

**NATIONAL TRANSPORTATION SAFETY BOARD**

Office of Aviation Safety  
Washington, D.C. 20594

December 11, 2009

**AIR TRAFFIC CONTROL**

**ADDENDUM TO THE FACTUAL REPORT**

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**DCA10IA001**

**A. ACCIDENT**

Location: En route to Minneapolis-St. Paul International/  
Wold-Chamberlain Airport (MSP), Minneapolis, MN  
Date: October 21, 2009  
Time: 1756 mountain daylight time (MDT)  
Aircraft: Northwest Airlines (NWA)

**B. HUMAN PERFORMANCE /AIR TRAFFIC CONTROL SPECIALISTS**

Malcolm Brenner, Ph.D.  
Daniel Bartlett  
Betty Koschig

National Transportation Safety Board  
Washington, DC

**C. SUMMARY**

On October 21, 2009, Northwest Airlines (NWA) flight 188, an Airbus A320, N374NW, did not respond to air traffic control communications for approximately one hour 17 minutes during cruise at FL370. Flight 188 flew past its intended destination while the flight was NORDO (no radio communications) but landed without further incident once radio

communication was reestablished. There were no injuries to the two pilots, three flight attendants and 144 passengers onboard. The flight was a regularly scheduled passenger flight operating under 14 Code of Federal Air Regulation Part 121 from San Diego, CA to Minneapolis-St. Paul International/Wold-Chamberlain Airport (MSP), Minneapolis, MN.

#### **D. DETAILS OF THE INVESTIGATION**

NTSB Investigators completed an interview and collected written material related to the Federal Aviation Administration (FAA) program providing resource management training to air traffic control crew. Following are an interview summary and copy of descriptive material on the program obtained from the FAA.

NWA188  
FAA ATC Crew Resource Management

As part of the ongoing investigation into the overflight of Minneapolis by NWA188 on October 21, 2009, the NTSB is evaluating air traffic control crew resource management (CRM) and the possible application of CRM to this incident.

Ms. LaGretta Bowser

NTSB investigators Malcolm Brenner, Dan Bartlett, and Betty Koschig interviewed Ms. Bowser on December 7, 2009 at NTSB Headquarters. Ms. Bowser was accompanied by Mr. John Reagan, a crew resource management (CRM) technical expert from her office. In response to questions presented by the group, Ms. Bowser provided the following information:

Ms. Bowser is the Director, Operational Services, of the Office of Safety, in the Air Traffic Organization (ATO) of the Federal Aviation Administration (FAA). She joined the FAA in 1987, after working about nine years as an air traffic controller in the U.S. Air Force, and has served in the FAA as air traffic controller at the Washington–Dulles Tower (IAD), air traffic supervisor at Andrews AFB, and specialist on terminal procedures and runway safety issues at the Office of Safety. She was promoted to her current position about two years ago.

Ms. Bowser's directorate is responsible for providing CRM training to air traffic controllers nationwide. FAA efforts to provide such training began around 2005 as a result of a recommendation from the Commercial Aviation Safety Team (CAST) to provide formal CRM training to controllers. At that time, the only national training that addressed teamwork was a three-day air traffic team enhancement (ATTE) course. Due to staffing constraints, managers found it difficult to schedule controllers off the floor for three days. Realizing this, Ms Bowser was tasked with developing a national program that could be taught in one day. Several ATC facilities in the Northwest Mountain region were already providing locally developed training and the current CRM course was developed based on that training. This one day CRM course emphasizes three elements: teamwork, individual performance, and threat and error management. Additionally, these principles are used to identify internal risks and external threats that exist at their facility. The FAA began teaching this course on a provisional basis in 2005, and by 2007 the course was certified by Air Traffic Training.

The 2007 NTSB recommendation for CRM training<sup>1</sup> for air traffic controllers was received very positively by her office as it supported work that was already in progress. A similar recommendation arrived about the same time from the Office of the Inspector General (OIG) in the Department of Transportation (DOT). These recommendations

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<sup>1</sup> In 2007, the NTSB recommended that the FAA: "Require all air traffic controllers to complete instructor-led initial and recurrent training in resource management skills that will improve controller judgment, vigilance, and safety awareness (Recommendation A-07-34)."

assured that CRM training maintained a high profile within the FAA and may have assisted in the FAA decision to continue to organize this training through the Office of Safety at a national level. Prior to receiving these recommendations, the FAA intended to develop the training module for administration by the individual service units. However, the FAA realized that the office of Safety was best suited to administer the training based on the alignment of initiatives already being worked by that office. The NTSB recommendation emphasized the importance of this effort.

Presently, the FAA ATC CRM training program consists of a single training course that has been completed by about 8,000 controllers of the total ATC work force of approximately 17,000 controllers. By the end of FY 2009, all Operational Evolution Partnership (OEP) airport towers had received the training, as well as Terminal facilities with high operational error rates, and by controllers at all FAA air route traffic control centers except Denver and Kansas City Centers (which are scheduled to receive this training in 2010). The program considers a facility fully trained if at least 80% of the controllers at the facility have completed the course.

Presently, there is no formal national program for follow-up action to the one-day course. However, at the request of a facility air traffic manager, the Safety Office can provide follow-up support that includes a revisit. The Office of Safety provides a report within 30 days that summarizes issues expressed during the course by facility controllers in breakout sessions. They also provide follow up material in the form of a quarterly brochure, newsletter, or mandatory reading item in the Air Traffic Bulletin. The Safety Office is currently developing a CD emphasizing effective debriefing procedures as part of CRM Program. Finally, the Safety Office has helped facilitate follow-up sessions at the invitation of the facility air traffic managers, such as at Albuquerque, Cleveland, and Houston Air Route Traffic Control Centers (ARTCCs) where they facilitated discussions on action planning. These follow on sessions briefly reviewed the course and had an open discussion addressing operational issues and mitigations within the facility. Local ATC facilities vary in the amount of follow up activities they provide to their workforce and some, such as Los Angeles ARTCC, have been very proactive.

The Safety Office is currently developing an order to formalize follow up activities as part of the national CRM training program. The follow up activities would include action planning, review and follow up to the course, and training of a cadre of controllers within the facilities who would facilitate CRM training on an on-going basis. However, such an order will have to respect complex labor/management issues and does not currently have a mandate within the FAA.

According to Ms. Bowser, Minneapolis ARTCC was very receptive to CRM training. The Minneapolis ARTCC air traffic manager attended the first course at the facility, really liked it, and directed his facility to accelerate training beyond the required 15%. The Office of Safety trained the cadres and the facility was able to conduct training and follow-up activities without further assistance. By contrast, Denver ARTCC has not received FAA ATC CRM training although the cadre of local instructors at Denver

ARTCC have completed their training and ATC CRM training. DEN will begin training their controllers in 2010.

The Office of Safety does not have a formal effort to judge the effectiveness of CRM training. NASA and airlines have already demonstrated the value of CRM training in other segments of the aviation industry, and the Office of Safety focuses its efforts instead on assuring that the content of the class is relevant to air traffic issues. However, the Office of Safety's Safety Culture division did complete a survey by an outside research group at the University of St. Louis. Part of that survey evaluated the differences between facilities that completed CRM training vs. those that had not. Ms. Bowser indicated that she would provide a copy of this study to the NTSB along with other written material about the FAA ATC CRM training program.

CRM is not necessarily a "magic bullet" to cure all safety concerns. Rather, it is like good preventive medicine that can help maintain the overall health of the air traffic control program.

## **Program Description**

Unlike courses that are airline-based or contain generic scenarios and activities, this workshop is ATC-specific, operationally-oriented, and relevant to the daily operations and culture of each facility.

CRM promotes an operational safety culture by conducting ATC-specific, operationally-oriented, and relevant to the daily operations and culture of each facility. The three major sections of the workshop are *Improving Teamwork*, *Improving Individual Performance*, and *Threat and Error Management (TEM)*. CRM provides training to all Terminal, Enroute, and Systems Operations personnel.

The *teamwork* section explores the characteristics of highly effective teams, CRM behaviors in an operational safety culture, routine team self-debriefs of ATC sessions, and best practices for delivering a good product to the next controller.

The *individual performance* section covers the two expert traits ATC – maintaining situational awareness and executing the plan, best practices for controllers working their own positions, principles for consistency, methods to enhance peak performance under pressure, countermeasures for overload and underload, and ensuring that safety is an already-established priority in all strategic and tactical capacity decisions.

The *threat and error management* section focuses on identifying and reducing error vulnerabilities, and applying countermeasures to those that remain. It covers avoiding the risk denial syndrome and intentional non-compliance with procedures, Dr. James Reason's "Swiss cheese" model of defense layers and the weaknesses inherent in each of them (specifically applied to ATC), the unsafe acts of individuals and teams, internal risks and external threats, local workplace factors that generate error-producing conditions, the identification of facility-specific actual or potential errors, and how individual and team vigilance can prevent these errors, or catch and correct those that still occur before they have an operational impact (an operational error or deviation, runway incursion, or accident).

## **Accomplishments**

- 8,402 Enroute and Terminal controllers trained on the concepts of CRM.
- Training conducted at 57 Terminal facilities, which includes all OEP Towers and most of the OEP Tracons.
- Enroute training conducted at 21 of 22 facilities. Training at or near 100 percent at ZMP, ZAU, ZLA, ZID, ZTL and ZJX.
- CRM DVD "*Human Factors 101 for Air Traffic Controllers*"
- *CRM Facilitator's Guide for Conducting Workshops* DVD
- CRM Articles were published in the AT Bulletin and FAAMA Magazine

## **Plans for FY10 and Beyond**

- FY10
  - Training at an additional 20 HQ identified Terminal facilities.
  - Continue District Cadre Facilitator workshops
  - Continue Enroute training for all controllers
  - CRM Supervisor's Course
  - CRM Guide to Team Debriefs DVD
  
- Beyond FY2010 to establish as permanent
  - CRM for the ATC Systems Command Center
  - CRM training for ATO-T new hires at the FAA Academy
  - A CRM behaviors lesson in the Operational Supervisors
  - Quarterly CRM refresher training that provides audiovisual replays of accidents and major operational errors, with guidelines for local discussions. Quarterly refresher training will only be required at those facilities that have completed the 1 day instructor led CRM workshop for 100% of facility personnel.
  - Monthly CRM newsletters to raise awareness of human factors throughout the field.
  - Conduct follow-up action planning at facilities where requested