Major contributing factors included the failure of the company's dispatching system to provide the flightcrew with up-to-date severe weather information pertaining to the aircraft's intended route of flight, the captain's reliance on airborne weather radar for penetration of thunderstorm areas, and limitations in the Federal Aviation Administration's air traffic control system which precluded the timely dissemination of real-time hazardous weather information to the flightcrew.

4. RECOMMENDATIONS

As a result of this accident, the Safety Board, on September 27 and September 28, 1977, recommended that the FAA:

"Expedite the development and implementation of an aviation weather subsystem for both en route and terminal area environments, which is capable of providing a real-time display of either precipitation or turbulence, or both, and which includes a multiple-intensity classification scheme. Transmit this information to pilots either via the controller as a safety advisory or via an electronic data link. (Class II = Priority Followup) (A-77-63)

"Establish a standard scale of thunderstorm intensity based on the NWS' six-level scale and promote its widespread use as a common language to describe thunderstorm precipitation intensity. Additionally, indoctrinate pilots and air traffic control personnel in the use of this system. (Class II = Priority Followup) (A-77-64)

"Transmit SIGMET's more frequently on navaids so that pilots can receive more timely information about hazardous weather. (Class II = Priority Followup) (A-77-65)

"Code, according to geographic applicability, Severe Thunderstorm Bulletins and Tornado Watch Bulletins issued by the National Severe Storms Forecast Center so that they may be transmitted to appropriate air traffic control facilities by the FAA Weather Message Switching Center; thus, air traffic control facilities can relay the earliest warning of severe weather to flightcrews. (Class II = Priority Followup) (A-77-66)

"Require that each air traffic control facility depict on the map portion of its radar displays, those airports immediately outside of that facility's jurisdiction to the extent that adjacent facilities depict those airports on their displays. (Class II - Priority Followup) (A-77-67)

to spread out

"Forinulate rules and procedures for the timely dissemination by air traffic controllers of all available severe weather information to inbound and outbound flightcrews in the terminal area. (Class II - Priority Followup) (A-77-68)"

The Federal Aviation Administration's responses to these recommendations were as follows:

A-77-63

"Comment. In August 1975, the Air Traffic Service (ATS) initiated an R & D effort requesting: (a) en route and terminal radars be evaluated to ascertain their capabilities to detect and display weather; (b) a comparison of ARSR/ASR and National Weather Service (NWS) radar detection capabilities; (c) identification of modifications to improve ATC radars; and (d) improve ATC radar weather detection without derogation in aircraft detection."

A-77-64

"Comment. ATS has taken appropriate steps for implementing the NTSB recommendation to establish a standard scale of thunderstorm intensity, based upon the NWS six-level scale. Action has been taken to promote widespread use throughout the Air Traffic Service of a common language to describe thunderstorm intensity. The DOT/FAA Notice N7110.510 dated June 12 served to acquaint air traffic control specialists with the descriptive terms developed by the NWS, and authorizes their use in the air traffic system.

"Thunderstorm intensity levels were published in the Airman's Inforhation Manual, Part 3A, on September 1 (Enclosure 2). This publication advised pilots of the NWS standard six-level scale and cites examples of standard phraseology to be used by controllers describing thunderstorm intensity levels. Definitions, and an explanation of the standard six-level scale, will also be contained in the Pilot-Controller Glossary of the Air Traffic Control Manual and the Flight Service Station Manual, effective January 1, 1978."

A-77-65

"Comment. The Federal Aviation Administration (FAA) has taken action to provide for enhanced dissemination of SIGMETs .and to provide Severe Thunderstorm Watch Bulletins and Tornado Watch Bulletins.

"Prior to the SO242 accident, the FAA had taken action to have both centers and towers make broadcasts on receipt of all SIGMETs. This broadcast would identify the area and alert pilots to the potentially adverse conditions that had developed If the identified area was of concern, the pilot could call the FSS for complete information.

"At the present time, it is nearly impossible due to manpower limitations to broadcast SIGMETs more frequently in the current manual FSS configuration and we do not have equipment to broadcast the data automatically. As the FSS Modernization program develops and new equipment is placed in service, we should be able to provide a continuous broadcast of advisories through automated methods.

"To enhance the broadcast program as an immediate measure, in May 1977, a revision to the priority of duties for FSS specialists was issued. This revision elevated notification actions to other Air Traffic facilities by the FSS and in FSS broadcasts of SIGMETs and AIRMETs. Required notifications now are only ranked after emergency actions and NAVAID malfunctioning requirements. Broadcast of SIGMETs and AIRMETs now are rauked only below services to airborne aircraft (other than above actions). This provided for dissemination of vital information to pilots and controllers in a more timely and effective manner."

A-77-66

"Comment. In June 1977, we proposed to the NWS that Severe Weather Forecasts or Bulletins (WWs) be implemented for aviation use. We have had subsequent letters between the two offices in trying to optimize the product. Our last reply from the NWS on September 19 outlined a separate aviation severe local storm watch for Service A that would be distributed geographically according to states by the FAA Weather Message Switching Center. This proposed format appears to meet the needs of the pilot and the FAA. Barring unforeseen problems, this product should be available shortly after the first of calendar year 1978. This project has and will continue to have a high priority."

A-77-67

"Comment. We are presently exploring the feasibility of the following methods for display of emergency airports:

Display all airports with approved approaches within the display area, either by automated or mechanical/electrical means.

In NAS Stage A, place the display of all airports not required for normal operations on a separate filter key. These airports could then be brought up for display in emergency situations by depressing this key.

We hope to be able to decide the appropriate course of action by December 23 and will advise the Board accordingly."

The FAA's response to recommendation A-77-68 has not been received.

In conjunction with the adoption of this report, the Safety Board issued the following recommendations to the FAA.

"Initiate research to determine the attenuating effects of various levels of precipitation and icing on airborne radomes of both x- and c- band radar, and disseminate to the aviation community any data derived concerning the limitations of airborne radar in precipitation. (Class II - Priority Action) (A-78-1)

"Expedite its review of Recommendation A-73-40 with a view toward early requirement of properly designed shoulder harnesses at flight attendant stations in air carrier aircraft. (Class II - Priority Action) (A-78-2)''