2187

National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: December 20, 1989
In reply to: A-89-138 and -139

Honorable James B. Busey
Administrator
Federal Aviation Administration
Washington, D.C. 20591

The National Transportation Safety Board is concerned that, in the last 18 months, there have been three near midair collisions southwest of Los Angeles, California, involving international air carrier flights and general aviation airplanes. In each case, air traffic controllers alerted the air carrier flightcrews to the presence of the other unknown traffic and a potential catastrophe was narrowly averted. The Safety Board believes these incidents, which have marked similarities, exemplify an unsafe situation for international air carrier flights arriving in the Los Angeles area from the southwest.

In each incident, the international carrier was flying a wide-bodied turbine-powered airplane, was operating under an instrument flight rules (IFR) flight plan, and was inbound to Los Angeles International Airport. Also, each air carrier flight was cleared by air traffic controllers via a preferential arrival route and was descended to an assigned altitude of 7,000 feet, which placed the flight in an area of high-density visual flight rules (VFR) traffic operating in nonpositive-control airspace. The pilots of the general aviation airplanes involved in each incident were not in radio communication with an air traffic control facility because they were operating in an area where there is no requirement for them to do so.

The Safety Board believes that these arrival procedures for international air carrier flights, which result in a premature descent to 7,000 feet while more than 50 flying miles from the destination airport, are in direct conflict with the Federal Aviation Administration's (FAA) publicized policy of "keep 'em high" and the Department of Transportation's rulemaking that revised terminal control area (TCA) design to facilitate air carrier flights' direct entry into the upper vertical limits of that airspace. The Safety Board believes that the preferential arrival route and assigned altitudes contributed to these incidents and indicate the need for the FAA to take immediate corrective action to reduce the risk of collision between IFR commercial air carrier airplanes and VFR general aviation aircraft operating near large metropolitan airports.

One of the incidents, which resulted in a near midair collision and was investigated by the Safety Board, occurred on May 7, 1989, about 26 nautical miles south of the Seal Beach VORTAC 1/ at 7,000 feet mean sea level. The incident occurred at 1738 local time and involved Air New Zealand flight 6 (ANZ6), a Boeing 747, and an unidentified airplane. ANZ6 had just established radio communications with controllers at the Coast Terminal Radar Approach Control (Coast TRACON) following an automated handoff from controllers at the Los Angeles Air Route Traffic Control Center (Los Angeles Center). ANZ6 had departed Auckland, New Zealand, with an intermediate stop in Tahiti, and was en route to the Los Angeles International Airport with 366 passengers and 17 crewmembers. The captain of ANZ6 stated that the other airplane appeared to have been a twin-engine, red-and-white Cessna. Safety Board investigators were unable to establish the identity of the other airplane. The unidentified airplane was squawking transponder code 1200 (VFR) with mode C (altitude encoding) capability and was being monitored on radar by controllers at Coast TRACON.

The Safety Board's investigation of the incident determined that the original, filed route of flight for ANZ6 was via oceanic routings to the Santa Catalina VORTAC, then direct to Los Angeles. Prior to reaching Santa Catalina, the flight was rerouted by Los Angeles Center controllers via a preferential arrival route into the Los Angeles terminal area, which was in accordance with the letter of agreement between the Los Angeles Center and Coast TRACON. The revised routing, assigned to and acknowledged by the flightcrew of ANZ6, routed the flight via control area 1177 (C1177) to the Santa Catalina VORTAC, then outbound on the Santa Catalina 084 radial to intercept the Seal Beach VORTAC 148 radial, direct to the Seal Beach VORTAC, then direct to Los Angeles. Also, in accordance with the letter of agreement, the flight was cleared to cross the Santa Catalina VORTAC at or below 9,000 feet and to maintain 7,000 feet as a final altitude.

Soon after passing the Santa Catalina VORTAC, the flightcrew of ANZ6 made initial contact with controllers at Coast TRACON. The O'Neill radar sector at Coast TRACON, which was to provide air traffic control services to the flightcrew of ANZ6, was staffed by two controllers because on-the-job training was being conducted. The flightcrew of ANZ6 advised the controllers that they were level at 7,000 feet and navigating outbound on the Santa Catalina 084 radial. The developmental radar controller acknowledged the call and issued the current altimeter setting for El Toro, California. About 17 seconds after initial contact, the developmental radar controller issued a traffic advisory to the flightcrew of ANZ6 at "twelve o'clock eight miles opposite direction altitude indicates seven thousand four hundred." The flightcrew of ANZ6 advised that they were looking for the traffic.

Less than 1 minute after issuing traffic, the developmental radar controller advised the flightcrew of ANZ6 to "turn left heading three six zero vector around traffic one o'clock two miles ... westbound ... indicates seven

1/Very high frequency omnidirectional range/tactical air navigation (VORTAC)--A ground station navigational aid that provides pilots with azimuth and distance-to-station information.

thousand one hundred descending." The flightcrew acknowledged the clearance. Two seconds later, the radar instructor intervened and advised the flightcrew of ANZ6, "...if you don't have that traffic recommend you begin a descent immediately to six he's twelve o'clock less than a mile at seven." Shortly after this transmission, the flightcrew of ANZ6 advised, "...we're filing a near miss we've just missed him." The flightcrew later advised the controllers, "...same altitude head on, estimate about one mile when we took evasive action to ah descend left and ah believe he saw us as he started to climb right." Both the developmental radar controller and his instructor told Safety Board investigators that a turn was not issued sooner because ANZ6 was not established within the lateral confines of their airspace.

The captain of ANZ6 reported to Safety Board investigators that the flight visibility eastbound was approximately 1.5 miles at the time of the incident. He reported seeing the other aircraft closing head on and immediately turned left and descended. The captain estimated that he executed a 35-degree left bank and nosed down about 8 degrees as evasive action. The two airplanes passed at the same altitude with about 300 feet of horizontal separation. As a result of the evasive maneuver, one passenger and two cabin crewmembers suffered minor injuries.

Following the incident, Coast TRACON controllers called the Los Angeles Center and requested they track the unknown VFR target in an effort to identify the airplane. The target continued westbound in a gradual descent. When the target passed on the west side of Santa Catalina Island, radar contact was lost. A subsequent ramp search for the aircraft at the Santa Catalina airport was unsuccessful and Safety Board investigators were unable to interview the pilot.

During the investigation of this incident, Safety Board investigators were informed by facility staff at Coast TRACON that the revised routing issued to the flightcrew of ANZ6 was standard procedure and that this particular routing was established so that airplanes arriving into the Los Angeles area from over Santa Catalina Island could be sequenced with traffic from over San Diego. At one time, arrivals from over Santa Catalina Island were assigned 8,000 feet prior to entering Coast TRACON's airspace but, following procedural changes, the altitude was changed to 7,000 feet.

The Safety Board notes that this is the second incident involving Air New Zealand's flight 6. On September 5, 1988, at 1355 local time, ANZ6 was involved in a near midair collision about 22 miles south of the Seal Beach VORTAC while en route to Los Angeles International Airport. The flight was descending through 9,300 feet and in radio communication with controllers at the Los Angeles Center. The other airplane, believed to have been a Cessna although never identified, was being monitored on radar by the controllers at that facility. The airplane was squawking transponder code 1200 with mode C capability. The unknown airplane was not in communication with an air traffic control facility.

The controller at the Los Angeles Center, recognizing a potential conflict, issued traffic advisories and ultimately a safety advisory, and instructed the flightcrew of ANZ6 to maintain their present altitude. The

flightcrew then observed the traffic, opposite direction and in a right turn. The airplanes passed with 100 to 200 feet vertical separation and about 1,000 feet horizontal separation.

The Safety Board is also aware of another incident that occurred on May 29, 1989, involving Quantas Airways flight 17 (QFA17), a Boeing 747, and an unknown airplane about 10 miles east of Santa Catalina VORTAC. No formal notification of this incident was made to the FAA, nor was the flightcrew required to do so, therefore no investigation was conducted; however, the Safety Board has reviewed the captain's report written to his flight operations department after the incident.

The report, filed as an "Aircraft Safety Incident Report," states that after passing Santa Catalina VORTAC, the flightcrew of QFA17 was outbound on the Santa Catalina VORTAC 080 radial and descending to an assigned altitude of 7,000 feet when they were advised by air traffic control of unknown traffic, approaching from the right side of their airplane, in a descent through their altitude. The flightcrew observed the traffic as it passed in front of them, then made a left turn and passed off the left side of their airplane at the same altitude and with about 1/4-mile lateral separation. The captain estimated flight visibility to have been 10 miles in haze.

Following its investigation of the second incident involving ANZ6, Safety Board and FAA senior staff met on June 8, 1989, to discuss traffic flow into the Los Angeles area and to determine the feasibility of alternate routings that would allow ANZ6 and other international flights arriving from over Santa Catalina to remain at a higher altitude prior to entering the lateral confines of the Los Angeles TCA. The FAA staff said that present traffic flow and the proximity of special-use airspace (warning area reserved for Department of Defense operations) precluded altering the arrival routings for turbojet airplanes from over Santa Catalina VORTAC. The extensive briefing provided by the FAA was supplemented by a Los Angeles TCA chart depicting the primary departure and arrival flow, in and around the Los Angeles area. After discussing several possible solutions, the FAA acknowledged that the preferential arrival routing in question was so seldom used that it was not considered to be a problem area; however, the FAA also stated that discussions with the Department of Defense about special-use airspace were being conducted, but the possibility of reacquiring that airspace would probably be subject to negotiation for some time.

Since this meeting, the Safety Board has been made aware of other efforts, both within and outside the FAA, to resolve the problem of large IFR turbojet airplanes being exposed to the high traffic density of VFR general aviation airplanes at low altitudes east of Santa Catalina VORTAC. As a matter of standard procedure, staff from the FAA's Office of Accident Investigation accompanied Safety Board investigators during the investigation of the May 7, 1989, incident involving ANZ6. Subsequently, that office developed two recommendations for corrective action and forwarded them to the FAA Air Traffic System Resource Analysis Division in a memorandum dated May 24, 1989. The memorandum recommended that a review be conducted of "arrival altitudes and routings in major metropolitan areas to ensure that the safest practical configurations are being utilized," and to "conduct a review of terminal control areas to determine if any practical changes can be made to their

configuration that would increase the protection provided to large turbine powered aircraft in major metropolitan areas." These recommendations were forwarded to the Air Traffic Division on June 7, 1989. The acting director of Air Traffic Operations Service responsed to the safety recommendations in a memorandum dated August 25, 1989. He stated in part, "FAA Order 7100.9 mandates that regions shall initiate timely action to develop, revise, or cancel standard arrival routes/altitudes and coordinate each new/revised procedure....This review shall be conducted, as a minimum, on an annual basis and forwarded to the appropriate regional office by September 1 of each year...." The Safety Board notes that the route assigned to the three international carriers involved in these incidents was not a standard terminal arrival route (STAR), but rather a preferential arrival route specified in an interfacility letter of agreement between the Los Angeles Center and Coast TRACON. Commenting on the recommendation for a review of other TCAs to determine if any changes were necessary, the acting director stated, "FAA Handbook 7400.2, Procedures for Handling Airspace Matters, mandates that regions conduct periodic reevaluations of existing TCA designs." He went on to say that as a result of these evaluations, changes were being made to the Seattle TCA, and commented that as a result of meetings in St. Louis, Missouri, and five additional locations, TCA modifications would be made. The Safety Board is disappointed that neither the safety recommendations nor the Air Traffic Division's response specifically addressed the Los Angeles TCA or the preferential routing.

The Safety Board is aware that after the incident involving QFA17, senior representatives of Quantas Airways and Air New Zealand wrote to the Regional Administrator of the FAA Western Pacific region to express their concerns about arrival routings and air traffic control procedures into the Los Angeles area. As a result of their letters, senior FAA regional staff hosted a meeting on July 21, 1989, with representatives of those airlines to discuss alternate solutions that would be acceptable to all parties. One FAA proposal suggested a routing that began 80 miles southwest of Santa Catalina VORTAC, proceeded over San Diego to a point southwest of Palm Springs, to the Paradise VORTAC, then to Los Angeles International Airport. This proposal was not favored by both airlines because it required an additional 110 flying miles and would adversely affect payload, fuel load, and flight time limitations without providing an appreciable safety benefit. Another proposal suggested that, after passing Santa Catalina Island, flightcrews could, through the use of inertial navigation, fly parallel to and east of Victor Airway 27 (V27) between Santa Catalina and Ventura to maintain 4 miles of lateral separation from the airway and still remain clear of special-use airspace (warning area 291). From a point southwest of Los Angeles, the flights would then be vectored for sequencing with other arrivals.

It is the Safety Board's understanding that, although no mutual resolution was achieved at the July meeting, it was agreed that the FAA would continue to explore possible alternatives. The Safety Board was recently advised that representatives of both Quantas Airways and Air New Zealand were notified August 14, 1989, that beginning about September 11, 1989, the Western Pacific region and, specifically, Coast TRACON will implement revised procedures for airplanes arriving at Los Angeles International Airport from over Santa Catalina VORTAC. These procedures specify that large turbine-powered jets will cross Santa Catalina VORTAC at 13,000 feet at an indicated airspeed of

250 knots, then track outbound on the Santa Catalina 084 radial for 25 nautical miles while descending to 10,000 feet, then turn northbound while descending so as to cross 10 nautical miles south of the Seal Beach VORTAC at 7,000 feet. The new procedures are to be tested for a 30-day period while both the FAA and the affected flightcrews evaluate the effects of this change. To date, the Safety Board is not aware of the results of those tests.

The Safety Board notes the new proposed routing was not changed substantially from the preferential routing issued to the airplanes involved in the near midair collisions. The major exception to previous procedures is that large turbine-powered airplanes will be able to remain, initially, at a higher altitude than previously assigned. These new procedures still specify descent to 7,000 feet for turbine-powered airplanes outside the 30-nautical-mile "veil" around the Los Angeles International Airport that requires aircraft to have mode C capability as outlined in 14 CFR 91.24. The Safety Board is concerned that this airspace contains both a high number of VFR aircraft attempting to circumnavigate the perimeter of the Los Angeles "veil" and a high number of aircraft not in contact with an air traffic control facility. Therefore, the Safety Board remains skeptical about the safety benefit derived from the new arrival procedures.

The Safety Board believes that the TCA remains a feasible concept for decreasing the risk of midair collisions at major airports; however, it also believes that the potential for midair collisions between VFR and IFR aircraft will continue to exist so long as the avoidance of such collisions totally depends on the alertness of pilots and air traffic controllers without supplementary features to warn of impending conflict. In each incident described, the controller's and pilot's alertness played major roles in averting a potential catastrophe. However, the fact that each of these incidents resulted in airplanes being in close proximity, even after the air carrier flightcrew had been alerted to the presence of the other airplane, demonstrates again the limitations of "see-and-avoid."

The Safety Board investigated an August 31, 1986, accident in which the flightcrew operating IFR was not alerted to the presence of another airplane. A catastrophic midair collision occurred over Cerritos, California, involving an Aeromexico McDonnell Douglas DC-9 and a Piper PA-28. The airplanes collided at an altitude of about 6,560 feet mean sea level while the Aeromexico flightcrew was receiving air traffic control services from a controller at the Los Angeles TRACON. The pilot of the PA-28 was not in contact with an air traffic control facility nor was the airplane equipped with mode C capability. The 3 occupants of the PA-28 were killed; 58 passengers and 6 crewmembers on board the DC-9 were killed; 15 persons on the ground were killed, and others on the ground received minor injuries.2/ While the Safety Board acknowledges that the circumstances of this accident differ somewhat from the circumstances of the near midair collisions mentioned in the letter, it believes this accident exemplifies the potential danger of allowing large jets to enter the TCA at relatively low altitudes.

2/For more detailed information, read Aircraft Accident Report--"Collision of Aeronaves de Mexico, S.A., McDonnell Douglas DC-9-32, XA-JED, and Piper PA-28-181, N4891F, Cerritos, California, August 31, 1986" (NTSB/AAR-87/07).

On the day of the Cerritos accident, the FAA Administrator directed the FAA's Director of Aviation Safety to convene an interagency task group to conduct a formal review of TCAs. The group was charged with conducting an examination of TCA size, shape, traffic count, complexity, number and type of flight infractions, procedures, past enforcement efforts, and any other factor that would "allow the FAA to measure the effectiveness and to improve traffic flow and safe separation." The Administrator requested a written response within 30 days. The "TCA Task Group Review," dated October 1986, provided 57 recommendations that group members believed would increase TCA effectiveness in assuring the separation of current and future aviation traffic.

Acting on some of the recommendations made by the "TCA Task Group Review," the Secretary of Transportation announced on August 5, 1987, a Notice of Proposed Rulemaking (NPRM) to expand the controlled airspace (TCA) surrounding the Los Angeles International Airport. The rulemaking proposed to raise the ceiling of the Los Angeles TCA from 7,000 to 12,500 feet above sea level. The rationale for raising the ceiling was to "allow large jets to fly directly from airspace monitored by enroute air traffic control centers to the airspace monitored by controllers at the Los Angeles airport." In addition, the Secretary of Transportation said, "This proposal would provide private pilots, airline passengers and crewmembers with increased protection against midair and near midair collisions in the busy Los Angeles airspace. We also are planning similar actions to expand the lateral and vertical limits of TCAs at other airports in order to enhance operational safety."

On September 16, 1987, in its response to the FAA's NPRM on TCA classification and pilot/equipment requirements, the Safety Board stated it has repeatedly supported the concept of keeping air carrier aircraft in airspace where all traffic is subject to the collision protection provided by air traffic control. The Safety Board went on to note the highest collision risk was in the airspace below the floor of the PCA [positive control area] and outside of the boundary of the TCAs. The Board explained that this airspace must be transited by air carrier aircraft departing and approaching the major airports; however, other aircraft can operate under visual flight rules (VFR) and be unidentified by the controller. Expanding the horizontal boundary of the TCAs and raising the ceiling to 12,500 feet partially addresses this problem. The Safety Board, therefore, "strongly supports" those aspects of the proposed rule that establishes a single class TCA and expands the volume of TCAs to encompass the descent and climb transition areas used by air carrier aircraft.

The Safety Board determined that the probable cause of the Cerritos midair collision was "the limitations of the air traffic control system to provide collision protection, through both air traffic control procedures and automated redundancy." The Safety Board believes that until other redundancies are operational, such as the traffic alert and collision avoidance system (TCAS) on all commercial air carrier airplanes and the mode C intruder program at terminal air traffic control facilities, the FAA should take positive action to achieve the greatest level of safety for all users near major metropolitan airports that have a TCA. In addition, during the investigation of the May 7, 1989, near midair collision involving ANZ6, Safety Board investigators were informed that similar preferential arrival routes may exist at other major airports that result in air carrier flights being

descended to an altitude which results in entry at mid-altitudes rather than at the ceiling of the TCA. The Safety Board believes that the FAA should review and modify the preferential arrival routes and associated altitudes that are being assigned to commercial air carrier aircraft inbound to the Los Angeles area from over Santa Catalina VORTAC to assure that entry into TCA airspace occurs near the upper vertical limits. Also, the Safety Board believes that the FAA should conduct a review of all preferential arrival routes and altitudes at TCA airports to determine if descent routes and profiles are safe and in compliance with the FAA's national policy.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

> Review and modify air traffic control preferential arrival routes at the Los Angeles Air Route Traffic Control Center and other air traffic control facilities, as appropriate, so that air carrier flights landing at Los Angeles International Airport from over Santa Catalina VORTAC shall enter the Los Angeles Terminal Control Area at or near the upper vertical limit. (Class II, Priority Action)(A-89-138)
>
> Review preferential arrival routes at major airports where there is a terminal control area (TCA) and modify, as appropriate, those routes or procedures to ensure that air carrier airplanes enter the TCA at or near the upper vertical limit. (Class II, Priority Action) (A-89-139)

KOLSTAD, Acting Chairman, BURNETT, LAUBER, and DICKINSON, Members, concurred in these recommendations.

By: James L. Kolstad
Acting Chairman