibility, winds and temperature aloft, low level wind shear, including microburst and gust fronts, and clear air turbulence.

The FAA is confident, along with NWS, that we can make great strides in forecasting these phenomena in the next decade. The lack of progress in forecasting aviation weather in the past decade has been due to the lack of four technologies: sufficient observational tools, computational power, communications capacity, and scientific understanding of mesoscale processes. With NEXRAD, AWOS/ASOS, Profilers, and a new generation of satellites, the observational tools that will produce radical improvements in resolution of weather are available. The rapid increase in computer size and speed and communications technology in the last decade and projection of future technology addresses those two requirements. Because of these advances, we are making rapid

advances in better understanding short term, local scale weather processes.

We plan to support research and work with NWS to greatly improve its ability to forecast aviation weather elements for operational use. We will also systematically work with aviation users and NWS to define, develop and test weather products. We will continue to maintain our emphasis on "nowcasting" of weather phenomena critical to safe and efficient flight operations in the terminal area. "Nowcasts" are forecasts covering the next 30 to 60 minutes for weather phenomena such as microburst precursors, gust fronts, other wind shifts, and the onset of thunderstorms that have <u>not yet formed</u> but will in the terminal area within a prescribed time. Such tools will be immensely useful to traffic managers and controllers for safe and efficient operations in the terminal area.

Another new effort is the development of a single, dynamic data base of aviation weather information which would be continually updated with the most recent observational and forecast information and would serve all users with a wide variety of products. From such a data base, users could obtain a detailed description or graphical depiction of current and future weather along a specific route of flight. One advantage of this data

approach is the ease with which it is kept current. Another advantage is its ability to integrate information from multiple sources and provide a tailored product for the user.

In closing, I would like to assure you that we fully recognize the critical importance of aviation weather to system users and will continue our modernization efforts to provide that information in a timely and easily understood format.

Mr. Chairman, that concludes my prepared statement. Mr. Owens and I would be pleased to answer any questions you may have.