



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: August 20, 2003

In reply refer to: A-03-37 through -39

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

During the first few months of each calendar year, the National Transportation Safety Board develops a set of aviation accident statistics that summarize the previous year's aviation safety indicators in the context of the preceding 20 years. This information includes number of accidents, estimates of aviation activity (e.g., departures, flight hours), and accident rates for several commercial and general aviation segments of the industry. Within the commercial segment, the Safety Board reports on the following operational categories:

- scheduled air carrier operations conducted under 14 *Code of Federal Regulations* (CFR) Part 121,
- nonscheduled operations conducted under 14 CFR Part 121,
- scheduled operations conducted under 14 CFR Part 135, and
- nonscheduled operations conducted under 14 CFR Part 135.

The accident rates and statistics provided in these reports form the basis for assessing the state of aviation safety in the United States and are frequently cited by Congress, government agencies, the aviation industry, and others. For example, Safer Skies, a joint FAA/industry initiative established in 1998, uses aviation safety data provided by the Safety Board to identify safety improvements and to evaluate safety interventions. Valid activity data are necessary to compare the incident and accident rates for different aircraft types and types of operations, and to assess the impact of regulatory initiatives.

Three of the four segments of commercial aviation listed above—scheduled and nonscheduled Part 121 air carriers and scheduled Part 135 carriers—are required to regularly report revenue flight activity to the Department of Transportation (DOT) based on 14 CFR Part 241.¹ This information is maintained by the Bureau of Transportation Statistics (BTS) and is aggregated by the FAA Systems Process Audit staff (AFS-40) to produce annual summary reports of flight activity, which the Safety Board uses to calculate accident rates.

Unlike all Part 121 air carriers and scheduled Part 135 carriers, nonscheduled Part 135 operators are not currently required to report flight activity for their revenue flights—even

¹ Part 121 operators report activity on a monthly basis using Traffic Reporting System Form 41, Schedules T100 and T-100(f); scheduled Part 135 operators report quarterly using BTS Form 298-C, Schedules A-1 and T-1.

though this segment of commercial operations, possibly the largest of the four commercial segments,² accounts for 50 to 60 percent of all commercial accidents each year. To determine flight activity for this group of operations, the FAA uses the General Aviation and Air Taxi Activity (GAATA) Survey, conducted by the Office of Aviation Policy. The GAATA Survey was designed in 1978 to gather information from owners of general aviation and air taxi (that is, nonscheduled Part 135) aircraft operators regarding flight hours, avionics, base location, and primary use. Nonscheduled Part 135 aircraft comprise a small portion of the aircraft covered in the GAATA Survey. In 2001, aircraft used in nonscheduled Part 135 operations accounted for approximately 1.9 percent of the fleet targeted by the survey.³

To conduct the GAATA Survey, the FAA sends questionnaires to aircraft owners selected from its Civil Aviation Registry using a stratification procedure based on aircraft type and geographic region. For the 2001 survey, questionnaires were sent to the registered owners of 30,886 aircraft, and completed forms were returned for 16,432 aircraft (a 53.9 percent response rate⁴). The small proportion of nonscheduled Part 135 operators in the sample, combined with the low survey response rate, yields activity information that poorly represents actual activity for nonscheduled Part 135 operations.⁵ As a result of this imprecise activity estimate, the Safety Board is concerned that accident rate calculations are not accurate enough to effectively evaluate safety interventions.

In addition to the problem of sample size, GAATA Survey information typically takes 2 years to collect and process; for example, the most recently available data on FAA's Web site were collected in 2001.⁶ However, the FAA also prepares more timely estimates of flight activity for categories of aviation, including nonscheduled Part 135 operations, which the Safety Board uses to prepare preliminary accident rate calculations within the first few months of the calendar year. These estimates generally consider the number of registered aircraft over time and extrapolate reported measures from BTS or from the GAATA Survey. While calculating the 2001 preliminary activity data for the Safety Board in the spring of 2002, the FAA determined that the nonscheduled Part 135 flight hours had been underestimated. To solve this problem, the FAA used a revised method and provided adjusted estimates for the years 1992-2000. The revised activity estimate used the FAA's Vital Information Subsystem⁷ (VIS) to count aircraft assumed to be conducting nonscheduled Part 135 operations multiplied by a portion of the average number of flight hours for Part 135 operations reported on the GAATA Survey. Flight hours by aircraft were adjusted based on the number of aircraft owned by that operator; operators

² Estimates of fleet size for nonscheduled Part 135 operations vary. The GAATA Survey estimates that approximately 4,000 aircraft are involved in Part 135 operations; a recent air taxi operators study contracted for by the FAA estimated 10,547 aircraft, and the FAA Vital Information Subsystem (VIS) estimates more than 11,000. Given this range, it is difficult to make a definitive statement about the relative proportions of commercial aircraft conducting different types of operations.

³ There were 3,598 air taxis and 406 air tours in 2001 according to the GAATA Survey, Calendar Year 2001, Table 1.1, <http://api.hq.faa.gov/Gasurvey/index.htm>.

⁴ The sample frame included 414 non-qualified samples that were not included in the response rate calculation.

⁵ FAA (2003): GAATA Survey, Calendar Year 2001, Table 3.2, states that the percent standard error for air taxis is 12.7 and for air tours it is 27.6. By comparison, the total percent standard error for general aviation and air taxi hours flown by actual use is 2.0.

⁶ FAA (2003): GAATA Survey, Calendar Year 2001.

⁷ VIS is an FAA database used to track commercial and government operations certificates.

with 1 to 2 aircraft were estimated to fly air taxi operations 25 percent of the time, operators with 3 to 4 aircraft were estimated to fly air taxi operations 50 percent of the time, and operators with 5 or more aircraft were estimated to fly air taxi operations 80 percent of the time.⁸ It should be noted that the 2001 VIS showed 11,072 aircraft operating under nonscheduled Part 135, which was more than double the GAATA Survey's estimate of 4,019 aircraft. Based on the revised method, the resulting activity estimates were substantially different from previous years, with an average increase in flight-hour activity of 43 percent per year.

Based on the foregoing, the Safety Board concludes that the FAA should improve the methods it uses to estimate nonscheduled Part 135 activity, noting that a revision may not be considered an improvement unless it is validated against some known information. Although the FAA did revise its method for estimating air taxi activity, it did not validate its findings, either by requiring nonscheduled Part 135 operators to report activity or by conducting a full census survey. As a result, the Safety Board cannot be certain that the FAA's revision is accurate.

Background

As early as 1972, the Safety Board published its concerns regarding the adequacy of FAA data generated for nonscheduled Part 135 operations. In its *Air Taxi Safety Study*,⁹ the Board recommended that the FAA redraft 14 CFR Part 135 to recognize that commuter air carrier operations and air taxi charters are separate entities. The safety study also recommended that the Civil Aeronautics Board "require all air taxi operators so classified under 14 CFR Part 298 of the Federal Aviation Act of 1958, to report the number of passengers carried, the hours flown and miles flown, and the number of departures in revenue operations." Although the Federal Aviation Regulations were eventually changed to recognize the differences between commuters and air taxis, nonscheduled Part 135 operators (air taxis) have never been required to report activity.

In 1993, Safety Board staff again suggested that nonscheduled Part 135 operators be required to report revenue flight-hour activity, at least annually. This suggestion was made in the context of a response to a redesign of the (then-named) General Aviation Activity Survey. Recognizing that rulemaking would be required, the correspondence suggested that a separate, 100-percent survey of nonscheduled Part 135 aircraft be initiated until rulemaking was complete. FAA's response, in a letter received by the Safety Board on September 9, 1993, acknowledged that, although estimates of on-demand air taxi activity were of marginal quality, resources to complete an additional survey each year were not available.

In 1998, DOT's Office of the Secretary solicited public comments on the collection and management of aviation data through an Advance Notice of Proposed Rulemaking (ANPRM).¹⁰ In response to the ANPRM, the Safety Board suggested that the rulemaking include provisions to

⁸ Activity calculations were (number of aircraft) by (percentage category based on size of operator) by (average flight hour per aircraft from 1999 GAATA Survey). The analytical basis for stratifying operators and assigning percentage of operations was not made publicly available.

⁹ National Transportation Safety Board, *Air Taxi Safety Study*, PB-213 617 (Washington, D.C.: 1972).

¹⁰ Department of Transportation, Office of the Secretary, "Aviation Data Requirements Review and Modernization Program," Federal Register, Volume 63, Number 135 (July 15, 1998).

implement an airline activity data collection system. The recommended data collection system would have required submission of several activity indicators for revenue flights (flight hours, miles flown, departures, passengers enplaned, and passenger-miles flown) from every U.S. air carrier, including all air taxis and commuters.

The subsequent Notice of Proposed Rulemaking (NPRM)¹¹ narrowed the scope of the proposed rule by focusing specifically on modification of the T-100/T-100(f) Traffic Reporting System. In response to the Safety Board's suggestion to implement an activity data collection system that included air taxis, the DOT Office of the Secretary agreed that a need existed to collect data from on-demand operators. However, the NPRM also stated—

the Department believes Schedule T-100 is not the appropriate vehicle for collecting this type of information. The Office of Airline Information would not, on a monthly basis, be able to properly edit and process detailed traffic reports from thousands of on-demand operators. Rather, the Department believes there should be a separate rulemaking to address the issue of collecting data from on-demand air taxis.

No rulemaking resulted from the Board's suggestion to include nonscheduled Part 135 operations in the Traffic Reporting System, and the FAA continues to estimate that activity using the GAATA Survey.

In a 2001 safety report on public use aircraft,¹² the Safety Board identified important weaknesses related to the reliability and validity of flight-hour estimates generated using data from the GAATA Survey. The Board concluded that the survey produces imprecise flight-hour estimates due to several factors, including the following:

- The sampling error in the survey is relatively high, especially for certain groups of respondents that are few in number. This in turn leads to increased error in the activity estimates. For example, the percent standard error for air taxi operations is four times higher than that for personal use operations.
- To a great extent, the quality of survey responses depends on the record-keeping policies and memories of aircraft owners and, in some cases, their willingness and ability to obtain needed information from the pilots who fly their aircraft.
- The reporting matrix on the survey does not effectively separate the administrative purpose of flight (e.g., personal business, corporate) from the actual flying activity performed (e.g., transport of passengers, flight instruction, aerial observation).¹³

¹¹ Department of Transportation, Office of the Secretary, "Air Carrier Traffic and Capacity Data by Nonstop Segment and On Flight Market," Federal Register, Volume 66, Number 167 (August 28, 2001).

¹² National Transportation Safety Board (2001). *Public Aircraft Safety*, SS--01-01 (Washington, D.C.: 2001).

¹³ Changes to the 2002 survey revised purpose of flight categories; however, as of mid-2003, that survey had not been executed due to a lack of funding.

- The Civil Aviation Registry, from which GAATA Survey respondents are sampled, does not contain current address information for all aircraft. In 2001, at least 20 percent of the mailed questionnaires could not be completed because of registry errors (for example, Postmaster addresses were no longer valid, the aircraft selected for the sample had been sold or destroyed, or the air carrier was no longer operating). Recent meetings between Safety Board and the Registry indicate that the number of valid address records has increased, but address errors still represent a source of sampling error for the GAATA Survey.

In addition to its assessment of GAATA limitations, the Safety Board's Public Aircraft Safety Report recommended that the FAA "identify and implement methods independent of the General Aviation and Air Taxi Activity Survey that can be used to check the accuracy of nonairline flight-hour estimates. (A-01-74)." Although this recommendation was made in the context of improving safety data for public use aircraft, it recognizes limitations with the flight activity survey that also apply to nonscheduled Part 135 aircraft activity.

The Safety Board is not alone in its determination that nonscheduled Part 135 data are inadequate. In April 2000, a joint government/industry committee, the General Aviation Data Improvement Team (GADIT), was organized to improve available measures and estimates of general aviation activity. This group is one component of the General Aviation Joint Steering Committee of the Safer Skies program. Because nonscheduled Part 135 activity data are collected using the GAATA Survey, issues pertaining to the improvement of air taxi data were also discussed by the GADIT. The group's report included the following possible improvements related to nonscheduled Part 135 activity data: (1) have FAA inspectors collect data from Part 135 operators; (2) require a DOT report from Part 135 operators; (3) require flight plans and collect data from Part 135 operators, and (4) conduct a telephone survey of Part 135 operators to determine monthly hours. Of these possible improvements, only the suggestion to have FAA inspectors collect data from Part 135 operators was presented as a final recommendation from the group in their Activity Task Report dated June 15, 2001. An implementation plan for this suggestion has not been developed.

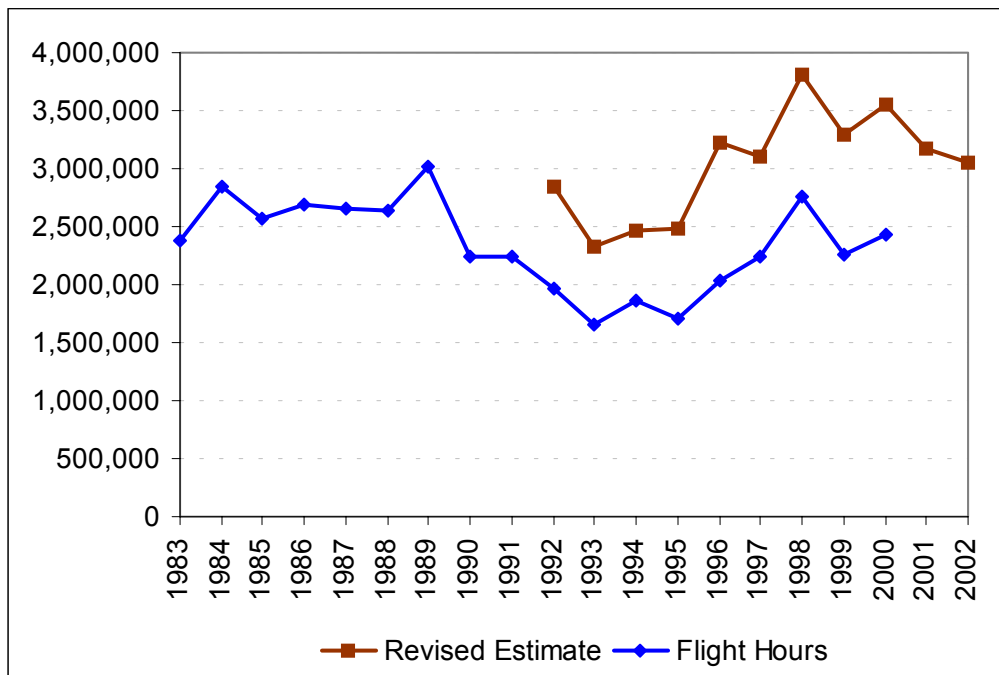
Recently, a study of air taxi operators mandated by Congress under Section 735 of the FAA Reauthorization Bill has demonstrated the impact of using various approaches to estimate activity data for Part 135 operations.¹⁴ The study integrated diverse data sources but could not necessarily align all measures. One analysis presented in the study compared the FAA's traditional method of estimating nonscheduled Part 135 activity to another method using the FAA's Operating Specification Subsystem (OPSS), a "real time data system that tracks operators registered with the FAA that have filed the required insurance information with the DOT." Using the OPSS, the study produced an estimate of 3.4 million flight hours, 10,547 aircraft, and 2,842 operators in 1999 compared to the approximately 2.4 million flight hours and 4,569 aircraft reported in the 1999 GAATA Survey for nonscheduled Part 135 operations.¹⁵ Based on

¹⁴ *Part 135 Air Taxi Operators (ATO) Study: Report to Congress Under Section 735 of the Wendell H. Ford Aviation Investment and Reform Act for the 21st Century* has not been released. The study was conducted by GRA, Incorporated. References to the study results are based on an initial briefing of project results (September 10, 2001) and a briefing to industry (November 1, 2001).

¹⁵ The GAATA Survey does not report number of operators.

that comparison, the study concluded that existing estimates of air taxi hours flown are likely too low, which biases accident rate estimates. However, the study also concluded that data limitations precluded development of a precise analysis of the air taxi industry.

In the spring of 2002, when the FAA produced its revised estimate for nonscheduled Part 135 flight activity, they employed some aspects of the air taxi operator's study. The FAA's 2001 revised estimate is therefore comparable to the study's estimate of flight activity. However, without comparing these methods to an independent criterion measure, such as data collected from a known sample of aircraft, it is difficult to verify either method. The following chart illustrates the effect of the revised nonscheduled Part 135 flight activity estimate, retroactively applied back to 1992.



In summary, certain aspects of the FAA's current procedures for estimating nonscheduled Part 135 flight activity are problematic. The problems were demonstrated by the estimates produced in the spring of 2002. First, use of a revised estimating method, which resulted in a substantial increase in estimated flight activity and a decrease in accident rates, was not validated. Second, neither the FAA's original method for calculating this important number, nor its revised method, appears to have a verifiable, empirical basis. Without an accurate, verifiable activity measure, such as data reported from nonscheduled Part 135 operators or a full census survey, neither the FAA nor the Safety Board can calculate safety data for the various segments that comprise nonscheduled Part 135 operations (e.g., passenger, air cargo, air ambulance).

Based on these concerns, the Safety Board believes that the FAA should require nonscheduled Part 135 operators to report activity data on an annual basis to include total hours flown, revenue flight hours, revenue miles flown, and number of departures by category/class of aircraft; to identify for each aircraft the proportion of flight time operations that are involved in sightseeing, air medical transport, passenger transportation, and cargo-only transportation; to

report for cargo operations freight ton-miles available and freight ton-miles flown; and to report for passenger service operations seat-miles available and passenger miles flown.

Estimates of flight activity will still need to be prepared prior to the processing of reported data to support timely calculations of safety rates, but the reported data will provide a criterion to validate estimates of nonscheduled Part 135 flight activity.

Further, because safety rate calculations are used by the Safety Board, the FAA, and throughout industry to evaluate operational risk over time and to assess the effectiveness of safety interventions, it is important that analysts can correctly use these rates in their calculations. Accordingly, any changes in the estimation methodology must be fully documented, including the designation of a statistical confidence interval to qualify the “goodness” of the estimate. For example, realizing that few people knew that the FAA had revised its estimate of nonscheduled Part 135 flight activity for 1992-2002, the Safety Board made note of the revision on its Web site to prevent multi-year trending without consideration of the change in the estimating methodology. In addition, because the revised estimate used a stratification procedure based on the size of the business operator (i.e., based on the number of aircraft owned by an operator), analytical results looking at small or large operators might be biased.¹⁶ Given these considerations, the Safety Board believes that the FAA should develop, validate, and document an unbiased method for generating and revising activity estimates based on nonscheduled Part 135 operations.

Finally, so that timely accident rates can be calculated, the Safety Board believes that the FAA should, each January, publish preliminary estimates of all activity data for the preceding year for scheduled and nonscheduled Part 121 operations, scheduled and nonscheduled Part 135 operations, and general aviation operations.

The FAA recently began the process for a comprehensive regulatory review of 14 CFR Parts 135 and 125.¹⁷ The Part 135/125 Aviation Rulemaking Committee offers a timely opportunity for the FAA to address both the need and the method for more accurate flight activity estimates for nonscheduled Part 135 operations. The Notice of Regulatory Review indicates that the FAA is considering establishing a number of work groups, and it would seem appropriate for the Operations Work Group to consider the issue of flight activity reporting. As a means of providing input to the regulatory review, a copy of this recommendation letter has been sent to the FAA docket file associated with that rulemaking.

Recommendations

Therefore, as a result of its work with accident data and activity data to calculate aviation safety rates, the National Transportation Safety Board recommends that the Federal Aviation Administration:

¹⁶ The stratification method favors operators with five or more aircraft. An analysis of operators with only one aircraft used for air taxi operations could be biased if the flight activity estimate were not used correctly.

¹⁷ Federal Register, Volume 68, Number 22, pg. 5487-5489, February 3, 2003, and FAA Order 1110, Part 135/125, Aviation Rulemaking Committee.

Require nonscheduled Part 135 operators to report activity data on an annual basis to include total hours flown, revenue flight hours, revenue miles flown, and number of departures by category/class of aircraft; to identify for each aircraft the proportion of flight time operations that are involved in sightseeing, air medical transport, passenger transportation, and cargo-only transportation; to report for cargo operations freight ton-miles available and freight ton-miles flown; and to report for passenger service operations seat-miles available and passenger miles flown. (A-03-37)

Develop, validate, and document an unbiased method for generating and revising activity estimates based on nonscheduled Part 135 operator surveys or reporting. (A-03-38)

Each January, publish preliminary estimates of all activity data for the preceding year for scheduled and nonscheduled Part 121 operations, scheduled and nonscheduled Part 135 operations, and general aviation operations. (A-03-39)

In your response to the recommendations in this letter, please refer to Safety Recommendations A-03-37 through -39.

Chairman ENGLEMAN, Vice Chairman ROSENKER, and Members CARMODY, GOGLIA, and HEALING concurred with these recommendations.

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Chairman

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