National Transportation Safety Board
Washington, D.C. 20594

June 30, 2005

Ms. Bettina Peronti
Air Traffic Manager
Boston Airport Traffic Control Tower
Logan International Airport
600 Control Tower, 19th Floor
East Boston, Massachusetts 02128

Dear Ms. Peronti:

On June 9, 2005, about 1940 eastern daylight time, Aer Lingus flight 132 (EIN132), an Airbus A330, and US Airways flight 1170 (USA1170), a Boeing 737, were involved in a runway incursion/near midair collision at General Edward Lawrence Logan International Airport (BOS).

At the time of the incident, airplanes were landing on runways 4R and 4L and departing from runways 15R and 9. The Local Control East (LCE) controller was responsible for airplanes operating on runways 4R and 9 and the Local Control West (LCW) controller was responsible for airplanes operating on runways 15R and 4L.

According to BOS air traffic control tower (ATCT) order 7110.11J, Standard Operating Procedures (SOP), under this airport configuration the LCW was required to coordinate runway 15R departures with LCE. This order stated that LCW would use the interphone to coordinate a release with LCE. The specified LCW phraseology for this coordination was "Request release runway 15R, (call sign)." The order indicated that the LCE should respond, "(Call sign) observed and released runway 15R." There were no other coordination requirements or facility-mandated usage of memory aids applicable to this situation.

In this case, in a variation from the standard procedures, the LCE initiated the coordination call for EIN132 (which was holding in position on runway 15R), advising the LCW, "Observed and released fifteen right, Shamrock, heavy." The LCW responded with her initials. The LCW then advised the EIN132 crew, "Shamrock 132 heavy I've got one crossing and I have got one arrival to the crossing runway it'll be an American seven five seven, you'll see him shortly, be ready." The pilot responded, "we're ready, Shamrock 132." A few seconds later, the LCW said, "Shamrock 132 heavy start bringing your power up traffic is on a three mile final to the crossing

runway wind zero eight zero at four runway one five right cleared for takeoff." The pilot of EIN132 acknowledged.

After the LCE released EIN132 for departure on runway 15R, American Airlines flight 1752 (AAL1752), a Boeing 757, landed on runway 4R, and the LCE cleared USA1170 for takeoff on runway 9. On the basis of the advisory to the EIN132 flightcrew about the landing American Airlines 757, it would appear that the LCW was aware of the potential conflict between AAL1752 and EIN132 and withheld EIN132's takeoff clearance to resolve it. However, no evidence was recorded of any coordination between the LCW and the LCE regarding a potential conflict between these two airplanes. Further, there is no evidence that the LCW was aware that USA1170, another potential conflict, was preparing to depart from runway 9. Under these circumstances, it would appear that separation between USA1170 and EIN132 was completely dependent on the actions and awareness of a single controller, the LCE.

When interviewed about operating procedures following this incident, the LCE stated that after he approved a departure release from runway 15R, he would turn over the flight progress strip for the next aircraft to depart runway 9 to remind himself not to authorize departures from that runway until the airplane departing runway 15R was clear of the area. He couldn't recall if he used this memory aid on the night of the incident. Although this technique assists in preventing conflicts between runway 9 departures and runway 15R departures, there is no analogous procedure for focusing attention on potential conflicts between runway 15R departures and runway 4R arrivals.

All systems involving human-machine interfaces are threatened by the potential for human error. In air traffic control, pilots, controllers, and automated systems must all function optimally to maximize controller/pilot situational awareness, to minimize the occurrence of controller/pilot errors, and to minimize the chances that controller/pilot errors will result in accidents. Recognizing the limitations of human performance, such as the volatility of controller memory, is a first step toward achieving these objectives. Development of redundant layers of protection designed to prevent controller errors and limit their impact is also important. Safety Board investigators are concerned that several aspects of BOS ATCT procedures do not provide redundant layers of protection against human error, and may some day permit a single controller error to develop into a serious accident.

In the airport configuration in use at the time of the incident, flight crews using runways 15R and runway 4L were on a different local control frequency than those crews using runways 4R and 9. Because two local control frequencies were in use, pilots could not directly monitor activities that were occurring around them; specifically, the pilots of USA1170 could not hear that the LCW had cleared the pilots of EIN132 for takeoff from runway 15R. In addition, the airport layout made it difficult for flight crews to see airplanes operating on intersecting runways. As a result, the pilots of USA1170 had no opportunity to detect the controller's error and were not prompted to confirm or question their own clearance to take off on a converging runway.

While BOS is equipped with the Airport Movement Area Safety System (AMASS), the current version of AMASS tracking software does not detect conflicts between aircraft operating on converging runways. Therefore, the two local controllers did not have automation backup for the type of incident under examination here.

Finally, BOS ATCT procedures require that the LCE and the LCW coordinate a release for airplanes operating from runways "that are not normally active in the runway configuration in use," which in this case applied to runway 15R. When interviewed, the LCE stated that he advised the LCW that EIN132 was "observed and released" and then, he believes he followed his usual technique and turned over the flight strip for USA1170 (the next runway 9 departure) before ceasing operations pending departure of EIN132. However, a review of recorded AMASS data and voice communications indicated that, after the LCE gave the LCW the release, AAL1752 landed on runway 4R. Airplanes using runway 4R conflict with traffic using runway 15R. As noted above, although there was no recording of any coordination between the LCE and the LCW about AAL1752, the LCW did ensure *adequate* separation between EIN132 and AAL1752. It is therefore possible that the LCE forgot about AAL1752 when issuing the release, and that the LCW detected the conflict on her own. The LCE also cleared USA1170 for takeoff from runway 9 without resolving that airplane's potential conflict with EIN132, indicating that he had likely forgotten about the airplanes' relative positions and casting doubt on the effectiveness of his memory aid technique.

To maintain awareness of developing situations, controllers scan runways and listen to transmissions made by other controllers. Controllers interviewed during this investigation stated that the noise level in the tower cab was quite high around the time of the incident. Although they were standing next to each other, neither the LCE nor the LCW heard the other controller issue takeoff clearances to their respective flights. BOS ATCT procedures do not mandate that an ATCT cab coordinator or supervisor monitor the local control positions, nor does the facility assign another controller, such as a local assist, to help the local controllers monitor traffic and provide redundancy in identifying errors and potential conflicts.

On the basis of observations made during the investigation of this incident, Safety Board investigators offer the following suggestions that may assist in preventing runway incursions at BOS.

1. Require the LCW to advise the LCE on the interphone "runway XXX, rolling, (initials)" when an aircraft is departing from a runway not normally active in the runway configuration in use. The receiving controller should respond with his/her initials. This coordination would provide the receiving controller with a timely reminder that the runway was in use and, if a conflicting clearance had just been issued, prompt that controller to immediately resolve the conflict.

2. Require either the supervisor or cab coordinator to monitor either the LCE or the LCW position, as appropriate, when they are using a runway not normally active in the runway configuration in use. The additional personnel would be able to monitor the traffic situation and provide redundancy in the detection of any developing conflicts.

3. Do not permit controllers to place an airplane on an active runway unless that airplane is expected to depart in an appropriately short time. The presence of an airplane holding on a runway should serve as a warning to ATCT observers that a departure is imminent. Frequent use of extended "position and hold" procedures increases the likelihood of runway conflicts and may cause controllers to become desensitized to the significance of an airplane occupying a runway. (In this case, EIN132 was held in position on runway 15R for more than 11 minutes before the LCW issued a takeoff clearance.)

4. Facility management should evaluate the feasibility of incorporating a local assist position to be used when an aircraft is departing from a runway not normally active in the runway configuration in use. The intent of this position would be to monitor the position and coordinate with other positions/facilities, as appropriate.

I appreciate the help and support you provided to the team during this investigation and I look forward to hearing from you.

Sincerely,

Sandra Rowlett
Deputy Chief, Operational Factors Division