



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: June 17, 2008

In reply refer to: A-08-40 through -43
A-01-66, A-07-57, and A-06-10 (Reiteration)

The Honorable Robert A. Sturgell
Acting Administrator
Federal Aviation Administration
Washington, DC 20591

On April 12, 2007, about 0043 eastern daylight time, a Bombardier/Canadair Regional Jet (CRJ) CL600-2B19, N8905F, operated as Pinnacle Airlines flight 4712, ran off the departure end of runway 28 after landing at Cherry Capital Airport (TVC), Traverse City, Michigan. There were no injuries among the 49 passengers (including 3 lap-held infants) and 3 crewmembers, and the aircraft was substantially damaged. Weather was reported as snowing. The airplane was being operated under the provisions of 14 *Code of Federal Regulations* (CFR) Part 121 and had departed from Minneapolis-St. Paul International (Wold-Chamberlain) Airport (MSP), Minneapolis, Minnesota, about 2153 central daylight time (CDT). Instrument meteorological conditions prevailed at the time of the accident.

The National Transportation Safety Board determined that the probable cause of this accident was the pilots' decision to land at TVC without performing a landing distance assessment, which was required by company policy because of runway contamination initially reported by TVC ground operations personnel and continuing reports of deteriorating weather and runway conditions during the approach. This poor decision-making likely reflected the effects of fatigue produced by a long, demanding duty day, and, for the captain, the duties associated with check airman functions. Contributing to the accident were 1) the Federal Aviation Administration (FAA) pilot flight and duty time regulations that permitted the pilots' long, demanding duty day and 2) the TVC operations supervisor's use of ambiguous and unspecific radio phraseology in providing runway braking information.¹

Pilot Actions and Decision-Making During the Flight

The Safety Board's review of cockpit voice recorder (CVR) evidence indicated that, consistent with the captain's performing operational experience (OE) duties, the pilots'

¹ For more information, see *Runway Overrun During Landing, Pinnacle Airlines, Inc., Flight 4712, Bombardier/Canadair Regional Jet CL600-2B19, N8905F, Traverse City, Michigan, April 12, 2007*, Aircraft Accident Report NTSB/AAR-08/02 (Washington, DC: NTSB, 2008), which is available on the Safety Board's website at <<http://www.nts.gov/publictn/2008/AAR0802.pdf>>.

conversation during the flight largely focused on operational and procedural issues, including the inclement weather (snow and strong winds). Postaccident interviews and CVR evidence showed that the pilots had been operating in inclement weather conditions with snow, wind, and turbulence all day and expected to encounter similar weather conditions at TVC. The pilots received updated weather information from company dispatch personnel about 45 minutes before landing. This updated information indicated that the winds at TVC were still favorable for landing, and the captain advised the passengers that “it looks like we’re gonna have no problems gettin’ in [to TVC] this evening.”

Landing Distance Assessments

CVR and postaccident interview evidence indicated that the pilots’ concerns during the flight appeared to be primarily related to the TVC wind conditions, perhaps because that was the critical factor in the airplane’s delayed dispatch from MSP.² Although the CVR recorded the captain mentioning the possibility of diverting to Detroit Metropolitan Wayne County Airport (DTW), Detroit, Michigan,³ late in the approach (about 1 minute before touchdown), the pilots exhibited limited concern regarding the runway surface condition.

About 37 minutes before they landed, the pilots listened to the TVC automated surface observing system (ASOS) broadcast for updated weather information and runway surface condition information. This ASOS information indicated winds out of 040° at 7 knots and visibilities of 1 1/2 miles in light snow. This was the only TVC ASOS broadcast the pilots listened to before their arrival at TVC. However, TVC ground operations personnel provided the pilots with updated weather and runway surface condition information on several occasions as the airplane neared the airport. The TVC airport operations supervisor provided runway surface condition information to the accident pilots both before (“forty plus MU”⁴ with “thin wet snow over patchy thin ice”) and during the vectoring stages of the approach (for example, “it’s comin’ down pretty good,” “this is fillin’ in pretty quick,” and “it’s fillin’ in real hard”). (Evidence indicates that the runway surface conditions at TVC deteriorated because of increasing snowfall during the last 15 minutes of the accident flight.) Consistent with this information, the CVR recorded the captain commenting that he expected to land on a contaminated runway. For example, the captain stated: “there’s snow removal on the field yet they’re showing forty or better sounds like a contaminated...runway to me” at 0029:10.5; “with contaminant, more than likely” at 0033:50.9; and “snowing hard” at 0034:09.3. (ASOS reports, which the pilots had not obtained, also showed that light snow increased to moderate snow about 0030; then, about 0040, increased to heavy snow with visibility of 1/4 mile.)

Pinnacle pilots were required to obtain the most current meteorological and runway surface condition estimates as close to landing as possible and perform landing distance assessments to determine whether adequate runway length was available before beginning an

² The accident flight departed MSP about 80 minutes after its scheduled departure time, in part due to forecast high winds at TVC.

³ DTW was the alternate destination airport identified for the accident flight.

⁴ MU values are runway friction measurements and are reported in a range from 0.0 to 1.0, where 0.0 is the lowest friction value, and 1.0 is the theoretical best friction value available. (Runway friction measurements are also sometimes reported in a range from 0 to 100.)

approach to a contaminated runway. This requirement was incorporated into Pinnacle's Operations Specifications (OpSpecs) in December 2006, consistent with guidance contained in the FAA's Safety Alert For Operators (SAFO) 06012.

However, CVR evidence and postaccident interviews revealed that the pilots did not perform a landing distance assessment. The captain told investigators that he had landed on snowy runways many times, that he believed the runway conditions were okay based on the freshly plowed runway and reported contamination depth, and that a landing distance assessment was not required. The first officer stated that he thought that pilots were required to (and should) check landing distances with a contaminated runway. He said that he believed 4,000 feet was the required landing distance but indicated that they did not check the landing distance charts.

The Safety Board concludes that the pilots failed to perform the landing distance assessment that was required by Pinnacle's OpSpecs; had they done so, using current weather information, the results would have shown that the runway length was inadequate for the contaminated runway conditions described. This accident reinforces the need for pilots to perform landing distance assessments before every landing, taking into account conditions at the time of arrival and adding a safety margin of at least 15 percent to calculated landing distances. Therefore, the Safety Board reiterates Safety Recommendation A-07-57.

Early in the airplane's descent, the TVC airport operations supervisor also provided the following precise runway condition report to the accident captain, "I've [.40+ MU on] runway two eight. I've got thin, wet snow [over] patchy thin ice." However, the captain ignored the company requirement for performance of a landing distance assessment demonstrating that sufficient runway exists for a safe landing in contaminated runway conditions regardless of contaminant depth. When later advised by the TVC airport operations supervisor that snow had accumulated to nearly 1/2 inch, the captain told the first officer, "[w]e're allowed 3 inches...half inch is nothing." The captain's comments indicated that he believed that company policies allowed them to land under any circumstances with up to 3 inches of contaminant on the runway.⁵ The TVC airport operations supervisor's comments (including "it's filling in" and his estimate that the snow was 1/2 inch deep) provided the pilots with ample information to recognize at least that the runway was contaminated and that a landing distance assessment should have been performed. Nonetheless, on the basis of the information provided by the TVC ground operations supervisor, the captain appeared satisfied that the ground cover was within Pinnacle's limitations and continued the approach without performing a landing distance assessment. The Safety Board concludes that because the pilots had ample evidence that wet snow was accumulating rapidly on the runway at TVC they should have anticipated a landing on a contaminated runway and performed a landing distance assessment as required by the company's operations specifications (OpSpec).

As the approach continued, the pilots could have reassessed their decision and performed a landing distance assessment as they received additional information regarding TVC weather and runway conditions; air traffic control (ATC) and CVR data and postaccident pilot statements indicated that their workload was relatively light during the approach to TVC. Further, if the

⁵ Pinnacle policies only permitted landings on runways with wet snow depths of 1 1/2 inches or less.

pilots were concerned about the time and workload involved in conducting a landing distance assessment during the approach, they could have requested either a delayed turn-in for the approach or holding pattern instructions from MSP Air Route Traffic Control Center (ARTCC).

Landing Distance Assessment Training

SAFO 06012, Section 3g provides the following guidance for training flight crews on the landing distance assessment procedures, stating that all flight crewmembers should be made aware of the procedures:

....in a manner consistent with the operator's methods for conveying similar knowledge to flight operations personnel. It may be conducted via operations/training bulletins or extended learning systems...all flight crewmembers should have hands on training and validate proficiency in these procedures during their next flight training event.

Pinnacle Airlines voluntarily adopted the guidance in SAFO 06012 and incorporated mandatory landing distance assessments for contaminated runways into both its flight manual and OpSpec, informing pilots via a revision to the flight manual, and teaching the procedure in ground school. The FAA principal operations inspector (POI) for Pinnacle indicated that he was satisfied with the company's adoption of this SAFO. However, provisions for hands-on-training and validation of proficiency were not put into place.

Although both the captain and the first officer were familiar with the landing distance assessment procedure (in fact, as part of the first officer's OE, the captain reviewed the landing distance assessment procedures during a previous flight), neither recognized the need to accomplish this procedure when they were briefed on the contaminated runway conditions at TVC. This deficiency may be explained by fatigue impairment, but more thorough training on the rationale behind conducting a landing distance assessment may have made the crew more cognizant of the need for such an assessment and of the benefits of conducting the assessment for contaminated runways before landing. After the accident, Pinnacle voluntarily increased its training on the landing distance assessment by providing pilots with an additional review of the charts and their proper use during semiannual training events, annual ground school training, and annual pilot check flights.

When adopting new operational procedures, it is important to ensure that those who will be using the procedures have a thorough understanding of not only how to perform the procedure, but when to perform it. Because dispatch must perform a landing distance calculation before departure to ensure that the airplane can land at the destination airport within weight limits and in the available landing distance, pilots may not recognize the criticality of performing a landing distance assessment just before landing. The assessment is particularly critical when runway conditions may have changed over the length of the flight, as was the case at TVC. The primary purpose of conducting a landing distance assessment is to account for current runway conditions. The Safety Board is concerned that the introduction of a landing distance assessment in a manner similar to other, possibly less essential procedures followed by training up to 6 months later, may not sufficiently communicate to pilots the importance of and appropriate time for conducting a landing distance assessment before landing on a contaminated runway.

The Safety Board supports the guidance of SAFO 06012 and recognizes that Pinnacle Airlines voluntarily adopted this procedure and enhanced their training after the accident. The Safety Board concludes that initial training for pilots on the rationale for and criticality of conducting a landing distance assessment before landing on a contaminated runway would reinforce the need to conduct such an assessment. The FAA's Takeoff/Landing Performance Assessment Aviation Rulemaking Committee, convened to discuss the landing distance assessment methods provided in SAFO 06012, provides an ideal forum to address the training that is necessary for the implementation of landing distance assessment procedures. Therefore, the Safety Board believes that the FAA should, as part of the Takeoff/Landing Performance Assessment Aviation Rulemaking Committee, address the need for initial training on the rationale for and criticality of conducting landing distance assessments before landing on contaminated runways.

Pilot Fatigue Issues

The accident occurred well after midnight at the end of a demanding day during which the pilots had flown 8.35 hours,⁶ made five landings, been on duty more than 14 hours, and been awake more than 16 hours.⁷ During the accident flight, the CVR recorded numerous yawns and comments that indicate that the pilots were fatigued. Additionally, the captain made 3 references to being tired and the first officer stated, "jeez, I'm tired." Additionally, the pilots' high workload (flying in inclement weather conditions, and in the captain's case, providing OE for the first officer) during their long day likely increased their fatigue.

The Safety Board's 1994 study of flight crew-related major aviation accidents indicated that fatigue related to lengthy periods of wakefulness can contribute to accidents. Specifically, the Board's study found that captains who had been awake for more than about 12 hours made significantly more errors (including failure to recognize and discontinue an ill-advised or flawed approach) than those who had been awake for less than 12 hours.

Accident data further show that long duty days significantly increase the likelihood of human factors-related accidents. Pilots who flew schedules involving 13 or more hours of duty time had accident rates several times higher than pilots who flew shorter schedules. In its investigations of two accidents in which fatigue was cited and the pilots continued an ill-advised and/or flawed approach (the June 1999 accident at Little Rock, Arkansas, and the October 2004 accident at Kirksville, Missouri),⁸ the Safety Board noted that the pilots had been continuously

⁶ Although the pilots' 8.35 hours of flight time exceeded the flight time cap, Federal regulations do allow for such exceedences when they are the result of "circumstances beyond the [operator's] control...such as adverse weather conditions."

⁷ The captain stated that although he was off duty during the days before the accident, his sleep during that time was interrupted, in part because of a newborn child. He awoke about 0700 CDT on the day of the accident. The first officer was also off duty in the days before the accident, during which he made a personal trip to California. He awoke about 0630 CDT on the day of the accident.

⁸ See (a) National Transportation Safety Board, *Runway Overrun During Landing, American Airlines Flight 1420, McDonnell Douglas MD-82, N215AA, Little Rock, Arkansas, June 1, 1999*, Aircraft Accident Report NTSB/AAR-01/02 (Washington, DC: NTSB, 2001) and (b) National Transportation Safety Board, *Collision with Trees and Crash Short of the Runway, Corporate Airlines Flight 5966, BAE Systems BAE-J3201, N875JX, Kirksville, Missouri, October 19, 2004*, Aircraft Accident Report NTSB/AAR-06/01 (Washington, DC: NTSB, 2006).

awake for at least 15 to 16 hours (as had the pilots in this accident). In addition, several other accidents have involved fatigued pilots, subject to long continuous wakefulness and late hours, who attempted to land despite evidence that the approach should be discontinued.⁹ Research also indicates that alertness suffers when a working day exceeds 14 to 16 hours.¹⁰

Fatigue especially affects decision-making, and people who are fatigued become less likely to consider options and more likely to become fixated on a desired outcome. Among pilots, this may appear as errors such as failing to discontinue an ill-advised approach. In this case, the accident occurred during an instrument approach to a snow- and ice-contaminated runway in a snowstorm after the fifth flight segment of the day. The pilots had performed four previous landings and flown in challenging (windy, turbulent, snowy) weather conditions throughout the day, and it is unlikely that they wanted to extend their day further by diverting to an alternate airport. In this case, it is likely that fatigue and a desire to end the trip (and their day) influenced the pilots' continuation of the approach despite evidence that they should either delay the approach or divert to an alternate airport.

The Safety Board concludes that the poor decision-making shown by the accident pilots, including their failure to account for the changing weather and runway conditions during the approach; their failure to perform a landing distance calculation; and their failure to reassess or discontinue the approach accordingly, likely reflected the effects of fatigue.

The pilots' schedule for the accident sequence was consistent with existing FAA flight and duty time regulations. The Safety Board has long urged the FAA to review and update the hours-of-service regulations based on current scientific evidence. For example, in 2006, the Board issued Safety Recommendation A-06-10, which recommended that the FAA "modify and simplify the flight crew hours-of-service regulations to take into consideration factors such as length of duty day, starting time, workload, and other factors shown by recent research, scientific evidence, and current industry experience to affect crew alertness." Despite this and other fatigue-related recommendations, the FAA has not updated or revised its pilot flight and duty time regulations. On the basis of the FAA's continued inaction, in November 2006, the Safety Board classified Safety Recommendation A-06-10, "Open—Unacceptable Response."

This accident demonstrates again that fatigue-related issues continue to affect the safety of airline operations and that the airline industry could greatly benefit from hours-of-service rules that reflect current scientific understanding and industry experience to minimize the effects of fatigue on safety. The Safety Board concludes that existing FAA pilot flight and duty time regulations permitted the long and demanding day experienced by the accident pilots, which

⁹ See a) National Transportation Safety Board, *Uncontrolled Collision With Terrain, American International Airways Flight 808, Douglas DC-8-61, N814CK, U. S. Naval Air Station, Guantanamo Bay, Cuba, August 18, 1993*, Aircraft Accident Report NTSB/AAR-94/04 (Washington, DC: NTSB, 1994); b) National Transportation Safety Board, *Controlled Flight into Terrain, Korean Air Flight 801, Boeing 747-300, HL7468, Nimitz Hill, Guam, August 6, 1997*, Aircraft Accident Report NTSB/AAR-00/01 (Washington, DC: NTSB, 2000); and c) National Transportation Safety Board, *Collision With Trees on Final Approach, Federal Express Flight 1478, Boeing 727-232, N497FE, Tallahassee, Florida, July 26, 2002*, Aircraft Accident Report NTSB/AAR-04/02 (Washington, DC: NTSB, 2004).

¹⁰ G.P. Kruger (1989). "Sustained work, fatigue, sleep loss, and performance: a review of the issues," *Work and Stress*, vol. 3, pp. 129-141.

resulted in their fatigued condition and degraded pilot decision-making. Therefore, the Safety Board reiterates Safety Recommendation A-06-10.

Because the accident captain was serving as a line check airman during the accident flight, issues related to scheduling of check airmen were addressed in this investigation. In addition to regular line pilot duties, check airmen have the added responsibilities of providing OE to new hires¹¹ while shouldering additional cockpit duties as needed, depending on the experience and competency of the new hire. In this case, the accident captain was subject to significant additional workload because of his check airman duties. Throughout the day, the captain was flying in challenging conditions without the assistance of an experienced colleague, continually monitoring the first officer's actions and performance as the nonflying pilot, and providing guidance to the first officer. (CVR evidence showed that the captain actively provided instruction and monitoring of the first officer's actions in support of his initial OE throughout the accident flight.)

These additional responsibilities can result in a workload that is substantially more demanding and fatiguing than regular line flying and, in this case, would have almost certainly exacerbated the development of fatigue for the captain. Especially during a time of pilot shortages and high turnover rates, increased training demands could force line check airmen to spend the bulk of their flying time providing OE and flying with new pilots with less experience, resulting in greater demands on the check airmen. The captain indicated that most of his flying during the weeks before the accident involved OE and performing other check airman duties. Federal regulations do not address check airman hours of service apart from general flight and duty time limitations, and Pinnacle did not apply special duty-time limits to its line check airmen at the time of the accident. Subsequent correspondence from Pinnacle representatives indicates that check airmen performing OE are now limited to 14 hours of duty and 8 hours of "actual" (rather than "scheduled") flight time per day.

The Safety Board concludes that the additional responsibilities and task demands involved in providing OE and performing related check airman functions likely aggravated the effects of fatigue for the captain/check airman. The Board recognizes that previously reiterated Safety Recommendation A-06-10 encompasses numerous factors that the FAA should consider in modifying flight crew flight and duty times and other limitations for pilots, including workload. The increased workload involved when a line check airman is providing OE and performing related check airman functions is another aspect of flight and duty time regulations and other limitations that need to be addressed as part of Safety Recommendation A-06-10. Further, on June 10, 2008, the Safety Board issued Safety Recommendations A-08-44 and -45 recommending the development and evaluation of fatigue management systems; the breadth of issues potentially addressed by these systems could include specific factors addressing check airman functions and the Safety Board urges the FAA to consider check airman workload in fatigue management system development and guidance.

¹¹ Other check airman duties include performing line and proficiency checks.

Airport and Runway Condition Reports and Ground Personnel Phraseology

In accordance with published procedures, after tower closing time the pilots communicated directly with TVC airport operations personnel on the common traffic advisory frequency (CTAF) regarding the timing of their arrival, snow removal activities, and the airport/runway conditions. The airport operations personnel are the source of runway and field condition reports issued by the control tower during operating hours; therefore, the accident flight crew had direct access to equivalent runway and field condition information.

During the last 30+ minutes of the accident flight, the TVC airport operations supervisor made several radio transmissions to the accident pilots regarding snow removal operations, subsequent snowfall, and accumulation of snow on the landing runway. About 16 minutes before the airplane landed, the TVC airport operations supervisor described the runway braking action as “nil” in a radio transmission on the TVC CTAF. The Safety Board concludes that it is likely that neither pilot heard this “nil” braking report because the transmission occurred simultaneously with critical approach instructions issued by the MSP ARTCC controller.

Less than 3 minutes later, the TVC airport operations supervisor stated, “...again...brakin’ action’s probably nil on the runway.” However, this “probably nil” statement from the TVC airport operations supervisor was not definitive, nor was it standard phraseology for reporting runway conditions. The captain promptly requested clarification, asking, “are you saying it’s nil?” The TVC airport supervisor’s response to this question was even more ambiguous than his “probably nil” statement; he stated that he had not been “out there to do a field report and it’s been 5, 10 minutes, so I don’t know what it’s doin’ now.” (The TVC airport operations supervisor stated during postaccident interviews that this assessment of the runway condition was based on tests he conducted in his vehicle on runway 28, during which he perceived “minimal to nonexistent” braking action and “uncertain” directional control; however, he did not provide the pilots with this detailed description of conditions.) When further queried by the captain, the TVC airport operations supervisor estimated the runway snow depth to be “close to” 1/2 inch. CVR-recorded communications between the pilots indicated that the captain was initially concerned about the TVC airport operations supervisor’s “probably nil” braking report but felt more confident about landing after hearing the contaminant depth estimate of 1/2 inch. The Safety Board concludes that, although Pinnacle procedures prohibit landing when runway braking action is reported as “nil,” the TVC airport operations supervisor’s description of “probably nil” (a term that has no clearly defined meaning with regard to runway braking action) and his subsequent failure to confirm a nil braking report when questioned further by the pilots likely led the pilots to believe that the runway braking action was not actually nil and therefore did not directly prohibit the landing.

The FAA recommends that airports use the *Aeronautical Information Manual* (AIM) chapter titled, “Radio Communications, Phraseology, and Techniques” as a source for related airport training materials and procedures. This AIM chapter emphasizes the importance of precision, conciseness, and proper radio technique in successfully communicating by radio and includes examples of proper phraseology and radio techniques. A review of TVC training materials for operations personnel regarding communications and airport familiarity indicated that the materials were consistent with and referenced the AIM information. Further, TVC

records indicate that all ground personnel on duty the night of the accident, including the airport operations supervisor, had successfully completed the required training.

Because the airport operations supervisor had completed the required training and was also familiar with appropriate phraseology from his pilot training, it is not clear why he failed to provide specific and decisive information at all times on the night of the accident. However, it is likely that TVC airport operations supervisor's reticence to confirm his "probably nil" braking report when the captain tried to confirm it was a factor in the pilots' decision to continue the approach. The Safety Board concludes that the TVC airport operations supervisor's use of ambiguous and unspecific radio phraseology when providing braking action information likely affected the captain's decision to continue the approach; an unambiguous runway surface condition report would have provided the pilots with more accurate and useful information to factor into their landing decision. Therefore, the Safety Board believes that the FAA should issue a CertAlert to all 14 CFR Part 139 certificated airports that describes the circumstances of this accident, emphasizes the importance of specific and decisive radio communications, and urges airports to ensure that those criteria are being met in all airfield radio communications.

Runway Closure Procedures in Snow and Ice Conditions

In 2005, the FAA Great Lakes Region sent correspondence to all Part 139 airport operators in the region regarding operations during snow and ice conditions. This letter stated that airports must implement procedures for closing any pavement available to air carriers when braking action/friction values reach an unsafe value (the equivalent of nil braking action). TVC airport personnel discussed this issue at a snow plan meeting held September 22, 2006. However, at the time of the accident, TVC's snow and ice control plan did not specify criteria that would result in airport personnel closing a runway and/or the airport. If TVC's snow and ice control plan had incorporated such criteria, it is likely that the TVC airport operations supervisor would have, given his determination that the braking action was nil, closed the runway to air carrier operations before the accident flight arrived, forcing the pilots to take alternate action. After the accident, TVC received operational criteria information from the air carriers, and the airport now restricts air carrier operations when MU values of .27 or less are measured or when nil braking action is reported by pilots or TVC ground operations personnel.

The Safety Board concludes that incorporation of minimum safe operating limits for runway surface conditions into an airport's snow and ice control plan would ensure that airport operations personnel prohibit air carrier operations on any runway if, in their estimation, the braking action on that runway is unsafe. Therefore, the Safety Board believes that the FAA should require all 14 CFR Part 139 certificated airport operators to include in their airport's snow and ice control plan absolute criteria for type and depth of contamination and runway friction assessments that, when met, would trigger immediate closure of the affected runway to air carrier operations. Friction assessments should be based on pilot braking action reports, values obtained from ground friction measuring equipment, or estimates provided by airport ground personnel.

Aircraft Rescue and Firefighting Crash Detection

The TVC aircraft rescue and firefighting (ARFF) responder reported that, although he heard that the accident site was somewhere along runway 10/28, he initially had difficulty

determining the airplane's location along the length of that runway, despite his use of forward-looking infrared (FLIR) equipment, in part because of snow-restricted visibilities. Additionally, the ARFF vehicle radio was set to scan emergency radio frequencies, and transmissions about a concurrent, unrelated off-airport fire resulted in congestion on those radio frequencies, making it difficult for the ARFF responder to obtain clarifying information. (The investigation revealed that TVC personnel promptly addressed this frequency congestion issue after the accident.) The ARFF responder was able to drive directly to the accident site after he heard a radio transmission stating, "we're on the numbers of 10," and arrived at the site about 7 minutes after he was alerted to the accident. The Safety Board concludes that, although there were no reported injuries resulting from this accident, had a postaccident fire occurred, the delay in ARFF response could have adversely affected the safety of passengers after the accident. The Safety Board further concludes that the FLIR equipment installed in the ARFF vehicle did not help the firefighter locate the accident airplane; however, improved crash detection and location equipment would likely have facilitated a more timely ARFF response. Therefore, the Safety Board reiterates Safety Recommendation A-01-66.

Postaccident Alcohol Testing

Title 14 CFR Part 121 Appendix J, Section B1 states that a decision to forgo the administration of a postaccident alcohol test "shall be based on the employer's determination, using the best available information at the time of the determination, that the covered employee's performance could not have contributed to the accident." The Safety Board is not aware of any information at the time of the accident that would have precluded the pilots from alcohol testing. Pinnacle did conduct drug tests for the pilots 3 hours after the accident and both pilots tested negative for illicit drugs, but the pilots were not tested for alcohol. Although there is no reason to believe their performance was affected by alcohol, the failure of the airline to perform required postaccident alcohol tests prevents a definitive statement on the issue. Even though there was initially some uncertainty as to whether the runway overrun was an accident or an incident, it would have been prudent for Pinnacle to comply with the drug and alcohol testing regulations as if the overrun were to be classified as an accident.

After another recent accident,¹² pilots tested negative for alcohol and drugs. However, the alcohol testing was delayed until about 3 hours after the accident and no records stating the reasons for the delay were prepared by the air carrier—Shuttle America—(as required by 14 CFR Part 121, Appendix J) nor were such records requested by an FAA representative.

Timely testing for alcohol after an accident is necessary to evaluate any safety factors related to alcohol impairment or to eliminate them from further consideration. The Safety Board concludes that, although there was no evidence that alcohol was a factor in either recent accident, it cannot be conclusively ruled out; further, there is evidence that administration of required testing was not conducted or enforced strictly. Therefore, the Safety Board believes that the FAA should emphasize with POIs the importance of conducting timely postaccident drug and alcohol testing.

¹² For additional information, see National Transportation Safety Board, *Runway Overrun During Landing, Shuttle America, Inc., doing business as Delta Connection Flight 6448, Embraer ERJ-170, N862RW, Cleveland, Ohio, February 18, 2007*, Aircraft Accident Report NTSB/AAR-08/01 (Washington, DC: NTSB, 2008).

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

Emphasize with principal operations inspectors the importance of conducting timely postaccident drug and alcohol testing. (A-08-40)

As part of the Takeoff/Landing Performance Assessment Aviation Rulemaking Committee, address the need for initial training on the rationale for and criticality of conducting landing distance assessments before landing on contaminated runways. (A-08-41)

Issue a CertAlert to all 14 *Code of Federal Regulations* Part 139 certificated airports that describes the circumstances of this accident, emphasizes the importance of specific and decisive radio communications, and urges airports to ensure that those criteria are being met in all airfield radio communications. (A-08-42)

Require all 14 *Code of Federal Regulations* Part 139 certificated airport operators to include in their airport's snow and ice control plan absolute criteria for type and depth of contamination and runway friction assessments that, when met, would trigger immediate closure of the affected runway to air carrier operations. Friction assessments should be based on pilot braking action reports, values obtained from ground friction measuring equipment, or estimates provided by airport ground personnel. (A-08-43)

Also, the following previously issued recommendations to the Federal Aviation Administration are reiterated:

Evaluate crash detection and location technologies, select the most promising candidate(s) for ensuring that emergency responders could expeditiously arrive at an accident scene, and implement a requirement to install and use the equipment. (A-01-66)

Immediately require all 14 *Code of Federal Regulations* Part 121, 135, and 91 subpart K operators to conduct arrival landing distance assessments before every landing based on existing performance data, actual conditions, and incorporating a minimum safety margin of 15 percent. (A-07-57) (Urgent)

Modify and simplify the flight crew hours-of-service regulations to take into consideration factors such as length of duty day, starting time, workload, and other factors shown by recent research, scientific evidence, and current industry experience to affect crew alertness. (A-06-10)

In response to the recommendations in this letter, please refer to Safety Recommendations A-08-40 through -43. If you would like to submit your response electronically rather than in hard copy, you may send it to the following e-mail address: correspondence@ntsb.gov. If your response includes attachments that exceed 5 megabytes,

please e-mail us asking for instructions on how to use our Tumbleweed secure mailbox procedures. To avoid confusion, please use only one method of submission (that is, do not submit both an electronic copy and a hard copy of the same response letter).

Chairman ROSENKER, Vice Chairman SUMWALT, and Members HERSMAN, HIGGINS, and CHEALANDER concurred in these recommendations.

[Original Signed]

By: Mark V. Rosenker
Chairman