

STATEMENT OF RAMON A. ALVAREZ, DEPUTY DIRECTOR FOR  
AIR TRAFFIC SERVICE, FEDERAL AVIATION ADMINISTRATION,  
BEFORE THE HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY,  
SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT, CONCERNING  
WEATHER RELATED ACCIDENTS. MARCH 25, 1981.

MR. CHAIRMAN AND MEMBERS OF THE SUBCOMMITTEE:

I WELCOME THE OPPORTUNITY TO APPEAR BEFORE YOU TODAY TO  
DISCUSS WEATHER RELATED ACCIDENTS.

BEFORE DISCUSSING FAA'S VARIOUS PROGRAMS ASSOCIATED WITH  
WEATHER DISSEMINATION, I WOULD LIKE TO BRIEFLY IDENTIFY THE  
ELEMENTS THAT MAKE UP OUR AIR TRAFFIC CONTROL SYSTEM.

## THE AIR TRAFFIC CONTROL SYSTEM

THE FEDERAL AVIATION ADMINISTRATION'S AIR TRAFFIC CONTROL SYSTEM IS COMPRISED OF AIR ROUTE TRAFFIC CONTROL CENTERS, AIRPORT TRAFFIC CONTROL TOWERS, AND FLIGHT SERVICE STATIONS. WITHIN THE U.S. AND PUERTO RICO, THERE ARE 23 CENTERS, MORE THAN 400 TOWERS, AND OVER 300 FLIGHT SERVICE STATIONS. AIR ROUTE TRAFFIC CONTROL CENTERS HANDLE EN ROUTE AIRCRAFT OPERATING UNDER INSTRUMENT FLIGHT RULES BETWEEN AIRPORT TERMINAL AREAS. MORE THAN 30 MILLION SUCH OPERATIONS WERE HANDLED BY OUR CENTERS LAST YEAR.

AIRPORT TRAFFIC CONTROL TOWERS DIRECT THE MOVEMENT OF AIRCRAFT ON AND IN THE VICINITY OF AN AIRPORT. IN ADDITION TO DIRECTING ACTUAL TAKEOFFS AND LANDINGS, APPROXIMATELY 180 OF THE FAA TOWERS ALSO PROVIDE RADAR SERVICES TO AIRCRAFT USING THE PRIMARY AIRPORT AS WELL AS TO MANY SECONDARY AIRPORTS WITHIN THEIR AREA OF JURISDICTION. MORE THAN 66 MILLION AIRPORT OPERATIONS WERE RECORDED AT FAA CONTROLLED AIRPORTS IN 1980.

FLIGHT SERVICE STATIONS PROVIDE WEATHER DATA AND OTHER ASSISTANCE TO PILOTS. THEY MAINTAIN A VITAL LINK IN THE AIR-GROUND COMMUNICATIONS SYSTEM, AND ALTHOUGH GENERAL AVIATION PILOTS ARE THE PRINCIPAL USERS OF THESE FACILITIES, THEY ALSO SERVE THE MILITARY AND AIR CARRIERS. LAST YEAR, MORE THAN 64 MILLION PILOT BRIEFINGS AND IN-FLIGHT REQUESTS FOR ASSISTANCE WERE GIVEN.

WEATHER DISSEMINATION

A VERY IMPORTANT AREA OF CONCERN TO THE FEDERAL AVIATION ADMINISTRATION (FAA), AS WELL AS THE AVIATION COMMUNITY TODAY, IS THE COLLECTION AND DISSEMINATION OF CURRENT AND EXPECTED SIGNIFICANT WEATHER CONDITIONS TO THE SYSTEM.

THE TWO PRIMARY REASONS FOR OUR CONCERN ARE THE NEED FOR US IN AIR TRAFFIC TO PLAN OUR FLOW OF AIR TRAFFIC ACTIVITIES AND TO PROVIDE AN UPDATED CURRENT PRODUCT TO THE PILOTS FOR THEIR USE IN FLIGHT PLANNING.

I WOULD LIKE TO ADDRESS THE FAA'S PRESENT METHODS AND PROCEDURES IN THE AREA OF WEATHER DISSEMINATION AND THEN BRIEFLY DISCUSS SOME ON-GOING DEVELOPMENT EFFORTS TO IMPROVE THE PRODUCTS OR THE PROCESS, AND THEN RESPOND TO ANY QUESTIONS THAT YOU MAY HAVE.

THE FAA AGREEMENT WITH THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) PLACES RESPONSIBILITY FOR OPERATIONAL WEATHER PRODUCTS WITHIN THE NATIONAL WEATHER SERVICE (NWS). FAA IS RESPONSIBLE FOR THE DISSEMINATION OF AVIATION WEATHER INFORMATION TO AFFECTED ELEMENTS WITHIN THE ATC SYSTEM.

THE AIR TRAFFIC CONTROLLER AND FLIGHT SERVICE SPECIALIST HAVE LONG BEEN IN THE WEATHER LOOP TO VARYING DEGREES. THIS IS NECESSARY TO INSURE AN EXCHANGE OF WEATHER DATA ESSENTIAL TO THE PLANNING FUNCTIONS OF BOTH PILOTS AND CONTROLLERS.

A BASIC PRINCIPLE OF THE ATC SYSTEM IS STATED IN THE FEDERAL AVIATION REGULATIONS - "THE PILOT IN COMMAND OF AN AIRCRAFT IS DIRECTLY RESPONSIBLE FOR, AND IS THE FINAL AUTHORITY AS TO THE OPERATION OF THAT AIRCRAFT." THE REGULATION GOES ON TO REQUIRE EACH PILOT IN COMMAND OF AN AIRCRAFT TO FAMILIARIZE HIMSELF WITH WEATHER REPORTS AND FORECASTS PERTINENT TO THE FLIGHT. THE FAA IS CHARGED UNDER THE FEDERAL AVIATION ACT WITH THE MANAGEMENT OF THE NATIONAL AIRSPACE SYSTEM. IN FULFILLING THIS MANDATE, FAA'S MAIN INVOLVEMENT IN WEATHER IS TO ENSURE THAT ALL CURRENT WEATHER AND AIRPORT CONDITION INFORMATION WHICH MAY AFFECT FLIGHT IS AVAILABLE TO THE AIR TRAFFIC CONTROL SYSTEM AS AN AID IN TRAFFIC PLANNING.

ALL CONTROLLERS AND SPECIALISTS ARE REQUIRED TO FAMILIARIZE THEMSELVES WITH PERTINENT WEATHER INFORMATION WHEN COMING ON DUTY AND TO MAINTAIN AWARENESS OF CURRENT WEATHER INFORMATION NEEDED TO FULFILL THEIR RESPONSIBILITIES. AS AN EXAMPLE, WIND DIRECTION AND VELOCITY ARE PREDOMINANT FACTORS IN SELECTING ACTIVE RUNWAYS.

CURRENT CEILING AND VISIBILITY ARE FACTORS IN PLANNING AN EFFICIENT FLOW OF TRAFFIC WITH RESPECT TO AVAILABLE TYPES OF APPROACHES. FOR INSTANCE, USE OF VISUAL APPROACHES IS PROHIBITED WHEN FLIGHT CANNOT BE CONDUCTED IN VFR CONDITIONS, AND SOME INSTRUMENT APPROACH PROCEDURES REQUIRE HIGHER WEATHER MINIMA THAN OTHERS.

CONTROLLERS ARE ALSO REQUIRED TO ISSUE SPECIFIC WEATHER INFORMATION TO ALL ARRIVALS AND DEPARTURES WHEN THE WEATHER IS BELOW CERTAIN CONDITIONS. OF CRITICAL IMPORTANCE IS THE ACTUAL CONDITION OF THE RUNWAY DURING PERIODS OF ICE, SNOW, OR RAIN. THIS INFORMATION IS OBTAINED FROM THE AIRPORT MANAGEMENT OR MILITARY OPERATIONS OFFICE. THERE ARE ALSO PROCEDURES FOR THE CONTROLLER TO ISSUE THE CURRENT RUNWAY VISIBILITY UNDER CERTAIN WEATHER CONDITIONS. THESE PROCEDURES ARE DESIGNED TO AID THE PILOT IN HIS WEATHER RELATED RESPONSIBILITIES.

AS AN ADDITIONAL SERVICE TO PILOTS, FLIGHT SERVICE SPECIALISTS PROVIDE REQUESTED WEATHER INFORMATION BY FACE-TO-FACE, TELEPHONE, OR RADIO BRIEFINGS, AND ALSO BROADCAST WEATHER INFORMATION OVER THE VOICE FEATURE OF NAVIGATIONAL AIDS.

FOLLOWING A WEATHER RELATED ACCIDENT INVOLVING A SOUTHERN AIRLINES AIRCRAFT IN 1977, FAA ACCELERATED SEVERAL ON-GOING PROGRAMS. ONE OF THESE WAS THE ESTABLISHMENT OF A CENTER

WEATHER SERVICE UNIT, OR CWSU, IN OUR AIR ROUTE TRAFFIC CONTROL CENTERS IN ORDER TO IMPROVE THE QUALITY, QUANTITY, AND THE OPERATIONAL SIGNIFICANCE OF WEATHER INFORMATION MADE AVAILABLE TO THE CENTER.

THIS ACTION WAS INITIATED IN 13 OF OUR CENTERS IN 1978, AND THE FINAL CONFIGURATION OF 21 WAS IN PLACE BY OCTOBER 1980.

THE CWSU STAFFING IS MADE UP OF NATIONAL WEATHER SERVICE METEOROLOGISTS UNDER A REIMBURSABLE AGREEMENT WITH NWS, AND FAA WEATHER COORDINATORS WHO FUNCTION AS A TEAM TO DETECT, SCREEN, AND DISSEMINATE AVIATION WEATHER INTELLIGENCE IN SUFFICIENT DETAIL TO PERMIT ATC PERSONNEL AND PILOTS TO MAKE DECISIONS PERTINENT TO FLIGHT OPERATIONS. THE CWSU CONCEPT INVOLVES THE METEOROLOGIST PROVIDING THE REQUIRED WEATHER EXPERTISE, AND THE FAA WEATHER COORDINATOR PROVIDING OPERATIONAL KNOWLEDGE AND ATC "KNOW HOW" TO ENSURE THAT THE INFORMATION GETS TO THE AFFECTED AREAS WITHIN AND OUTSIDE OF THE CENTER.

THE CWSUs FUNCTION IS THE ANALYSIS AND INTERPRETATION OF WEATHER DATA TO DETERMINE ACTUAL WEATHER CONDITIONS AND PROVIDE "NOWCASTING," WHICH IS A CURRENT DETAILED DESCRIPTION OF EXISTING CONDITIONS OR A DIAGNOSIS OF A GIVEN SITUATION WHICH CAN BE USED TO MAKE OPERATIONAL DECISIONS; SOME EXAMPLES ARE THE SOONER-THAN-EXPECTED DEVELOPMENT OF THUNDERSTORMS OR THE BEGINNING OF SNOW OR RAIN WHEN NONE WAS EXPECTED. THUS, ATC PERSONNEL ARE ADVISED OF

CHANGING WEATHER CONDITIONS AND UPDATED FORECASTS. ALTHOUGH THIS PROGRAM IS LESS THAN 1 YEAR OLD IN SOME FACILITIES, IT HAS PROVED TO BE HIGHLY SUCCESSFUL, RECENT EVALUATIONS HAVE UNCOVERED PROBLEMS IN SOME PRODUCTS AND DISSEMINATION PROCEDURES, AND ADDITIONAL IMPROVEMENTS ARE PLANNED.

OTHER NWS FACILITIES PROVIDE ADDITIONAL WEATHER INFORMATION TO THE SYSTEM SUCH AS SIGNIFICANT METEOROLOGICAL INFORMATION, OR SIGMETS. THE NATIONAL SEVERE STORMS FORECAST CENTER IN KANSAS CITY ORIGINATES AND DISTRIBUTES SIGMETS TO OUR AIR ROUTE TRAFFIC CONTROL CENTERS AND FLIGHT SERVICE STATIONS. THEY CONTAIN INFORMATION SUCH AS REPORTS OF STRONG FRONTAL ACTIVITY, MODERATE TO HEAVY ICING, WINDSHEAR, TURBULENCE OF MODERATE OR GREATER INTENSITY AND SIMILAR CONDITIONS PERTINENT TO THE SAFETY OF FLIGHT. THE INFORMATION IS DISSEMINATED TO AFFECTED CONTROLLERS WITHIN THE CENTER AND OUTLYING TERMINAL FACILITIES BY THE CWSU FOR INTERNAL PLANNING AND RELAY TO PILOTS. THE PILOT CAN ALSO RECEIVE IT BY LISTENING TO A BROADCAST INITIATED BY A FLIGHT SERVICE STATION ON THE VOICE FEATURE OF A NAVIGATIONAL AID. ADDITIONAL INFORMATION IS AVAILABLE BY DIRECT CONTACT WITH AN EN ROUTE FLIGHT ADVISORY POSITION LOCATED AT 44 OF OUR FLIGHT SERVICE STATIONS.

BUT QUESTIONS STILL ARISE - HOW MUCH INFORMATION IS ENOUGH? WHY DO WEATHER RELATED ACCIDENTS CONTINUE? DID THE PILOT HAVE ALL THE INFORMATION AVAILABLE - AND IF NOT, WOULD IT HAVE PREVENTED THE ACCIDENT IF HE HAD?

THE MAIN QUESTION SEEMS TO BE - WHAT CAN BE DONE TO IMPROVE THE DISSEMINATION SYSTEM? FAA HAS INTRODUCED SEVERAL CHANGES IN RECENT YEARS DESIGNED TO IMPROVE THE DISSEMINATION OF WEATHER INFORMATION. ALTHOUGH CURRENT METHODS ARE GOOD, THEY ARE ONLY AS GOOD AS THE DATA RECEIVED. TO THIS END, IDENTIFICATION OF ADDITIONAL WEATHER INFORMATION WHICH WILL ENHANCE THE SAFETY OF FLIGHT IS BEING SOUGHT, AS WELL AS IMPROVED DISSEMINATION PROCEDURES.

TO SATISFY THE NEEDS OF TODAY'S SYSTEM, FAA HAS EMBARKED ON SEVERAL OPERATIONAL AND DEVELOPMENT EFFORTS WHICH HAVE VERY HIGH PRIORITIES IN THE AIR TRAFFIC SERVICE. THESE INCLUDE BOTH THE INSTALLATION OF UPGRADED EQUIPMENT AND IMPROVED COMMUNICATIONS BETWEEN WEATHER SOURCES, CONTROLLERS, FLIGHT SERVICE SPECIALISTS, AND PILOTS.

SOME EXAMPLES ARE:

1. WEATHER DISSEMINATION IMPROVEMENT PROGRAM. THE AIR TRAFFIC SERVICE, IN ORDER TO MAKE MORE TIMELY DISSEMINATION OF SIGNIFICANT WEATHER BOTH TO OUR AIR TRAFFIC CONTROLLERS AND PILOTS, IS RESTRUCTURING THE PRIORITIES AND DUTIES OF THOSE PEOPLE RESPONSIBLE FOR THE EXCHANGE OF WEATHER INFORMATION. ONE OF THE ISSUES TO BE CONSIDERED IS THE METHOD BY WHICH USING TODAY'S TECHNOLOGY, THE ISSUANCE OF SIGNIFICANT WEATHER IS ASSURED BOTH WITHIN OUR FACILITIES AND TO PILOTS.

IN ADDITION, WE ARE EVALUATING A SYSTEM FOR THE CONTINUOUS BROADCASTING OF SIGNIFICANT AVIATION WEATHER INFORMATION. TRANSCRIPTIONS WILL BE PREPARED BY DESIGNATED FSS FACILITIES AND BROADCAST ON SELECTED VORs. THE PILOT COULD THEN LISTEN TO THE VOR AND RECEIVE CURRENT SIGNIFICANT WEATHER. MORE DETAILED WEATHER INFORMATION MAY BE RECEIVED FROM OUR FLIGHT ADVISORY SERVICE OR FSS FACILITIES.

THE OBJECTIVE OF THESE EFFORTS IS TO ASSURE THE TIMELY DISSEMINATION OF CURRENT AND ACCURATE SIGNIFICANT WEATHER INFORMATION THAT MAY AFFECT THE SAFETY OF FLIGHT.

2. COLOR WEATHER RADAR PROGRAM - WILL PROVIDE FOR THE DISPLAY OF NWS RADAR INFORMATION ON SEVERE WEATHER AND SEPARATE THE WEATHER RETURNS INTO SIX DISTINCT LEVELS OF INTENSITY WHICH ARE DISPLAYED AS DIFFERENT COLORS. THIS EQUIPMENT IS SCHEDULED FOR THE CWSUs AND EFAs POSITION OF THE FLIGHT SERVICE STATIONS EARLY NEXT YEAR.

3. FLIGHT SERVICE STATION AUTOMATION - IS A PROGRAM DESIGNED TO PROVIDE BETTER WEATHER PRODUCTS AND IMPROVED SERVICE TO THE USERS. DURING THE NEXT 5 YEARS, 61 OF OUR FLIGHT SERVICE STATIONS ARE EXPECTED TO RECEIVE AUTOMATION EQUIPMENT AT THE RATE OF APPROXIMATELY 12 PER YEAR.

4. LOW LEVEL WIND SHEAR ALERT SYSTEM - IS A PROGRAM THAT DETECTS THE PRESENCE OF A POSSIBLY HAZARDOUS LOW LEVEL WIND SHEAR BY HAVING ITS COMPUTER CONTINUOUSLY COMPARE THE WINDS AROUND THE PERIPHERY OF AN AIRPORT WITH THE WIND MEASURED AT THE CENTER OF THE FIELD.

IF THE DIFFERENCE BETWEEN THE CENTER FIELD WIND AND A PERIPHERAL WIND EXCEEDS A PREDETERMINED VALUE, A THUNDERSTORM OR THUNDERSTORM GUST FRONT WIND SHEAR IS PROBABLE. WHEN THIS CONDITION EXISTS, THE TOWER CONTROLLER WILL PROVIDE ARRIVAL AND DEPARTURE AIRCRAFT WITH AN ADVISORY OF THE WIND CONDITIONS WHICH INCLUDES THE CENTER FIELD WIND PLUS THE PERIPHERAL WIND INFORMATION. DURING THE 1978-80 PERIOD, A TOTAL 24 SYSTEMS WERE INSTALLED. BY SEPTEMBER 1981, 34 ADDITIONAL SYSTEMS ARE EXPECTED TO BECOME OPERATIONAL.

SOME OTHER FAA RESEARCH AND DEVELOPMENT PLANS. PAST EFFORTS RELATED TO AVIATION WEATHER THAT ARE NOW UNDER IMPLEMENTATION, INCLUDE LOW LEVEL WIND SHEAR ALERT SYSTEMS AS MENTIONED ABOVE, A SPIN-OFF OF THIS WORK INTO AIR CARRIER PILOT TRAINING, LOW COST AUTOMATED SURFACE WEATHER OBSERVING SYSTEMS WITH AUTOMATED VOICE TRANSMISSION (THESE ARE NOW COMMERCIALY AVAILABLE FOR AIRPORT SPONSOR PURCHASE), AND CONTINUED AUTOMATION OF FLIGHT

SERVICE STATIONS, INCLUDING PILOT SELF-BRIEFINGS AND FLIGHT PLAN FILING. CURRENTLY UNDERWAY ARE EFFORTS TO DISPLAY NWS RADAR DERIVED HAZARDOUS WEATHER ON ATC RADAR DISPLAY, AUTOMATION OF ROUTE FORECASTS FOR PILOT SELF-BRIEFINGS, AND AUTOMATIC TRANSMISSION OF VOICE WEATHER DATA AND WEATHER RADAR DATA TO THE COCKPIT VIA NAVAIDS AND DATA LINK. WE ALSO HAVE TWO JOINT PROGRAMS WITH THE DEPARTMENT OF COMMERCE AND THE DEPARTMENT OF DEFENSE.

THE FIRST IS TO REPLACE CURRENT WEATHER RADARS WITH RADARS EMPLOYING DOPPLER TECHNOLOGY, WHICH WILL AFFORD FAR GREATER CAPABILITY TO ASSESS AND DISPLAY HAZARDOUS WEATHER CONDITIONS. THE SECOND IS TO DEVELOP AUTOMATIC WEATHER OBSERVATION SYSTEMS THAT WILL REPLACE HUMAN OBSERVERS AT FACILITIES THAT MUST BE CLOSED, AND TO BE ABLE TO TAKE WEATHER OBSERVATIONS AT GENERAL AVIATION AIRPORTS WHERE WEATHER OBSERVATION CAPABILITIES DO NOT EXIST TODAY.

IN SUMMARY, A NUMBER OF VALID AREAS OF CONCERN HAVE SURFACED IN RECENT YEARS REGARDING WEATHER COLLECTION AND DISSEMINATION. MUCH OF THIS HAS COME ABOUT AS A RESULT OF OUR OWN EVALUATIONS. A LOT HAS BEEN LEARNED, AND A VERY HIGH PRIORITY HAS BEEN PLACED ON IMPROVING THE SYSTEM IN THIS AREA IN EVERY WAY POSSIBLE. WE FEEL THAT WITH THE IMPLEMENTATION OF OUR PROGRAMS, WE WILL BE IN A BETTER POSITION TO PROVIDE THE PILOT WITH A MORE COMPREHENSIVE AND UP-TO-DATE WEATHER ADVISORY WHICH WILL GREATLY ENHANCE SAFETY IN OUR NATIONAL AIRSPACE SYSTEM.