USE OF THE
NATIONAL AIRSPACE SYSTEM

Federal Aviation Administration

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Memorandum

U.S. Department of Transportation
Office of the Secretary
of Transportation
Office of Inspector General

Subject: INFORMATION: Use of the National Airspace System
Federal Aviation Administration
Report Number CR-2008-028

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Economic Analysis

Reply to Attn. of: JA-50

To: Acting Federal Aviation Administrator

This report presents the results of our audit of the use of the National Airspace System (NAS). The House Committee on Transportation and Infrastructure requested this audit to provide policymakers with a common understanding of who uses the NAS as they consider how to finance the aviation system into the future. Disagreement among stakeholders regarding their use of the NAS makes it difficult to evaluate Federal Aviation Administration (FAA) financing alternatives.

Our specific objectives were to determine: (1) how different groups use NAS elements, (2) how that usage contributes to aviation congestion, (3) whether NAS users can be grouped in a meaningful manner based on their usage of the system, and (4) how good a proxy is jet fuel for use of FAA air traffic services.

We examined FAA fiscal year (FY) 2005 flight activity data[1] and other data regarding the use of FAA tower, terminal, and en route services by different aircraft types and user groups. We also assessed the relationship between jet fuel consumption and use of FAA's air traffic control services in several representative markets. A detailed discussion of our scope and methodology is included in Exhibit A. We conducted this audit in accordance with generally accepted Government Auditing Standards prescribed by the Comptroller General of the United States. We did not systematically audit or validate the data in any of the

[1] FY 2005 is the latest flight activity data available from FAA that contains the corrected identification of aircraft engine type and operator classification necessary to undertake this analysis.

databases. However, we conducted trend analyses and checks of the data to assess reasonableness and comprehensiveness. We also spoke with managers responsible for maintaining the databases to understand any noted inconsistencies and attempt to resolve them. Based on our understanding of the data through discussions with knowledgeable agency officials, as well as checks for obvious errors in accuracy and completeness, we determined that the data was sufficiently reliable for our purposes.

BACKGROUND

Currently, NAS users pay the vast majority of FAA's costs through ten aviation-related excise taxes, including taxes on airfares, fuel and cargo. Almost 68 percent of the revenue from these taxes in FY 2006 derived from the 7.5 percent ticket tax and the then $3.30 segment tax in calendar year (CY) 2006.[2] All of the aviation excise taxes supporting FAA's programs will expire on June 30, 2008.[3] Congress is currently deliberating on whether to continue, replace, or modify these excise taxes as part of its ongoing effort to reauthorize the FAA.

Aviation stakeholder groups strongly disagree on their relative use of the aviation system and contribution to aviation congestion. Air carrier representatives argue that non-air carriers are significant NAS users and as such contribute to aviation congestion and the resultant system delays. Non-air carrier representatives, particularly general aviation and "business jet" groups, claim that they do not make significant use of the NAS, are marginal users to the system, and do not contribute to aviation congestion because they avoid congested airports and airspace.

This disagreement on NAS usage leads to similar disagreements as to the relative share of FAA's costs that each stakeholder group should pay.[4] Air carriers claim that they are being unfairly required to pay more than their use of the NAS and FAA services would justify. As a result, they claim that they are subsidizing non-air carriers', in particular business jet operators', NAS usage. Conversely, general aviation and business jet operators contend they are paying their fair share for their relative use of the system.

Air Carriers *are scheduled and charter airlines, usually operating jet or turboprop aircraft with more than 30 seats.*

Non-Air Carriers *are general aviation, fractional (shared) ownership, and on-demand air-taxi operators using aircraft with less than 30 seats.*

[2] The segment tax rose to $3.40 in calendar year 2007.

[3] These taxes were scheduled to expire on September 30, 2007. Congress extended them through a series of Continuing Resolutions, the most recent of which expires on June 30, 2008.

[4] Another factor relevant to the policy decision on the amounts that user groups should pay for FAA services is the cost of providing individual FAA services at different locations using different staff and equipment. This report does not address the cost of providing individual services.

On March 21, 2007, we testified[5] on the use of the NAS before the House Transportation and Infrastructure Committee's Aviation Subcommittee; our testimony also included our observations on the Administration's FAA financing proposal.[6] In lieu of the Administration's FAA financing proposal, the Senate Commerce Committee passed the Aviation Investment and Modernization Act of 2007 (S. 1300). In addition, the Senate Finance Committee, which has jurisdiction over the aviation excise taxes, passed its title of the FAA financing legislation. However, the Senate as a whole has not passed a long-term FAA program reauthorization and financing bill at this time. The House passed the FAA Reauthorization Act of 2007 (H.R. 2881), which incorporates both program authorization and tax provisions.

The Administration's proposal would alter the structure of fees and taxes paid by air carriers and non-air carriers, reflecting FAA's conclusion that the revenues recovered from users should be more closely linked with the cost of providing air traffic services. The Senate Commerce and Finance Committee proposals would change the structure of fees and taxes of non-air carriers to a lesser degree. The House proposal fundamentally maintains the current structure of taxes among the user groups.

RESULTS IN BRIEF

We found that air carriers and non-air carriers, including general aviation and business jet operators, all make sufficient use of the NAS so as to materially contribute to FAA's costs and congestion in general. We also found alternative NAS user groupings that are more homogeneous in terms of their use of FAA services than the groupings reflected in the current aviation excise tax structure. Finally, we found that jet fuel consumption is a better proxy for the use of the NAS than the current aviation excise taxes, but it does not measure whether air traffic control services are used, nor does it distinguish between the types and complexities of services used.

All Aircraft Groupings by Engine or Operator Type Make Significant Use of the NAS

We examined use of the NAS in two ways: by aircraft powered by different engine type and by aircraft flown by different operator types. We found that all of the groups examined made significant use of FAA air traffic control services.

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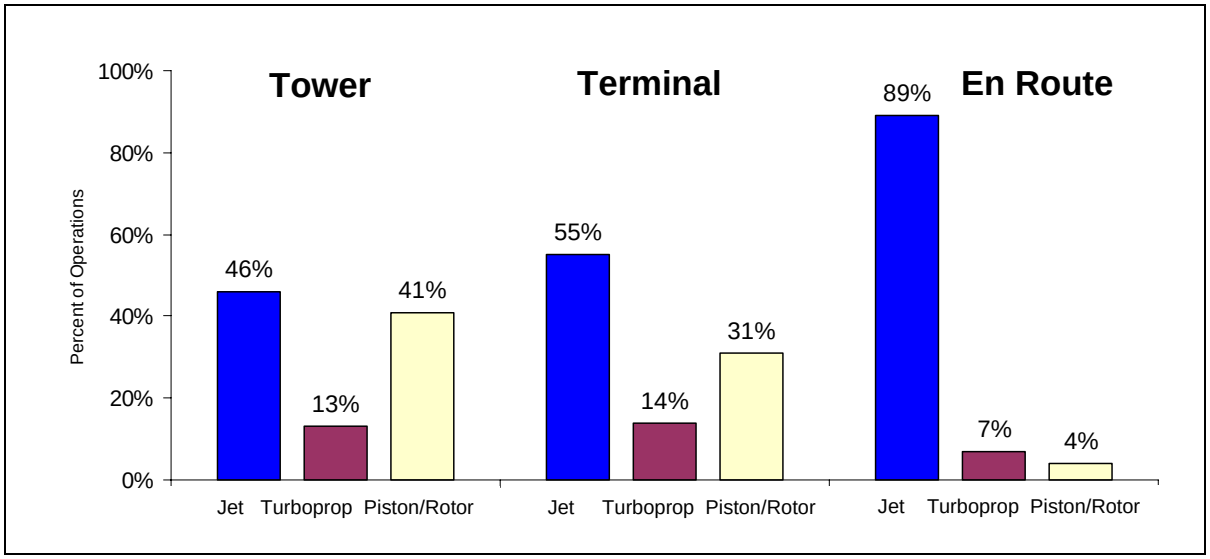
[5] OIG Testimony Number CC-2007-034, "FAA's Financing Proposal," March 21, 2007. OIG reports and testimonies are available on our website: www.oig.dot.gov.

[6] The Next Generation Air Transportation Financing Reform Act of 2007 (S. 1076).

Piston Engine Airplanes and Rotorcraft Make Significant Use of the NAS. While jets and turboprops were the major users of the NAS, piston engine airplanes and rotorcraft accounted for 41 percent of FAA tower services[7] and 31 percent of FAA terminal area control services in FY 2005 (see figure 1). However, since piston engine airplanes and rotorcraft typically operate at lower altitudes, they only utilized 4 percent of en route services.

Figure 1. Use of Air Traffic Control Services by Aircraft Type - FY 2005

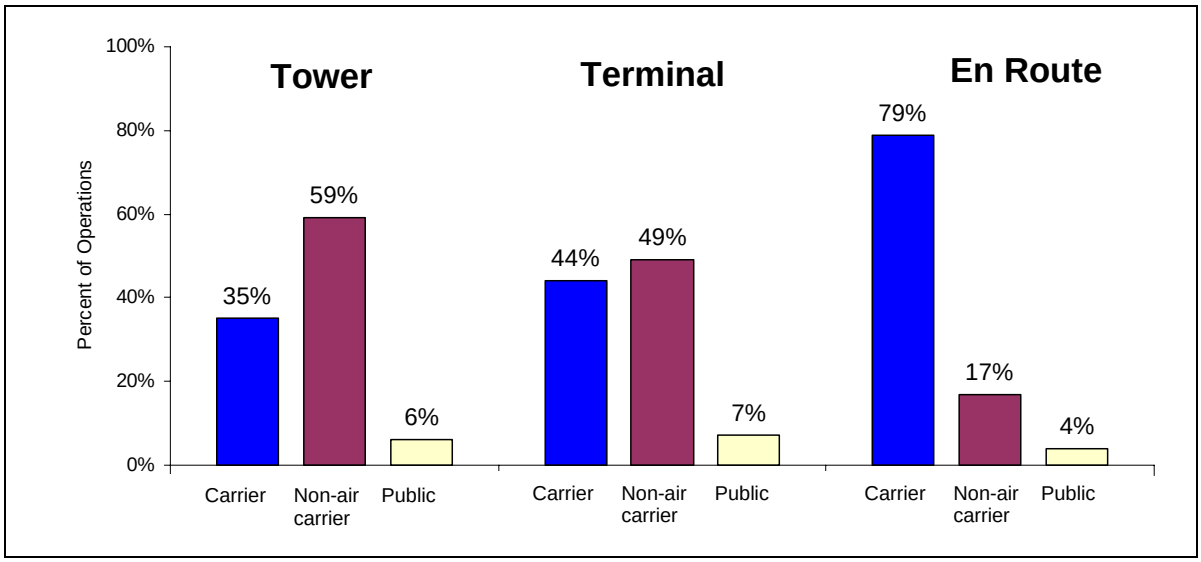


Source: OIG Analysis of FAA Stakeholder Data Package

Non-Air Carriers Make Significant Use of the NAS. Non-air carriers were the major users of FAA tower and terminal area control services in FY 2005, accounting for 59 percent and 49 percent respectively of these services. However, air carriers were the major users of FAA en route services, accounting for 79 percent of the total (see figure 2 on the following page).

[7] FAA services were measured in terms of operations, i.e., an aircraft handled by an air traffic control facility. For a tower, this was a landing or take-off. For terminal area radar, this was an instrument approach, departure or other control within the terminal airspace. For en route, this was a mile flown under positive en route control.

Figure 2. Use of Air Traffic Control Services by Operator Group - FY 2005



Source: OIG Analysis of FAA Stakeholder Data Package

We found that non-air carriers tend to avoid large primary metropolitan airports. Overall, at the 26[8] large primary airports we examined, air carriers accounted for 93 percent of all operations. Operations by non-air carriers at these airports ranged from as little as 1 percent to as high as 20 percent. However, we also found that non-air carriers have significant operations at the most active towers in the country (as determined by number of operations). More than half (53 percent) of non-air carrier operations occurred at the top third (162) most active towered airports (see table 4 on page 10). Finally, 77 percent of all operations at the two-thirds of towers with the lowest activity were attributable to non-air carriers.

Business Jets' NAS Usage Is Considerable. FAA does not track business jets as a separate NAS user group. However, we disaggregated FAA's data in two different ways that shed light on the current debate among stakeholder groups representing air carriers and business jet operators about business jets' NAS usage. A broader categorization that approximates business jets is non-air carrier jets (jets operated by corporations, individuals, and air taxis and under fractional or shared ownership arrangements). These jets accounted for 12 percent of tower and 13 percent of terminal area control services in 2005. In comparative terms, non-air carrier jets use of tower and terminal area control services is about one-third of air carrier jets and turboprops. A narrower categorization of business jets is general aviation jets, which excludes air taxis and fractionals. These accounted for

[8] Four of the 30 large primary airports were not included in this analysis. Washington Reagan is general aviation restricted. The data for Minneapolis-St. Paul was incomplete. The data for San Diego was not provided, and Honolulu is geographically unique.

9 percent of tower and 7 percent of terminal area control services in 2005 (see tables 1 and 2 on pages 8 and 9).

Both Air Carriers and Non-Air Carriers Contribute to Aviation Congestion

We examined congestion[9] at several of the most active towers, terminal radar approach control (TRACON) facilities, and en route centers. We found that air carriers accounted for the majority of activity and congestion at the 26 large primary metropolitan airports, with non-air carriers contributing, but to a far lesser degree. Air carriers and non-air carriers contributed to congestion at the terminal control areas we examined. For example, non-air carriers accounted for 20 to 30 percent of the peak level of instrument approach operations at the New York TRACON (see figure 5 on page 14). Both commercial and general aviation operators contributed to congestion at the heavily used en route centers we examined. For example, general aviation operations accounted for 18 percent to 23 percent of operations at the Cleveland en route center during peak times of the day (see figure 6 on page 15).

NAS Users Can Be Grouped More Homogeneously Than Reflected in the Current Aviation Excise Tax Structure

The current aviation excise taxes do not group NAS users homogeneously in terms of their use of the NAS. For example, the current tax structure groups jets used for non-commercial purposes with general aviation piston engine airplanes, although they are taxed at different rates. However, those jets are likely to have more in common (in terms of NAS usage) with commercial jets, which are taxed differently. Certain aircraft and operator types have distinct operating characteristics that could form the basis of more homogeneous groupings. Jet and turboprop aircraft have different operating characteristics than piston engine airplanes and rotorcraft. Similarly, air carrier operators have different operating characteristics than non-air carriers. Grouping users by aircraft or operator type would be more indicative of NAS usage than the distinctions inherent in the current excise tax structure.

A Tax Based on Fuel Consumption Would Approximate NAS Usage, but it Does Not Measure Use of Air Traffic Control Services

We found that a tax based on fuel consumption is a better barometer of NAS activity than the current excise taxes because it would recover costs from users

[9] We measured congestion by examining the demand for specific air traffic services at the busiest times of day. For towers, we examined arriving flight operations. For TRACONs, we examined instrument approach operations. For en route centers, we examined operations.

more in proportion to their system activity than excise taxes. For example, our examination of the Las Vegas to Los Angeles flight market found that commercial aircraft accounted for 90 percent of all aircraft activity. However, commercial aircraft paid 99 percent of the excise taxes currently collected. This share would decline to 94 percent under a fuel-only tax. However, a fuel tax is not a perfect proxy for NAS activity since fuel consumption can vary in proportion to factors unrelated to that activity, such as aircraft weight. In addition, a tax based on fuel consumption neither measures whether ATC services are used nor distinguishes among the types and complexities of the services used. Similarly, the current ticket, segment, and freight waybill taxes do not vary according to the complexity or amount of ATC services consumed.

FINDINGS

All Aircraft Groupings By Engine or Operator Type Significantly Use the NAS.

We examined use of the NAS in two ways: by aircraft powered by different engine types (jet, turboprop, and piston/rotor) and by aircraft flown by different operator types (air carrier, non-air carrier, and public use). We found that none of the groups examined were marginal users of FAA air traffic control services.

Piston Engine Airplanes and Rotorcraft Significantly Use the NAS

We examined NAS usage by aircraft type and found that piston engine airplanes and rotorcraft were significant NAS users, accounting for 41 percent of tower, 31 percent of terminal, and 4 percent of en route services in FY 2005. Turboprop aircraft accounted for 13 percent of tower, 14 percent of terminal, and 7 percent of en route services. Jet aircraft were the largest users of FAA services, accounting for 46 percent of tower, 55 percent of terminal, and 89 percent of en route services (see figure 1 on page 4).

Tower *services manage ground operations on airport taxiways and runways as well as departure and landing activity in airspace within about 5 miles of the airport. The sophistication of services ranges from visual-only control, at the majority of airports, to radar and instrument landing aids at the larger air carrier airports.*

Terminal Area Control *services are provided to aircraft in an area that rises up to 10,000 feet and expands to a 30 to 50 mile radius of major airports. Aircraft are provided instrument approaches to and departures from the primary and secondary airports within the terminal control area or managed while transiting the terminal area airspace.*

En Route Control *services provide positive control for all aircraft flying above 18,000 feet and those flying below that level, but operating under Instrument Flight Rules (IFR) conditions and oceanic air traffic control for the 80 percent of controlled international airspace under FAA management.*

Non-Air Carriers Significantly Use the NAS

We also examined NAS usage by operator type and found that in FY 2005 non-air carriers exceeded air carriers in their use of FAA tower and terminal area control services, but not en route services. Non-air carriers accounted for 59 percent of tower, 49 percent of terminal, and 17 percent of en route services. Air carriers accounted for 35 percent of tower services, 44 percent of terminal, and 79 percent of en route services. Public users[10] accounted for 6 percent of tower services, 7 percent of terminal area control services, and 4 percent of en route services.

We also found that non-air carriers accounted for 93 percent of the aircraft contacts made by flight service stations in FY 2005. While general aviation operators accounted for 75 percent of the total contacts, fractionals and air taxis accounted for 18 percent of the total contacts.[11] Users of these services are mostly light aircraft operators, not airlines or corporate aircraft operators that contract for weather and flight dispatch services or employ their own staff to handle these functions.

Non-air carrier piston engine airplanes and rotorcraft were the largest users of FAA tower services in FY 2005, accounting for 40 percent of all services. Their usage of tower services was 33 percent higher than the next highest user group, air carrier jets, which accounted for 30 percent of tower service usage. Non-air carrier jets also accounted for considerable tower service usage at 12 percent (see table 1).

Table 1. Tower Services Usage – FY 2005
Percent of Tower Operations by User Category and Aircraft Type

User	Jet	Turboprop	Piston/Rotor	User Total
Air Carrier	30%	4%	1%	35%
Non-Air Carrier (General Aviation)	12% (9%)	7% (5%)	40% (38%)	59% (51%)
Public Use	4%	1%	1%	6%
Aircraft Total	**46%**	**13%**	**41%**	**100%**

Source: OIG Analysis of FAA Stakeholder Data Package
Percentages may not add due to rounding.

[10] Public users are military, governmental, and medical flight operators.
[11] Fractional operators are shared ownership arrangements, and air taxis are on-demand charter operators.

Air carrier jets were the largest users of terminal area control services in FY 2005, accounting for 38 percent of those services. Their usage was 31 percent greater than the next highest user, non-air carrier piston engine airplanes and rotorcraft, at 29 percent (see table 2). Non-air carrier jet usage of terminal area control services was 13 percent.

Table 2. Terminal Area Control Services Usage – FY 2005
Percent of Approach Control Operations by User Category and Aircraft Type

User	Jet	Turboprop	Piston/Rotor	User Total
Air Carrier	38%	5%	1%	44%
Non-Air Carrier (General Aviation)	13% (7%)	7% (3%)	29% (22%)	49% (33%)
Public Use	4%	2%	1%	7%
Aircraft Total	**55%**	**14%**	**31%**	**100%**

Source: OIG Analysis of FAA Stakeholder Data Package
Percentages may not add due to rounding.

Air carrier jets dominated the use of en route services in FY 2005, accounting for 75 percent of those services. Their usage was almost seven times that of the next largest user, non-air carrier jets, at 11 percent (see table 3).

Table 3. En Route Control Services Usage – FY 2005
Percent of Aircraft Miles Controlled by User Category and Aircraft Type

User	Jet	Turboprop	Piston/Rotor	User Total
Air Carrier	75%	3%	0%	79%
Non-Air Carrier (General Aviation)	11% (5%)	3% (2%)	4% (3%)	17% (10%)
Public Use	3%	1%	0%	4%
Aircraft Total	**89%**	**7%**	**4%**	**100%**

Source: OIG Analysis of FAA Stakeholder Data Package
Percentages may not add due to rounding.

We found that non-air carriers tend to avoid certain large primary metropolitan airports. Overall, at the 26 large primary airports we examined, air carriers accounted for 93 percent of all operations. Operations by non-air carriers at these airports ranged from as little as 1 percent to as high as 20 percent. However, we also found that non-air carriers have significant operations at the most active

towers in the country (as determined by number of operations), many of which surround large primary airports.

While 87 percent of air carrier operations were at the top third most active towers (162 airports), more than half (53 percent) of non-air carrier operations also occurred at these airports. Total activity at the top third most active towers was split almost evenly between air carrier and non-air carrier operations. Finally, 77 percent of all operations at the two-thirds of airports with the lowest activity were attributable to non-air carriers (see table 4).

Some towered airports exclusively used by non-air carrier operators are among the busiest towers in the country in terms of flight operations. Of the 40 most active towers in the country, nine are nearly exclusive non-air carrier facilities. For example, in FY 2005, Denver Centennial Airport, a reliever to Denver International Airport, had more operations than New York John F. Kennedy Airport, and Deer Valley Airport, in Phoenix, had more tower operations than either Orlando International or San Francisco International Airports.

Table 4. Operations at Towered Airports - FY 2005

% of Tower Operations / % of Carrier Operations	Air Carrier	Non-Carrier	Public
1/3 Most Active Towers	48% / 87%	50% / 53%	3% / 33%
2/3 Least Active Towers	13% / 13%	77% / 47%	10% / 67%

Source: OIG Analysis of FAA Stakeholder Data Package
Percentages may not add due to rounding.

Business Jets' NAS Usage Is Considerable

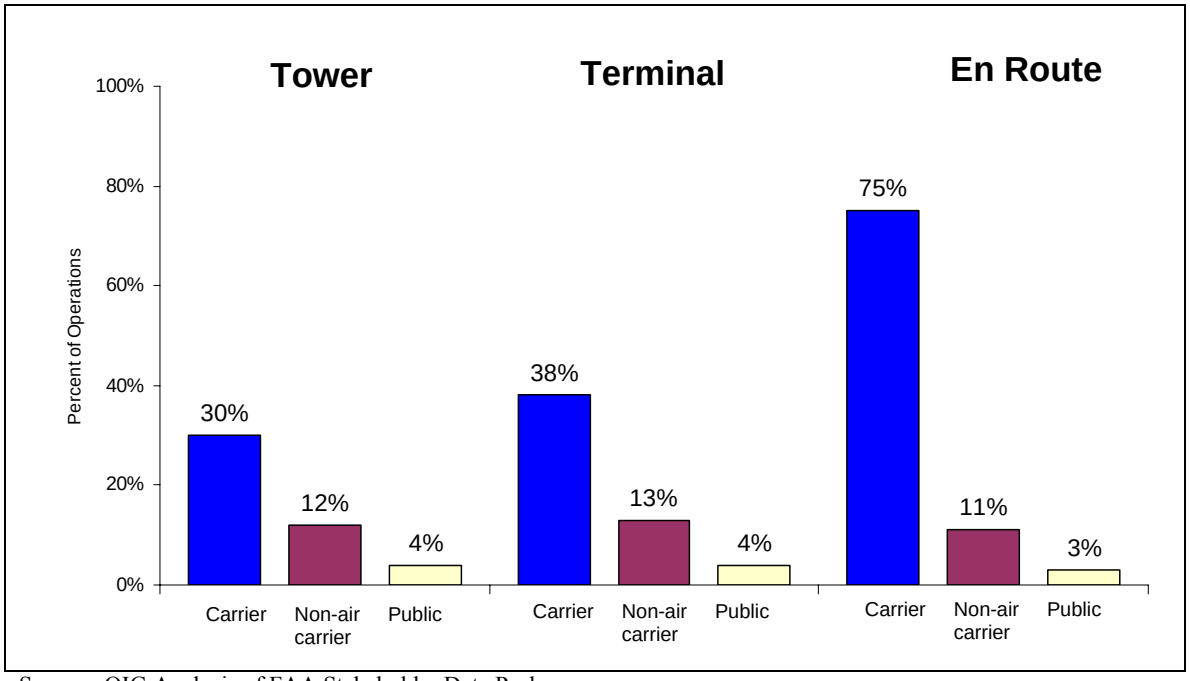
The structure of taxes on "business" or "corporate" jets has become a lightening rod in the debate regarding how to finance the FAA. Under the current system of aviation excise taxes, the same flight can be charged a significantly different amount depending upon the purpose for which the flight is made. An aircraft flown by a scheduled air carrier will be charged the 7.5 percent ticket tax and the $3.30 (CY 2006) per passenger flight segment fee. The same aircraft, privately owned, would likely impose similar costs on FAA, but would pay less than the scheduled airlines for those same services through the general aviation fuel tax.

Air carrier representatives argue that it is unfair for their passengers and themselves to subsidize these business jets. However, the National Business Aviation Association contends that only 3 percent of general aviation aircraft that are used for business purposes actually belong to Fortune 500 companies (i.e. are "corporate jets") and business aircraft tend to avoid congested primary airports in favor of reliever or business airports. As a result, these stakeholders contend that the current scheme by which business aircraft are charged for air traffic services is both fair and appropriate.

FAA does not track business jets as a separate NAS user group. This would be difficult as it requires determining whether or not a particular flight was taken for business purposes. However, we disaggregated FAA's data in two different ways that shed light on the current debate regarding business or corporate jets' NAS usage.

The first, broader categorization that approximates business jets is non-air carrier jets (jets operated by corporations, individuals, and air taxis and under fractional or shared ownership arrangements). This categorization will necessarily include a small number of jet aircraft that are owned by individuals or corporations, but used for recreational or non-business purposes. This categorization is significantly smaller than the category of "business *aircraft*" used by some stakeholder groups, which includes a significant number of piston engine airplane and rotorcraft operations. Non-air carrier jets accounted for 12 percent of tower and 13 percent of terminal area control services in 2005 (see figure 3).

Figure 3. Jet Use of Air Traffic Control Services - FY 2005



Source: OIG Analysis of FAA Stakeholder Data Package

The second, narrower categorization of business jets is general aviation jets. This narrower categorization more closely approximates "corporate jets" used by some stakeholder groups as opposed to our definition of business jets. Under this narrower definition, non-air carrier general aviation jets accounted for 9 percent of tower and 7 percent of terminal area control services in 2005. To put this in perspective, under both categorizations, these proxies for business jets' tower and terminal area control services in FY 2005 was about one-third of air carrier jets.

We did find support for the argument by representatives of business jet operators that business jets do not generally use large primary airports. As stated previously, the majority of tower operations at these primary airports are air carrier. However, business jets' use of the NAS in total is not insignificant. As we stated in our March 21, 2007 testimony, based on our analysis of NAS usage, the use of FAA air traffic services by commercial operators, general aviation operators, and public users is sufficient to warrant separate cost allocation categories. None of these groups had activity levels low enough to support a conclusion that they did not materially contribute to FAA's costs.

Air Carriers and Non-Air Carriers Contributed to Congestion

We measured congestion by examining the demand for specific air traffic services at the busiest times of day. For towers, we examined arriving flight operations. For TRACONs, we examined instrument approach operations. For en route centers, we examined operations. We found that air carriers dominate tower activity at most of the large primary metropolitan airports and were responsible for most of the congestion. Non-air carriers contributed to congestion at the busy terminal control and en route facilities we examined, and less significantly at large primary metropolitan airports.

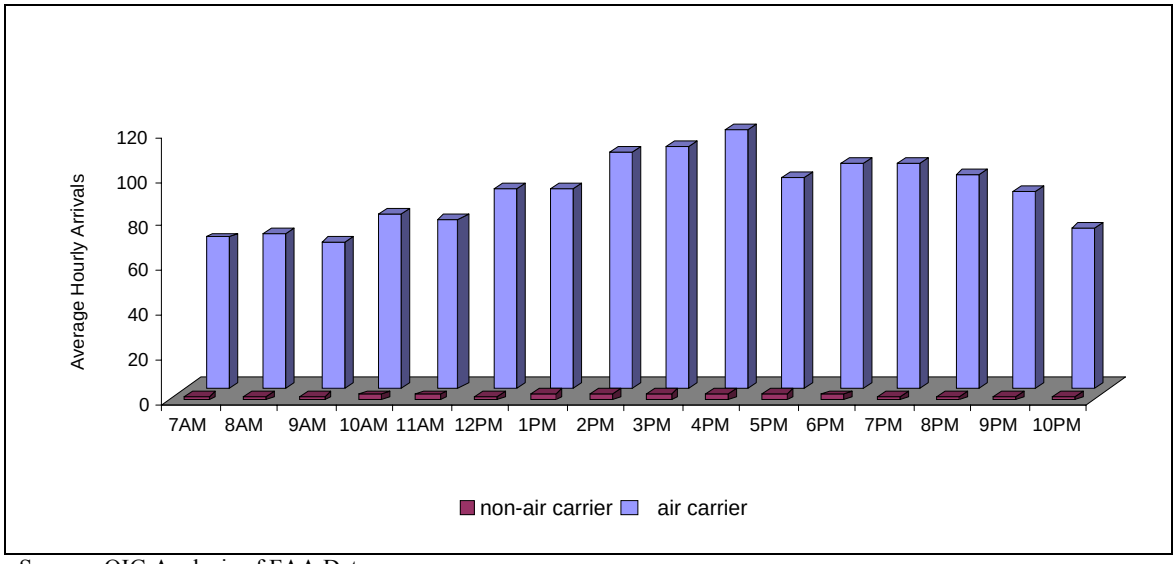
Demand for Tower Services at Large Airports

Air carriers account for the majority of tower operations at the large, primary metropolitan airports. Non-air carrier operators tend to use other airports in the metropolitan area surrounding the large primary airports. At 26 large hub (primary) airport towers, air carriers accounted for an overall average of 93 percent of operations, ranging from 78 percent to 99 percent. While non-air carriers accounted for less than 4 percent of tower operations at 11 of the 26 airports we reviewed, at other large primary airports the percent of non-air carrier operations ranged from 6 percent to as high as 20 percent of operations.

In terms of time of day operations, we found that at the three primary airports in the New York metropolitan area, hourly demand for terminal area control services increased, starting at 7:00 a.m., and peaked between 2:00 p.m. and 6:00 p.m.

These are popular arrival times for travelers returning to New York or connecting to departing international flights at Kennedy. Air carriers account for the bulk of operations during these peak time periods, and therefore account for the majority of congestion. Non-air carriers account for a small amount of this activity (see figure 4), but do exhibit similar time of day peaking, and as such, do contribute to congestion. We found similar results for the other large primary airports we examined.

Figure 4. New York Terminal Control Area - FY 2005
Arriving Flight Operations by Hour of Day
(LaGuardia, Newark, and John F. Kennedy)



Source: OIG Analysis of FAA Data

Demand for Terminal Area Services

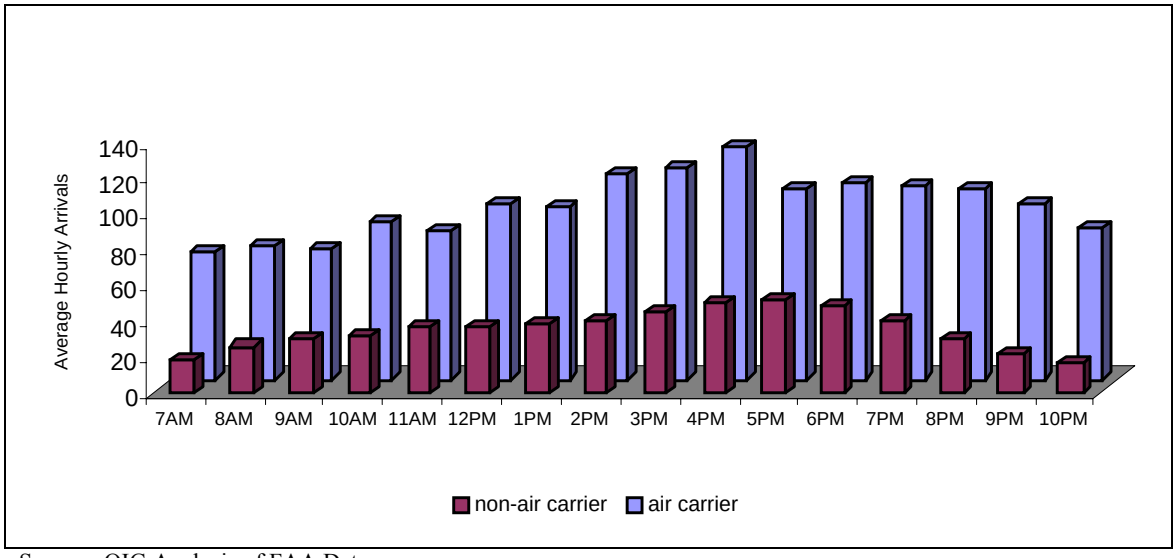
We found that both air carriers and non-air carriers contributed to congestion at the terminal area radar facilities we examined.[12] These facilities provide terminal area radar services for both the primary and secondary airports within their areas of coverage. Therefore, even though air carriers and non-air carriers may tend to use different airports in a metropolitan area, they use the same TRACON facility. For example, the New York TRACON facility handles three large primary airports,[13] primarily serving air carriers, and 12 outlying towered airports, primarily serving non-air carriers. Non-air carriers accounted for 20 percent to 30 percent of the peak level of instrument approach operations at the New York TRACON.

[12] Terminal area radar control services are provided by terminal radar approach control (TRACON) facilities located within the primary airport's control tower or in a separate facility.

[13] La Guardia, Kennedy, and Newark.

Air carrier and non-air carrier demand for terminal area radar services exhibited the same peaking during the prime travel times of the day at the metropolitan areas we examined. In other words, both air carriers and non-air carriers were competing for terminal area control services during the same busy, congested time periods. For example, at the New York TRACON, non-air carriers exhibited the same time of day peaking in demand for terminal services as did air carriers (see figure 5). We found the same patterns of terminal service use by non-air carriers, including time of day peaking, in our examination of activity at the Chicago TRACON.

Figure 5. New York Terminal Control Area – FY 2005
Instrument Approach Operations by Hour of Day
(Includes Outlying Airports)



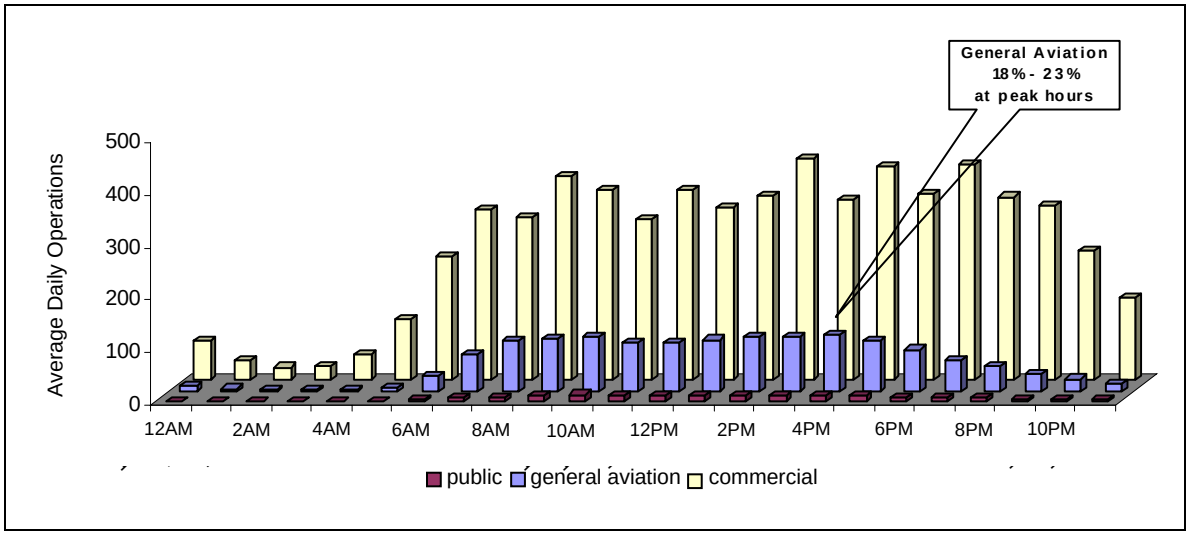
Source: OIG Analysis of FAA Data

Demand for En Route Services

We found that both commercial and general aviation operators contributed to congestion at the two heavily used en route centers we examined. General aviation operators' use of en route services was not insignificant. Their demand for air traffic control services peaked during the busy periods at the en route centers. Due to data limitations, we included fractional and air taxi services with air carriers in a "commercial" category and presented general aviation separately in the en route time of day demand analysis.

As shown in figure 6, 80 percent of operations during July 2005 at the Cleveland en route center were attributable to commercial operators and 17 percent of operations were attributable to general aviation. In addition, general aviation operations accounted for an even higher share of total operations, between 18 percent and 23 percent, during the most congested times.

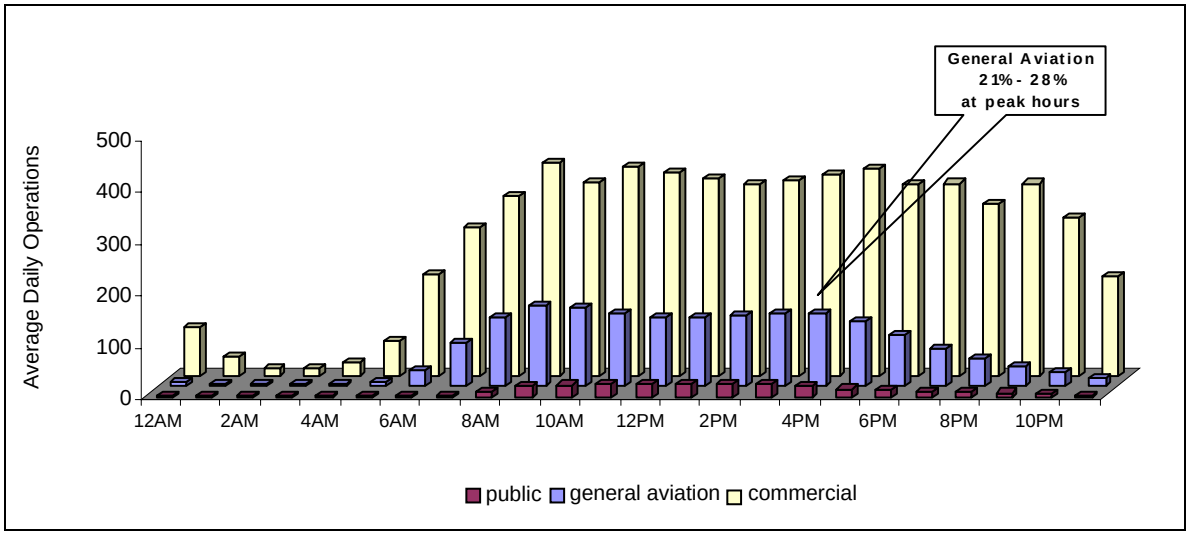
Figure 6. En Route Center Operations by Hour of Day
Cleveland Center – July 2005



Source: OIG Analysis of FAA Data

We found the same pattern of usage at the Atlanta en route center. Seventy-five percent of operations during July 2005 were attributable to commercial operators and 21 percent of operations were attributable to general aviation. As in Cleveland, the share of operations at the Atlanta en route center attributed to general aviation during peak periods ranged from 21 percent to 28 percent (see figure 7 on the following page).

Figure 7. En Route Center Operations by Hour of Day
Atlanta Center – July 2005



Source: OIG Analysis of FAA Data

NAS Users Can Be Meaningfully Grouped Based on Their System Usage

Certain aircraft and operator types have distinct operating characteristics that form the basis of meaningful groupings. For example, jet and turboprop aircraft share different operating characteristics than piston engine airplanes and rotorcraft. Jet and turboprop aircraft have greater altitude capacity and usually employ more sophisticated navigational aids that make greater use of more complex air traffic control services. Piston engine airplanes and rotorcraft usually fly at lower altitudes than jet and turbo-prop aircraft, rarely using en route control services.

Similarly, air carrier operators have different operating characteristics than non-air carriers. Air carriers generally fly fixed routes, serve large metropolitan airports, and have specific time of day requirements. Non-air carriers generally do not operate on a fixed schedule and rarely use large primary airports. We found these groupings were more meaningful in terms of NAS usage than alternatives such as commercial versus recreational aircraft. Either of these groupings (engine or operator type) could form the basis for recovering from a group as a whole the costs it imposes on FAA.

Fuel Consumption is a Better Measure of Use of the NAS than Existing Passenger and Cargo Taxes, but it Does Not Measure the Use of Air Traffic Control Services

Existing passenger and cargo excise taxes have a minimal relationship to the use of air traffic control services. Trust Fund revenue generated by the passenger ticket taxes and cargo waybill taxes depends on the ticket price or waybill amount and the quantity of passengers or cargo on a flight, not the air traffic control services received. Thus, there is disparity among the commercial operators subject to the excise taxes—the revenue generated by large air carrier aircraft versus smaller aircraft operated by air taxis and fractional operators. The passenger and cargo excise taxes, which are applied only to commercial flights, also create a disparity when compared to the fuel tax paid by general aviation users of the same air traffic control services.

Based on a review of five nonstop markets, a tax based on fuel consumption would distribute the fee burden more equitably than the current excise tax system. In the markets studied, air carriers accounted for 92 percent of all flight activity, but paid 99 percent of the taxes collected under the current system (see table 5). The tax share would decline to 97 percent under a fuel only tax (see table 5). Non-air carrier flights, on the other hand, comprised 8 percent of the flight activity and contributed only 1 percent under the current tax and fee structure. Under a fuel-only tax system, contributions to the cost of operations by non-air carriers would increase to 3 percent.

Table 5. Fuel Consumption as a Measure of System Use
Flight Fuel Consumption and Current Tax Contribution – October 2006

Market	Air Carrier			Non-air carrier		
	Percent of Flights	Percent of Fuel Consumed	Contributions Under Current Tax	Percent of Flights	Percent of Fuel Consumed	Contributions Under Current Tax
Newark – Los Angeles	99.1%	99.5%	99.8%	0.9%	0.5%	0.2%
Salt Lake City – Seattle	70.4%	82.6%	88.9%	29.6%	17.4%	11.1%
Memphis – Miami	97.2%	99.3%	99.9%	2.8%	0.7%	0.1%
Boston – La Guardia	97.6%	99.1%	99.9%	2.4%	0.9%	0.1%
Las Vegas- Los Angeles	90.6%	94.4%	99.2%	9.4%	5.6%	0.8%
Weighted Average	**92.3%**	**96.9%**	**98.8%**	**7.7%**	**3.1%**	**1.2%**

Source: OIG Analysis of FAA, BTS and DOT Data

However, a tax based on fuel consumption is not a perfect proxy for NAS activity since fuel consumption can vary in proportion to factors unrelated to that activity, such as aircraft weight. In addition, fuel consumption neither measures whether ATC services are used nor distinguishes among the types and complexity of the services used. Similarly, the current ticket, segment, and freight waybill taxes do not vary according to the complexity or amount of ATC services consumed.

In conclusion, we did not find support for the arguments that either piston engine airplanes, rotorcraft, or non-air carrier operators are marginal users of the NAS and do not contribute to congestion. However, we did find support for the argument that these user groups tend to avoid the large primary metropolitan airports, particularly when a reliever airport is nearby. We found that both air carriers and non-air carriers contribute to congestion at the terminal area radar and en route facilities we examined. We also found that user groupings based either on aircraft or operator type would provide a more homogeneous grouping of users, according to their use of the NAS, than is inherent in the current excise tax structure. Finally, we found that a tax based on jet fuel consumption is a better proxy for the use of the NAS than the current aviation excise taxes, but it does not measure whether air traffic control services are used, nor does it distinguish between the types and complexities of services used.

We met with FAA officials to discuss our results, and their technical comments were incorporated into the report. Since we are making no recommendations, no formal response to this report is required. We appreciate the courtesies and cooperation given by FAA representatives during this audit. If I can be of further assistance, please feel free to contact me at (202) 366-1981 or Mitchell Behm, Program Director, at (202) 366-1995.

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cc: FAA Assistant Administrator for Aviation Policy,
Planning, and Environment
FAA Chief of Staff
FAA Audit Liaison

EXHIBIT A. SCOPE AND METHODOLOGY

Scope

In a letter to the Inspector General, the House Committee on Transportation and Infrastructure, Subcommittee on Aviation requested that our office determine who uses the National Airspace System and how users contribute to congestion. In addition, we were requested to evaluate whether jet fuel consumption was representative of NAS usage.

Data in this report were obtained from the FAA. The data was used to perform the analyses detailed below.

This performance audit was conducted in accordance with generally accepted Government Auditing Standards prescribed by the Comptroller General of the United States with the exception of the data quality standards described below. There has been no prior audit coverage in this area by the Department of Transportation's Office of Inspector General.

Methodology

Our analysis focused on the flight activity of FY 2005. It is the latest period for which enhanced FAA flight activity data were available.

We analyzed data on tower, terminal area, and en route air traffic control (ATC) operations to assess the use of air traffic control services. We obtained the operations data from FAA. We used the data to analyze the use of ATC services by aircraft operator type (carrier, non-air carrier, and public user) and by aircraft engine type (jet, turboprop, and piston/rotor). The analysis extended to use of ATC services at different types of towers and terminal control areas as well as at domestic and oceanic en route facilities. For tower facilities, we also conducted analyses of operations at individual tower facilities.

We examined contributions to congested air traffic control services by analyzing demand for the largest passenger service airports and several of the most heavily used terminal control TRACONs and en route centers. We analyzed demand by time of day and by user group.

The fuel as a proxy analysis was based on flight data obtained using the FAA's ETMSC database for selected origin and destination markets over the period of one month (October 2006).

For each of the markets selected:

- We utilized Form 41 data to determine fuel burn rates for each of the aircraft types (large jets, regional jets, business jets, general aviation aircraft, and cargo aircraft).
- We obtained revenue data from the FAA for cargo carriers, air taxi operations, belly cargo on commercial carriers, and fractional and other non-scheduled Part 135 passenger and cargo carriers.
- We utilized the quarterly airfare data for Q106 which is compiled published by OST to estimate the average air fares between the selected origin and destination markets.
- We utilized BTS data for estimates of average system-wide load factors.

Using this information we examined and modeled contributions made by different aircraft groups under the current excise tax system compared to a fuel only excise tax system and a weight and distance based user fee.

Data

We did not systematically audit or validate the data in any of the databases. However, in prior work, we conducted trend analyses and checks of the data to assess reasonableness and comprehensiveness. We also spoke with managers responsible for maintaining the databases to understand any noted inconsistencies and attempt to resolve them. Based on our understanding of the data through discussions with knowledgeable agency officials, as well as checks for obvious errors in accuracy and completeness, we determined that the data was sufficiently reliable for our purposes.

1. Data Package for Stakeholders: FAA-developed air traffic activity data and cost accounting data. The air traffic activity measures include operations data for FAA towers and approach control facilities and flight activity data for domestic and en route flights. The data provide information on air traffic activity by user groups (aircraft operator types) and by aircraft engine types. In addition, FAA provided individual flight operations records for flights at selected TRACONs, towers, and en route centers. This data included time of day information. Scope: FY 2005.

   We found that FAA understated piston engine airplane and rotorcraft NAS usage in FY 2005 by an estimated 6 percent due to a partial error in its

methodology.[14] As a result, we believe the actual percent of tower operations by piston engine airplanes and rotorcraft was approximately 47 percent as opposed to the 41 percent FAA reported. Conversely, jet and turboprop usage was approximately 53 percent as opposed to the reported 59 percent. The data did not allow us to restate the jet and turboprop categories separately. However, the error does not appear to have a significant impact on the results of the FAA cost allocation methodology.

2. Air Traffic Activity Data System (ATADS): An FAA database of flight activity at staffed facilities. Scope: Airport towers across the country, FY 2005.

3. Enhanced Traffic Management System (ETMS): An FAA-maintained database providing detailed flight records, including time, distance, aircraft types, and user types for aircraft flying under an instrument flight plan. Scope: October 2006.

[14] FAA made an allocation of generic general aviation operations among the different engine type classifications without taking into consideration that most general aviation jet and turboprop aircraft were already accounted for in another (ETMS) data source, thus creating duplicate counts for many of those types and under counting of piston and rotor aircraft operations.

EXHIBIT B. MAJOR CONTRIBUTORS TO THIS REPORT

THE FOLLOWING INDIVIDUALS CONTRIBUTED TO THIS REPORT.

Name	Title
David Tornquist	Assistant Inspector General for Rail and Maritime Program Audits and Economic Analysis
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Stephen Smith	Transportation Industry Analyst
Ralph W. Morris	Economist
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Meredith McDaniel	Analyst
Darlisa Crawford	Writer-Editor

The following pages contain textual versions of the charts and graphs found in this document. These pages were not in the original document, but have been added here to accommodate assistive technology.

Use of the National Airspace System
Section 508 Compliant Presentation

Figure 1. Use of Air Traffic Control Services by Aircraft Type – FY 2005

Aircraft Type	Tower	Terminal	En Route
Jet	46%	55%	89%
Turboprop	13%	14%	7%
Piston/Rotorcraft	41%	31%	4%

Figure 2. Use of Air Traffic Control Services by Operator Group – FY 2005

Operator Group	Tower	Terminal	En Route
Carrier	35%	44%	79%
Non-Air Carrier	59%	49%	17%
Public	6%	7%	4%

Figure 3. Jet Use of Air Traffic Control Services – FY 2005

Operator Group	Tower	Terminal	En Route
Carrier	30%	38%	75%
Non-Air Carrier	12%	13%	11%
Public	4%	4%	3%

Figure 4. New York Terminal Control Area – FY 2005
Arriving Flight Operations by Hour of Day
(LaGuardia, Newark, and John F. Kennedy Airports)

Time of Day	Air Carrier Operations	Non-Air Carrier Operations
7 a.m.	67	2
8 a.m.	69	2
9 a.m.	65	2
10 a.m.	78	3
11 a.m.	75	3
12 p.m.	89	2
1 p.m.	89	3
2 p.m.	106	3

3 p.m.	108	3
4 p.m.	115	4
5 p.m.	94	3
6 p.m.	100	3
7 p.m.	100	2

Figure 5. New York Terminal Control Area – FY 2005
Instrument Approach Operations by Hour of Day
(Includes Outlying Airports)

Time of Day	Air Carrier Operations	Non-Air Carrier Operations
7 a.m.	71	19
8 a.m.	74	27
9 a.m.	73	29
10 a.m.	87	33
11 a.m.	82	36
12 p.m.	98	38
1 p.m.	96	39
2 p.m.	115	42
3 p.m.	117	46
4 p.m.	129	50
5 p.m.	105	53
6 p.m.	110	48
7 p.m.	108	40

Figure 6. En Route Center Operations by Hour of Day
Cleveland Center – July 2005

Time of Day	Commercial Operations	General Aviation Operations	Public Operations
12 a.m.	75	9	2
1 a.m.	38	5	2
2 a.m.	26	3	2
3 a.m.	28	3	1
4 a.m.	52	4	1
5 a.m.	118	8	2
6 a.m.	237	28	4
7 a.m.	328	70	7
8 a.m.	312	95	9
9 a.m.	392	101	12
10 a.m.	366	104	13
11 a.m.	309	93	11

12 p.m.	366	94	12
1 p.m.	333	98	12
2 p.m.	354	103	13
3 p.m.	423	105	12
4 p.m.	347	109	11
5 p.m.	411	96	10
6 p.m.	359	80	9
7 p.m.	413	58	9
8 p.m.	352	47	7
9 p.m.	335	34	4
10 p.m.	248	23	4
11 p.m.	160	15	3

Note: General Aviation represents between 18 percent and 23 percent of total operations during peak hours.

Figure 7. En Route Center Operations by Hour of Day
Atlanta Center – July 2005

Time of Day	Commercial Operations	General Aviation Operations	Public Operations
12 a.m.	94	10	3
1 a.m.	38	6	2
2 a.m.	16	4	1
3 a.m.	15	4	1
4 a.m.	28	5	1
5 a.m.	70	8	1
6 a.m.	197	30	1
7 a.m.	286	83	4
8 a.m.	346	134	9
9 a.m.	412	155	20
10 a.m.	374	151	23
11 a.m.	403	141	24
12 p.m.	394	133	24
1 p.m.	380	133	24
2 p.m.	371	138	24
3 p.m.	378	142	24
4 p.m.	388	142	21
5 p.m.	401	124	15
6 p.m.	370	99	13
7 p.m.	372	72	11
8 p.m.	330	55	11

9 p.m.	371	38	8
10 p.m.	304	27	5
11 p.m.	193	16	3

Note: General Aviation represents between 21 percent and 28 percent of total operations during peak hours.