

August 8, 2005

Honorable Marion C. Blakey
Administrator
Federal Aviation Administration
Washington, D.C. 20591

Dear Ms. Blakey:

Thank you for the Federal Aviation Administration's (FAA's) March 9, 2005, response to the National Transportation Safety Board regarding Safety Recommendations A-04-48 through -50, stated below. These recommendations were issued to the FAA as a result of the Safety Board's investigation of a January 19, 2004, incident involving Air Canada Jazz flight 8093, a de Havilland DHC-8, which landed on taxiway T at Seattle-Tacoma International Airport (SeaTac), Seattle, Washington, after being cleared to land on adjacent runway 16R and the Board's review of the events/conditions associated with three landings and four near-landings on taxiway T. Subsequent to our receipt of the March 9, 2005, letter, Safety Board staff met with FAA staff to discuss additional developments related to these recommendations.

A-04-48

Allow Seattle-Tacoma International Airport, as an interim solution, to apply (a) large nonstandard taxiway identification markings (such as the word "TAXIWAY") at regular intervals to the full width of the taxiway T surface, starting near the approach end and continuing for one-half the length of the taxiway; and (b) a continuous serpentine line over the taxiway centerline, between each of the aforementioned nonstandard taxiway identification markings.

The Safety Board notes that the FAA formed a team of subject matter experts to evaluate this recommendation. In January 2005, the team issued a report, titled *Recommendations of Treatments of Taxiway Tango at Seattle-Tacoma Airport for the Mitigation of Taxiway Landings*, which the FAA included with its response; the report made a number of recommendations to reduce the potential for these taxiway landings. The team's recommendations focused on the problem at three stages in the arrival sequence: (1) before visual contact with the airport; (2) at initial runway selection; and (3) after runway selection to correct a selection error. The changes recommended in stages (1) and (2) have been implemented. The Board notes that despite these changes, flight crews continue to misidentify taxiway T as runway 16R. This type of mistake occurred most recently on January 30, 2005, when a Southwest Airlines 737 almost landed on taxiway T.

The measures called for in Safety Recommendation A-04-48 fall into the third stage, after runway selection to correct a selection error. The FAA letter states that the team determined that

the measures called for in Safety Recommendation A-04-48 would be ineffective because the serpentine lines would not be visible to pilots sufficiently far from touchdown, especially in wet weather or glare-out conditions (common at SeaTac during winter months). The Safety Board questions the emphasis on wet weather since Safety Board data from 1999 to 2005 indicate that half of the taxiway landings or near landings (four out of eight) occurred during dry surface conditions. Further, according to discussions with FAA staff, the recommended serpentine markings were not painted on the concrete surface of taxiway T as part of the FAA testing process. Given this information, the Safety Board questions how the FAA could determine that these measures were ineffective.

In the January 2005 report, the FAA team recommended applying a paint treatment on each side of the taxiway in a triangular pattern to make the taxiway appear serpentine; this paint would signal to pilots on approach that the taxiway is not a runway. The team's report includes pictures taken on final approach to taxiway T at SeaTac that depict this black triangular paint treatment. During dry surface conditions, the triangular black paint treatment appears to be effective in signaling that the taxiway is not a runway. However, the Board notes that the pictures in the report were not actual photographs of the taxiway after application of the treatment, but rather a simulation (that is, a computer-generated overlay) of the triangular black paint treatment.

After the report's completion, the FAA performed a limited test of paint types and colors applied to the taxiway shoulder by SeaTac. Airport personnel painted black, pastel green, and gray paint, and a black pavement seal, on the faded black asphalt shoulder of taxiway T, but did not paint on the concrete surface of the taxiway itself. The FAA conducted several flight tests to observe the paint visibility. However, the paint strips created markedly less contrast than would be expected on the lighter-color concrete surface because the paint had been applied only within the faded black asphalt shoulder area of the taxiway. In addition, the test had been performed only on 150-foot by 25-foot rectangular sections located on the asphalt shoulder of the taxiway rather than on the entire length of the taxiway. When members of the test team (including a Safety Board representative) were unable to clearly identify the painting in the asphalt shoulder areas of taxiway T, the FAA concluded that painting on the taxiway itself would also be ineffective because the markings would not be visible to pilots during wet surface and glare-out conditions.

The Safety Board is concerned that the FAA tested only the faded black asphalt shoulder areas rather than the taxiway itself. Further, two aspects of this test procedure raise questions about the FAA's conclusion. Taxiway T is concrete, and any paint ultimately applied to it would logically be of a dark color, resulting in good contrast. The test strips, however, consisted of dark-colored paint applied to faded black asphalt, which would not provide as good a contrast. In addition, because the test had been performed only on smaller sections, the treatment was less noticeable from the air. The Safety Board believes that the FAA's test procedure did not test the specific actions recommended in A-04-48, which have proven effective elsewhere, before declaring them ineffective.

Further, the Safety Board is aware that the FAA team developed an effective alternative to paint, using taxiway grooving that is designed to cause the taxiway itself to appear serpentine.

However, the grooving used for the test sequence was not the standard grooving used on runway surfaces (1/4 inch wide by 1/4 inch deep, with 1 1/2 inch center-to-center spacing) and, therefore, did not accurately portray the contrast expected from standard grooving. The Safety Board believes the abbreviated flight test of the approximately 750-foot section of shallow grooving at SeaTac was inadequate to determine whether standard grooving would be effective in creating this serpentine design. Safety Board staff's review of the flight test video revealed that the shallow grooving was conspicuous enough to suggest that standard grooving would create a distinct contrast. However, based on FAA airport staff's limited flight test of this less-conspicuous grooving, the FAA concluded that the grooving treatment, as recommended in the FAA team's study, would not be effective, and the FAA told SeaTac not to continue the grooving project.

The Safety Board believes that an effective measure would be to combine the triangular paint and the grooving (that is, paint the grooves black) such that, in dry conditions, pilots may visually detect the painted serpentine pattern and, during wet conditions, the grooving would create the serpentine pattern seen in the flight test video. However, the Safety Board was informed by the FAA that it did not plan to do anything further to taxiway T until after completion of the research recommended in Safety Recommendations A-04-49 and -50.

Further, the FAA informed Safety Board staff that it would instruct other airports that have marked their taxiways with serpentine lines and/or wording such as *TAXI ONLY* and/or *TAXIWAY* to remove those "non-standard markings." The Safety Board believes that data provided by these airports has shown that serpentine lines and the painted word *TAXIWAY*, while non-standard, have proven effective at reducing taxiway landings and should not be removed. The Safety Board is aware that the FAA has not conducted any flight tests of the existing serpentine marking prior to instructing these airports to remove the "non-standard" markings or determining the markings to be "ineffective."

The Safety Board believes the taxiway T situation at SeaTac is a serious problem that has the potential to contribute to or cause a major accident, yet the FAA is unwilling to take any interim steps to mark the taxiway. The Board notes that the cost of the paint for the specific actions in this recommendation is negligible. The FAA's team proposed an effective alternative using pavement grooving, but the testing done was questionable; however, using the test results, the FAA dismissed the alternative. The Safety Board urges the FAA to reconsider its position on this issue. Pending consideration of the Board's comments, Safety Recommendation A-04-48 is classified "Open—Unacceptable Response."

A-04-49

Conduct research to establish marking standards for use on taxiways at airports with a recurring taxiway landing problem. The research and standards should include, but not be limited to, the dimensions, placement, and conspicuity of such markings under various weather, lighting, and visibility conditions.

A-04-50

Revise Advisory Circular 150/5340-1H, "Standards for Airport Markings," based on the findings of the research conducted in response to Safety Recommendation A-04-49.

The Safety Board notes that the FAA has indicated it will (1) research means to address the SeaTac taxiway T issue and the general issue of confusing runways and taxiways and (2) make appropriate modifications to its guidance material on airfield marking when this research is completed. The Safety Board requests that it be informed of the timeframe for completing the research. Pending completion of the research, publication of the findings, and incorporation of this material into FAA guidance on airfield markings, Safety Recommendations A-04-49 and -50 remain classified "Open—Acceptable Response."

Sincerely,

Original Signed By:

Mark V. Rosenker
Acting Chairman

cc: Ms. Linda Lawson, Director
Office of Safety, Energy, and Environment
Office of Transportation Policy