

**FAA NEEDS TO IMPLEMENT MORE EFFICIENT
PERFORMANCE-BASED NAVIGATION
PROCEDURES AND CLARIFY THE ROLE
OF THIRD PARTIES**

Federal Aviation Administration

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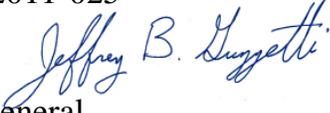
Memorandum

U.S. Department of
Transportation

Office of the Secretary
of Transportation
Office of Inspector General

Subject: **ACTION:** FAA Needs To Implement More
Efficient Performance-Based Navigation
Procedures and Clarify the Role of Third Parties
Federal Aviation Administration
Report Number AV-2011-025

Date: December 10, 2010

From: Jeffrey B. Guzzetti 
Assistant Inspector General
for Aviation and Special Program Audits

Reply to
Attn. of: JA-10

To: Federal Aviation Administrator

The Federal Aviation Administration (FAA) is developing the Next Generation Air Transportation System (NextGen) to move today's ground-based air traffic control system to a more efficient one that relies on satellite-based navigation systems on-board aircraft. A fundamental building block for NextGen is establishing new flight procedures using Area Navigation (RNAV) and Required Navigation Performance (RNP) specifications. The potential benefits of RNAV and RNP are significant and include shorter, more direct flight paths; improved airport arrival rates; enhanced controller productivity; fuel savings; and reduced aircraft noise.

While FAA has implemented over 600 RNAV and RNP¹ procedures since 2005, industry representatives have expressed concerns with both their quality and timeliness. In 2004, industry representatives asked FAA to allow third parties to assist the Agency in developing new procedures. In response, FAA entered into agreements in 2007 with two non-governmental third parties to develop and implement RNP procedures.

At the request of the Chairman of the House Subcommittee on Aviation, we evaluated FAA's oversight of RNP third-party agreements. The Chairman stated that a clear understanding of FAA and third-party processes, roles, and responsibilities is needed before any expansion of their role occurs. Accordingly,

¹ For the purposes of this report, the number of RNAV and RNP procedures represents RNAV Standard Instrument Departures (SID), RNAV Standard Terminal Arrivals (STAR), and RNP Authorization Required (AR) approaches.

our audit objectives were to (1) assess the extent to which FAA is relying on third parties to develop new procedures and (2) determine whether FAA has sufficient mechanisms and staffing to provide safety oversight of third parties' procedure development process.

On July 29, 2009, we testified before the House Subcommittee on Aviation regarding the challenges in implementing performance-based navigation in the U.S. air transportation system.² We included the results of our work to date on third-party agreements and highlighted actions FAA should take to effectively implement RNAV/RNP. At that time, FAA had not clarified its role with regard to new RNP procedures. Since then, FAA has stated that it will be the primary entity designing and implementing RNP procedures for the National Airspace System. Therefore, this report focuses on FAA's implementation strategy going forward and the potential role of third parties and formally transmits our recommendations to FAA. We conducted this review from March 2009 to October 2010 in accordance with generally accepted government auditing standards prescribed by the Comptroller General of the United States. Exhibit A details our scope and methodology. Exhibit B lists the specific locations we visited or contacted.

RESULTS IN BRIEF

FAA has clarified its role in developing new RNP procedures, stating that it will primarily rely on its own resources rather than third parties. Therefore, the role of the two third parties FAA has approved to develop RNP procedures remains unclear, as well as FAA's strategy for implementing timely, high-value routes using in-house resources. Thus far, FAA has mostly delivered overlays of existing routes that do not provide shorter flight paths to alleviate airspace congestion—a major industry concern. This is because FAA has mainly focused on developing a targeted number of procedures each year, not measuring user benefits. As a result, airlines have not widely used FAA's RNP procedures and state that third parties may provide additional technical expertise to develop the procedures they need. FAA contends that it has the technical expertise to deliver more efficient procedures without third parties but has yet to assess its in-house skill mix.

FAA also has not fully established an oversight program for third parties, defined the staffing levels needed to oversee them, or finalized key guidance to industry on qualifications to become a third-party developer. Such guidance is essential, as third parties would perform procedural development and maintenance functions historically performed solely by FAA. In 2007, FAA's Flight Standards Service established a third party oversight office, but it will be difficult to determine how

² OIG Testimony Number CC-2009-086, "Challenges in Implementing Performance-Based Navigation in the U.S. Air Transportation System," July 29, 2009. OIG reports and testimonies are available on our website: www.oig.dot.gov.

many staff this office will need until FAA better defines the extent of third party use. FAA also faces resistance to the third-party program within its Air Traffic Organization (ATO) Office of Aviation Systems Standards and organizational barriers among various lines of business that could delay new, comprehensive oversight policies. Thus far, these problems have impeded FAA's ability to oversee its own procedures, which raises questions as to how effectively FAA can monitor third parties. Without a coordinated oversight system in place, the potential for operational and safety risks increases.

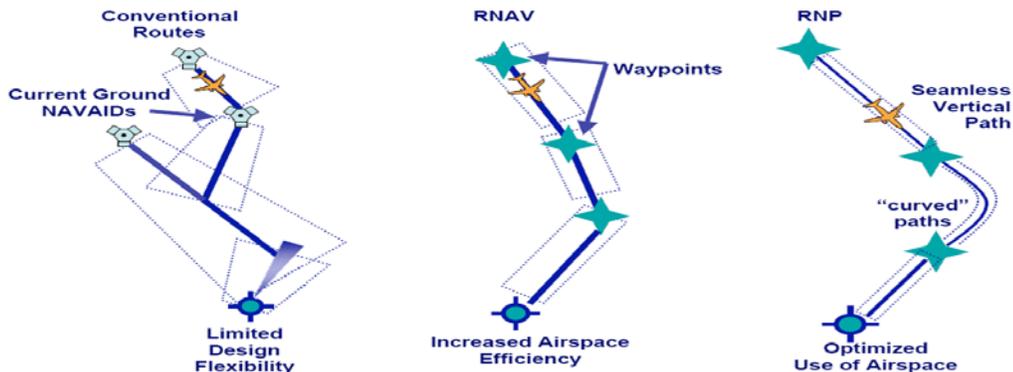
We are making a series of recommendations to help FAA effectively implement and coordinate RNAV/RNP procedures and establish an oversight program for third parties.

BACKGROUND

NextGen will rely on new routes and procedures that primarily use satellite-based navigation and on-board aircraft equipment to navigate with greater precision and accuracy. These new routes and procedures are commonly referred to as RNAV and RNP. For RNAV, pilots can use a combination of Global Positioning System (GPS) and other self-contained systems on-board aircraft to fly any desired flight path by reducing the limitations imposed by ground-based navigation systems. RNP is a form of RNAV that adds monitoring and alerting capabilities to the cockpit to alert the pilot when the aircraft cannot meet specified navigation performance requirements. RNP has the potential to allow more "lanes" or routes in the same airspace, creating additional capacity where needed.

Traditionally, aircraft have been required to fly routes between ground-based navigational aids to maintain required navigation accuracy of on-board systems. RNAV and RNP can increase airspace efficiency by providing more direct paths (see figure below), thereby improving airport arrival rates, enhancing controller productivity, saving fuel, and reducing aircraft noise.

Figure. Conventional, RNAV, and RNP Navigational Methods



Source: FAA

RNP approach procedures can be developed as *public* or *special* procedures. Public procedures are available to all operators that have been properly trained, equipped, and certified. Special RNP procedures are only available to a specific operator for whom the procedure was designed but may be authorized for others upon request. While FAA allows special RNP procedures, these have historically been authorized on a limited basis. Of the 225 existing RNP approach procedures, only 35 are specials. Table 1 provides details on the differences between public and special procedures.

Table 1. Public and Special RNP Procedures

Requirements	Public RNP Procedures	Special RNP Procedures
Who Can Use the Procedure?	Available to all qualified operators that have been properly trained, equipped, and certified	Issued to the specific operator for which the procedure was designed; other operators may request.
Publication/Federal Aviation Regulation	Federal Register in accordance with 14 C.F.R. Part 97 ^a	Not Published/Non-Part 97
Number of Procedures	190 RNP	35 RNP
Who Develops and Implements?	FAA's Office of Aviation System Standards Third parties	FAA's Office of Aviation System Standards and private industry procedure developers (airlines and third parties)
Who pays?	FAA ^b	Airspace user and FAA ^c

^{/a} Standard Instrument Procedures, 14 C.F.R. § 97 (1963). This FAA regulation governs the development of standard instrument approach procedures to airports in the United States.

^{/b} Public procedures developed by FAA are offered at no cost to airspace users. However, airlines will be expected to pay for public procedures that are developed by third parties.

^{/c} Airspace users usually pay for special procedures, but FAA may provide this service to industry in some cases.

In 2004, a joint FAA and industry group³ recommended that FAA begin using third parties to develop and speed the adoption of RNP procedures. In response, FAA entered into agreements in 2007 with two non-governmental third parties—Naverus and Jeppesen-Sanderson, a subsidiary of the Boeing Company—to design, integrate, test, and validate public RNP procedures. In 2007, FAA also established an oversight office within its Flight Standards organization to oversee the third party program.⁴ On September 25, 2009, the two vendors were certified and approved by FAA to design public-use approaches in the U.S. airspace system.

FAA HAS NOT WIDELY IMPLEMENTED EFFICIENT RNP PROCEDURES OR CLARIFIED THE ROLE OF THIRD PARTIES

FAA has not clearly communicated to Agency personnel and industry how and to what extent it will use third parties to implement new flight procedures. While FAA has granted authority to two third parties to develop public RNP procedures, it plans to primarily rely on its own resources to develop and implement RNAV/RNP procedures. However, FAA has yet to widely implement the more efficient procedures that provide new benefits to airlines and lacks an effective method for deploying procedures that considers how they will impact air traffic policies and whether they are working as intended. Until FAA designs and implements more efficient procedures, it will continue to expend resources to deploy procedures that carriers do not use and therefore do not achieve expected benefits across the National Airspace System.

FAA's Goals for Implementing New Flight Procedures Have Not Been Well-Targeted, and the Planned Use of Third Parties Will Not Meet Industry's Expectations

FAA's published strategic plan⁵ simply states that it will produce 50 RNP procedures annually through 2012. There is no mention of how or whether it will share development responsibilities with third parties. Although FAA has stated that it plans to use its own personnel rather than third party vendors to design and implement new flight procedures, it has not performed a detailed assessment of its in-house skill mix and expertise to determine whether the Agency can design and deliver more efficient routes in a timely manner consistent with industry's demand for high value routes. Given this uncertainty—and FAA's focus on the quantity of

³ The Air Traffic Management Advisory Committee (ATMAC) is a Federal advisory committee that recommends government/industry, consensus-based investment priorities to the Federal Aviation Administration that will improve the safety, capacity, or efficiency of the United States air transportation system.

⁴ FAA's Flight Standards Flight Procedures and Implementation and Oversight Branch (AFS-460) is responsible for managing and overseeing the third-party procedure development program.

⁵ FAA's 2009-2013 Flight Plan.

procedures rather than expected benefits—airlines and industry are skeptical of FAA’s ability to develop procedures that allow for more efficient arrivals and departures. A recent industry report on advancing NextGen stated that FAA lacks the resources to design and install new flight procedures in a timely manner and specifically recommended that FAA make greater use of third parties.⁶ However, FAA contends that it has sufficient technical expertise and is committed to move away from the production goal methodology beginning in fiscal year (FY) 2011. The Director of Airspace and Aeronautical Information Management told us that FAA is currently working with industry lead operators on specific projects in which the Agency is developing procedures that offer the more efficient attributes requested.

FAA officials have stated that the intent of the third-party initiative was to provide operators with FAA-qualified vendors who could develop public procedures where existing infrastructure was lacking or where there were no complex airspace integration issues. However, this approach will not meet airlines’ expectations because it would not speed development of new procedures at congested airports, which would be a higher priority for major airlines and critical for advancing NextGen through improved airspace operations. Further, using third parties to develop public procedures may not be practical. Third parties have not developed these in the past, and the extent to which air carriers will hire them to do so is unknown. While public procedures developed by FAA are offered at no cost to airspace users, airlines will be expected to pay for those developed by third parties and would be responsible for procedures that other carriers can use at no cost. While airlines value the technical expertise that third parties can provide, they may not find it cost beneficial to pay for RNP procedures that would benefit their competitors. In addition, according to one of the third-party vendors, the agreement with FAA is not cost beneficial for them because it specifies that third parties will be responsible for maintaining the procedures, which increases their liabilities, risks, and overall costs.

Therefore, FAA officials are now concerned that air carriers will increasingly request third parties to produce special procedures that provide more benefits and are tailored to their specific needs, rather than rely on the public procedures. Although FAA has had a process in place for years in which third parties have developed special procedures as requested by specific operators, FAA approved these only on a case-by-case basis. FAA states that an increasing number of special procedures will further complicate the workload of air traffic controllers and increase the complexity of the current air traffic control system.

⁶ Report by Aerospace Industries Association, “Civil Aviation Growth in the 21st Century: Meeting Capacity and Environmental Challenges,” September 2010.

FAA's Overlays of Existing Routes Have Resulted in Limited Benefits for Enhancing the Flow of Air Traffic

While FAA has met or exceeded its annual RNP production goals, most of the RNP procedures it has deployed have been overlays of existing routes. While overlaid procedures can be deployed more quickly because they do not have to undergo extensive environmental reviews, they do not maximize the benefits that can be achieved through RNP procedures, such as new, more direct flight paths.

FAA officials state that overlaid RNP procedures have provided benefits and that they were a necessary step for introducing RNP procedures into the National Airspace System. However, airline representatives assert that the overlays only provide limited benefits. Specifically, the benefits that FAA cites—such as serving as a back-up to ground-based navigation aids in case of system failure, transitioning from a traditional instrument landing system (ILS)⁷ airspace to a high performance network of procedures, and reducing the time involved in environmental reviews—do not equate to measurable capacity gains for the airlines. Representatives for major airlines that are RNP-equipped want FAA to develop RNP routes and procedures that maximize the full benefits of RNP, such as curved paths into airports. However, FAA officials told us that developing curved approaches may present operational challenges in air traffic environments such as New York because of the traffic density and airspace limitations and may not be feasible from an operations standpoint.

FAA agrees that it needs to move beyond basic overlays to incorporate flight path patterns that better address capacity and throughput, improve airport arrivals and departures during poor weather conditions, and enable improved and efficient flow of traffic. FAA has recently developed new RNP procedures with curved paths in a few locations, such as Raleigh-Durham. While FAA is committed to producing more efficient procedures going forward, without a detailed assessment of its in-house resources and training to do so, it is unclear whether the Agency can adequately fulfill industry needs in a timely manner or the extent to which it must rely on the use of third parties. A joint Government/industry task force charged with identifying mid-term actions FAA should take to advance NextGen reported in 2009 that the availability of critical expertise at FAA has been a bottleneck in the past and that training enough procedure development teams will be a key challenge.⁸

⁷ An instrument landing system (ILS) is a ground-based instrument approach system that provides precision guidance to an aircraft approaching and landing on a runway.

⁸ Final Report of the RTCA NextGen Mid-Term Implementation Task Force Report, September 9, 2009.

FAA Has Not Ensured That Air Traffic Control Policies Allow the Use of RNP at Some Congested Airports

FAA has implemented RNP procedures at airports without ensuring that air traffic policies would allow their use. For example, in May 2007, FAA implemented 10 RNP procedures⁹ at Atlanta Hartsfield-Jackson International Airport, but air traffic controllers have never cleared an aircraft to land using these procedures because current air traffic regulations do not allow their use for simultaneous operations at certain airports with parallel runways.

The Atlanta Hartsfield-Jackson International Airport, which is one of the busiest airports in the world, has closely spaced parallel runways (less than 2,500 feet between parallel runways). Due to high volumes of air traffic during peak hours, the airport must maintain capacity by allowing parallel landings for aircraft. However, current regulations¹⁰ state that only an aircraft flying an ILS approach, not RNP, can be used at airports with parallel runways. This restriction also affects other high-density airports, such as Miami, Los Angeles, and Dallas/Ft. Worth. Allowing approaches based solely on RNP or a combination of ILS, RNAV, and RNP for parallel approaches is currently prohibited unless FAA grants a waiver. To issue a waiver, FAA must perform a safety study, which can take several years to complete.

FAA recently completed a 4-year safety study to determine whether the regulations can safely be updated through a project at George Bush Intercontinental Airport (IAH) in Houston. On July 31, 2009, FAA granted a waiver to its air traffic regulations allowing IAH controllers to clear aircraft using a combination of ILS, RNAV, and RNP for parallel approaches to support its dual or triple parallel runways. FAA is now determining whether the regulations can be safely updated at other airports.

Even if FAA updates its policies and determines that RNP can be allowed at airports with parallel runways, airline representatives told us that they would not use the RNP procedures at Atlanta because they are overlays of existing conventional procedures, thus providing little or no added benefits other than a backup in the event the ground-based navigation aid shuts down.

FAA Does Not Analyze the Effectiveness of New Procedures in Improving Air Traffic Operations

FAA lacks an adequate process for assessing the effectiveness of new flight procedures—both before and after their implementation. While FAA has

⁹ These 10 RNP procedures were overlays of existing procedures.

¹⁰ FAA Order JO 7110.65 Air Traffic Control Handbook, paragraphs 5-9-6 and 5-9-7 prescribe aircraft separation standards required for parallel dependent and simultaneous independent operations.

implemented RNP at sites recommended by a joint FAA and industry group,¹¹ the sites were based on priorities established 5 years ago. FAA followed the original 2005 priority list provided by industry for selecting RNP sites without performing updated analyses to identify expected benefits before implementing the new procedures. Currently, FAA only does benefit analyses for select, individual procedures. In addition, FAA program officials do not track data that would show how often airlines use RNP procedures, whether they obtain expected benefits, or why they are not using certain procedures.

Unless FAA establishes an approach that relies on benefit analysis from a “before-and-after” perspective in close coordination with airlines and air traffic control facilities, it will continue to expend resources on procedures that carriers do not use and do not provide measurable capacity gains. For example, in late 2005, FAA designed and implemented a public procedure in Palm Springs; yet, no air carrier has used the procedure in the 4 years since it was implemented because its design does not provide shorter flight paths or the ability to fly at lower altitudes. According to a major airline that uses this airport, FAA did not adequately coordinate with all stakeholders, including air traffic controllers, before implementing this procedure to ensure that the airport would use it and that it would provide benefits.

An RNP procedure FAA deployed at Reagan Washington National Airport in 2005 has demonstrated some benefits, but only a few airlines are actually qualified to use it. The procedure allows pilots to follow a more precise path—not available through conventional or RNAV procedures—along the Potomac River while avoiding restricted airspace and obstacles.

FAA still has much work to do to analyze its in-house expertise and the potential role of third parties; however, it must also focus on targeted benefit analysis and improved coordination with airport stakeholders for the procedures it is implementing now. Otherwise, airlines will be left with little assurance that FAA can shift to a more effective approach in the future.

To its credit, FAA has stated that it is committed to improving its procedure implementation process by focusing on measuring and demonstrating benefits of new procedures going forward. In addition, in response to the 2009 joint Government/industry task force report, FAA initiated a cross-agency project to streamline the processes used to request, prioritize, approve, and implement new flight procedures. In FY 2011, FAA will begin implementing the review’s recommendations and gathering data to perform pre-and post-implementation

¹¹ This particular FAA/industry group, known as the Performance-Based Operations Aviation Rulemaking Committee (PARC), provides a forum for the U.S. aviation community to discuss, prioritize, and resolve issues; provide direction for flight operation criteria; and produce U.S. consensus positions for global harmonization.

benefit analysis for all performance-based navigation routes and procedures. FAA is also in the early stages of forming joint agency-industry teams to focus on deploying enhanced procedures at airports in busy metropolitan areas.

FAA HAS NOT FULLY ESTABLISHED A COORDINATED OVERSIGHT FRAMEWORK FOR THIRD PARTIES

FAA has not yet developed an oversight program to ensure third parties properly follow FAA design criteria and processes in integrating, validating, and maintaining flight procedures. FAA's Flight Standards office has drafted guidance for industry on processes for authorizing third parties. However, FAA has not finalized the guidance due to resistance from the ATO, which is responsible for designing flight procedures. Yet, the ATO views the draft guidance as critically important and wants Flight Standards to resolve its safety concerns before publishing the guidance. FAA must also address the fragmented efforts between its lines of business responsible for implementing and overseeing new flight procedures. Without a coordinated oversight framework, the potential for operational problems and safety risks will increase.

FAA Has Not Developed a Formal Oversight Program or Defined Agency Staffing Needs

FAA has not established a plan for how it will oversee and monitor third parties once they are qualified. FAA officials performed initial audits to qualify the two third-party vendors, Naverus and Jeppesen, and stated their intent to initially conduct 100 percent oversight of all the procedures developed by third parties. Once third parties have successfully demonstrated that they can develop these procedures on their own, FAA plans to schedule reviews every 2 years. However, these are only conceptual plans at this point, not a formal oversight program.

FAA also has not developed a plan specifying which offices will perform safety oversight reviews or how it plans to record and track results of the reviews. Currently, FAA's Flight Procedure and Implementation Oversight Branch (AFS-460) can perform 100 percent oversight because there are only two procedures that are under review. However, if the number of third-party vendors and procedures increases, FAA may be unable to monitor them at that level. In addition, it will be difficult for FAA to determine oversight staffing needs because the extent that airlines will use third parties is unknown.

FAA officials told us that the 14 personnel in its oversight office were sufficient to qualify the 2 vendors to design public procedures; however, the officials were unsure whether they had sufficient resources to oversee these vendors once they began designing more procedures or additional vendors if the program is

expanded. FAA must closely monitor staffing resources to ensure they keep pace with a potentially increasing workload. Moreover, the oversight office will be responsible for overseeing all flight validation activities performed by airlines and third parties—a key part of the procedure implementation process to ensure that the procedures are properly and safely working.

Representatives from the Flight Standards oversight office stated that they will leverage resources by using aviation safety inspectors in the Certificate Management Offices (CMO) and All Weather Operations (AWO) personnel to perform oversight of flight validation in the field.¹² However, some CMO staff we interviewed indicated that they did not know enough about RNP to validate work performed by third parties. According to the Deputy Assistant Manager, Flight Technologies and Procedures Division, CMOs will be trained when the time comes for them to flight test procedures produced by third parties. However, it will be difficult for FAA to add new duties for safety inspectors given that the current inspector workforce already has difficulty completing all basic required safety inspections.

FAA Has Been Unable To Establish Safety Oversight Guidance for Third Parties Due to ATO Concerns

Lack of support from key managers within the ATO has impeded FAA's efforts to effectively establish a third-party oversight program. This resistance dates back to at least May 2006 when Flight Standards recommended that third parties, rather than FAA, be responsible for implementing all RNAV/RNP procedures (both public and special). Due to opposition from the Director of Aviation System Standards,¹³ the recommendation was not approved. As a result, the third-party agreements that FAA entered into with Naverus and Jeppesen over 3 years ago are still based on Flight Standards' draft guidance.

The ATO has not approved the guidance due to safety concerns. Specifically, ATO managers are concerned about the safety of the policies and procedures third parties must follow and the level of support the program will need from FAA. ATO managers have also not approved separate guidance that ensures third parties use valid computer software in designing new flight procedures due to potential safety, security, and cost risks.

Under the third-party agreements, third parties are asked to perform functions involving the development, implementation, and maintenance of public instrument flight procedures—functions that have been solely performed by FAA in the past. In response to the draft guidance for qualifying third-party vendors, FAA officials

¹² CMOs are the Flight Standards field offices responsible for overseeing the safety of each airline.

¹³ This office is a part of FAA's Air Traffic Organization responsible for designing and developing public and special instrument flight procedures (IFP).

in the ATO's Office of Aviation System Standards expressed strong concerns regarding the use and safety oversight of third parties. Specifically, they questioned whether third parties will:

- be held to the same level of standards for safety as FAA when developing procedures,
- be able to effectively communicate across FAA's lines of business to coordinate procedure development and integration,
- possess the same level of training and experience required of FAA staff,
- be able to access FAA databases for procedure development, maintenance and Notices to Airman (NOTAM)¹⁴ publication,
- be able to determine when full environmental assessments are required, and
- properly integrate third party procedures in the National Airspace System.

Another issue that caused significant delays in implementing oversight guidance was ATO's concern about the third parties' understanding of their role in addressing environmental impacts of procedures they design. ATO did not believe that the draft guidance for qualifying third parties provided a clear understanding of the regulatory requirements for addressing environmental impacts. Normally, if a procedure has been categorized as an overlay of an existing one, then FAA could develop it without performing an extensive environmental assessment, which can be lengthy and costly. The types of procedures that require no full environmental assessment are Categorical Exclusions.¹⁵ Categorical Exclusions are usually reviewed, approved, and signed by the applicable FAA regional Flight Procedures Office manager. However, when the third-party vendors submitted their first public RNP procedures, which were overlays of existing conventional procedures, FAA had a difficult time determining which official would be responsible for reviewing and approving them for Categorical Exclusion. Nearly a year after these procedures were completed and ready for publication, an FAA ATO Headquarters official finally signed the Categorical Exclusions. Until FAA clarifies the approval process for environmental reviews for third party procedures, this will continue to be a challenge for FAA.

¹⁴ Notice to Airmen, or NOTAMS, are created and transmitted by government agencies and filed with an aviation authority to alert aircraft pilots of any hazards en route or at specific locations.

¹⁵ Categorical Exclusions are those types of Federal government actions that FAA has found, based on past experience with similar actions, do not normally require full environmental reviews because they do not individually or cumulatively have a serious effect on the human environment.

Fragmentation and Uncertainty About Roles Among FAA Offices Impede FAA's Efforts To Establish Cohesive Oversight of Flight Procedure Development

FAA has yet to address organizational barriers and fragmented efforts within its lines of business that have hindered the Agency's efforts to establish a coordinated oversight framework. As shown in table 2, several offices within FAA's Aviation Safety organization and the ATO play a role in ensuring the safe development and integration of new flight procedures into the National Airspace System regardless of whether they are implemented by third parties or FAA internal personnel.

Table 2. Roles and Responsibilities in the Development and Oversight of Flight Procedures

FAA Office	Responsibilities
<i>Air Traffic Organization</i>	
RNAV/RNP Group	<ul style="list-style-type: none"> • Implements and integrates RNAV and RNP routes and procedures into the NAS
Aviation System Standards	<ul style="list-style-type: none"> • Designs and develops public and special instrument flight procedures (IFP) • Operates a fleet of flight inspection aircraft for airborne evaluation of IFPs and maintains public procedures
Air Traffic Facilities	<ul style="list-style-type: none"> • Evaluate and use the procedures operationally • Train controllers on new procedures
<i>Aviation Safety</i>	
Flight Standards Service	<ul style="list-style-type: none"> • Develops and evaluates design criteria for IFPs • Oversees flight inspection policy and all IFP development, both FAA and third-parties • Approves special procedures • Enforces non-compliance penalties for procedures developed by third parties
Air Traffic Safety Oversight Service (AOV)	<ul style="list-style-type: none"> • Independently oversees the Air Traffic Organization • Audits Air Traffic facilities, including the Aviation System Standards (office that develops instrument flight procedures) • Enforces non-compliance penalties for procedures developed internally

Recognizing that this organizational framework may cause confusion or duplicative efforts, FAA entered into a memorandum of agreement between the Air Traffic Oversight Service and Flight Standards in 2008. The purpose of the agreement was to define oversight relationships and coordination, leverage the resources and expertise of both organizations, and enhance oversight with the

ultimate goal of providing one standard of safety oversight for the National Airspace System.

However, our work has shown that, despite the memorandum of agreement, unresolved issues still exist between Flight Standards and the Air Traffic Safety Oversight Division regarding oversight roles and responsibilities, and this will impact how RNP procedures are implemented. Although FAA's Flight Standards office is responsible for overseeing how FAA and third parties develop procedures, it does not have the authority to enforce penalties for non-compliances that it finds with procedures developed by FAA employees. That authority lies within the Air Traffic Safety Oversight Division. However, for procedures produced by third parties, FAA's Flight Standards personnel have the authority to issue penalties for any procedures that they find unsafe. As a result, FAA will face challenges in meeting its goal of one standard of safety oversight for internally versus externally developed procedures.

For example, two internal audits performed in 2007 and 2008 by FAA's Air Traffic Safety Oversight Office (AOV) and the Flight Standards Flight Procedures Implementation and Oversight Branch (AFS-460) could not determine that FAA had performed required biennial procedure maintenance reviews for 100 percent of the 1,242 procedures sampled in 2007 and the 211 sampled in 2008. These reviews are important because they assess maintenance of the procedures, such as checking for new ground obstacles or changes to navigational procedures. FAA also selected 10 of the 211 procedures sampled during the 2008 audit to check for safety-related issues. Seven of these 10 had safety-of-flight issues, such as improper terrain evaluations and destabilized descent, which could lead to controlled flight into terrain.¹⁶

When these safety violations were identified, representatives from AFS-460 notified the ATO's Aviation System Standards Office regarding the seven procedures they found to be unsafe, which resulted in Notice to Airmen actions and/or procedure amendments. However, AOV, rather than Flight Standards, had to issue a warning notice because Flight Standards had no enforcement authority to ensure that FAA corrected the identified problems. Although AOV issued a warning notice in June 2008, FAA is still working to correct the problems with performing biennial procedure reviews, almost 3 years after the problem was first identified.

In addition, Flight Standards Service approves special RNP procedures for use but does not have to coordinate them at the national level with the FAA Headquarters

¹⁶ Controlled flight into terrain (CFIT) occurs when an aircraft that is mechanically functioning normally is inadvertently flown into the ground, water, or an obstacle with inadequate awareness on the part of the pilot of the impending disaster.

RNAV/RNP program office, which is responsible for integrating RNAV and RNP routes into the National Airspace System. This is because, in the past, special procedures were not deployed in complex airspace. Now, special procedures are envisioned for complex airspace surrounding high density airports, which may conflict with public procedures also being planned or operated and create integration problems for the ATO. For example, in 2008, Southwest Airlines initiated a unique project to implement new RNAV/RNP arrivals and departures between Dallas-Love Field and Houston-Hobby airports. This project involved using new design criteria for departures and testing the feasibility of integrating RNAV routes at higher altitudes with airport-specific RNP arrivals and departures to link city pairs. Although this project required an extraordinary level of oversight and coordination between FAA and industry, RNAV/RNP program officials expressed concern that they were not involved in the initial coordination process.

According to a Southwest Airlines representative, the airline recently decided not to pursue the Dallas-Houston project due to FAA's lack of support for special procedures. However, coordination at a national level will still be important for any similar projects in the future. Without a policy that requires coordination at a national level with the RNAV/RNP program officials in planning and deploying complex special procedures, FAA cannot ensure that new procedures will be smoothly and safely integrated into the National Airspace System.

CONCLUSION

FAA's successful implementation of NextGen is vital to effectively and efficiently manage the anticipated demand for air travel and reduce gridlock across the Nation's airspace and airports. RNAV and RNP are critical building blocks for NextGen capabilities in the near and midterm. Yet, FAA has not fully laid the groundwork for successfully implementing RNP procedures that can provide measurable benefits in terms of capacity enhancements and delay reduction at airports. Until airline officials have confidence that FAA can produce efficient RNAV and RNP procedures, they will be less likely to make the needed investments to equip their aircraft and train flight crews. FAA Headquarters leadership must clearly define and communicate FAA's implementation strategy and the role of third parties. In addition, FAA must address critical coordination challenges with all stakeholders and refine its oversight program to ensure the safe and timely implementation of new flight procedures.

RECOMMENDATIONS

We recommend that FAA:

1. Assess its in-house skill mix to determine whether the Agency has the expertise needed to design and deliver more efficient, value-added RNP procedures in a timely manner.
2. Clearly define the role of third parties in developing and implementing RNP procedures, determine where third parties could play a cost-beneficial role in advancing the implementation of new procedures, and issue a report with the results of this evaluation.
3. Design an oversight strategy for third parties once the Agency clarifies their role in RNP design and implementation.
4. Improve the effectiveness of its approach for implementing new flight procedures by:
 - a. performing cost-benefit analyses in close coordination with stakeholders before and after implementing RNP procedures.
 - b. aligning Flight Plan goals with producing beneficial RNP procedures that have significant benefits rather than focusing on the number of procedures.
5. Improve the safety oversight and coordination process for implementing new flight procedures by:
 - a. resolving the Air Traffic Organization's concerns with the draft guidance that authorizes third parties to develop instrument flight procedures.
 - b. evaluating and clarifying the 2008 Memorandum of Agreement between the Flight Standards Service and the Air Traffic Safety Oversight Service regarding oversight roles and responsibilities between these FAA offices to ensure that oversight functions are properly coordinated for all instrument flight procedures and enforcement actions are handled consistently.
 - c. establishing a procedure for Flight Standards to coordinate with the RNAV/RNP program office on any request from industry to develop special RNP procedures that have national implications to ensure that these procedures do not conflict with procedures that already exist or are being created.

AGENCY COMMENTS AND OFFICE OF INSPECTOR GENERAL RESPONSE

We provided FAA with our draft report on October 15, 2010, and received the Agency's formal response on November 16, 2010. FAA concurred with recommendations 1, 2, 3, 4b, 5a, and 5b; partially concurred with recommendation 4a; and did not concur with recommendation 5c. Overall, FAA's response meets the intent of most of our recommendations, including actions proposed for 4a. However, we are requesting that FAA provide target dates for recommendations 3 and 4b and reconsider its position for recommendation 5c. FAA's response is included in its entirety as an appendix to this report.

For recommendation 3, FAA concurred but requested that we close it based on its current oversight system for third parties. However, FAA will not complete its evaluation and determination of third-party roles until February 1, 2011. Therefore, we cannot make a final decision on whether FAA has a properly designed oversight strategy until after the Agency makes its determination on the role of third parties as recommended in our report.

For recommendation 4a, FAA stated that it will perform cost-benefit analyses before and after implementing RNP procedures at specific project sites rather than on a procedure-by-procedure basis. We consider this action reasonable given FAA's new Metroplex initiative, in which the Agency plans to measure the benefits achieved by enhanced flight procedures implemented at 21 busy metropolitan areas.

For recommendation 4b, FAA stated that it was "considering a proposal" to eliminate numeric goals from its FY 2011 Flight Plan but did not provide a target date for completion. In addition to a target date, FAA needs to specify in its Flight Plan how it will measure and report on progress in establishing new routes. This clarification is important for airspace users given industry's strong desire for more beneficial routes that can enhance capacity and reduce delays.

For recommendation 5c, FAA stated that it has existing guidance that provides adequate procedures for coordination with all concerned lines of business. We are aware of this guidance; however, not all of FAA's lines of business agree that the regional coordination process as outlined in the current guidance is adequate for complex projects, such as the initiative with Southwest Airlines to introduce new special procedures at select airports. While FAA RNAV/RNP program officials attended meetings, they expressed significant concern with the overall level of coordination and the degree of national involvement. Therefore, we request that FAA determine whether the RNAV/RNP officials' concerns have been adequately resolved and evaluate whether the Agency needs to update

existing guidance to require a higher level of coordination for any future special procedures that have significant national implications.

ACTIONS REQUIRED

FAA's planned actions and target dates for recommendations 1, 2, 4a, 5a, and 5b are responsive, and we consider these recommendations addressed but open pending completion. We request that FAA provide, within 30 days of this report, a target date for recommendations 3 and 4b and clarifying information for recommendation 5c as discussed above. We appreciate the courtesies and cooperation of FAA representatives during this audit. If you have any questions concerning this report, please contact me at (202) 366-0500 or Robin Koch, Program Director, at (404) 562-3770.

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cc: FAA Senior Vice President for Operations, ATO
FAA Associate Administrator for Aviation Safety
Director of Flight Standards Service
Anthony Williams, AAE-001
Martin Gertel, M-1

EXHIBIT A. OBJECTIVES, SCOPE, AND METHODOLOGY

At the request of the Chairman of the House Committee on Transportation and Infrastructure, Subcommittee on Aviation, we performed an audit of FAA's plans for qualifying and overseeing non-governmental third party instrument flight procedure developers. The objectives of this audit were to (1) assess the extent to which FAA is relying on third parties for the development of new Required Navigation Performance (RNP) procedures and (2) determine whether FAA has established sufficient mechanisms and has sufficient staffing to provide safety oversight.

To determine the extent to which FAA is relying on third parties for the development of new RNP procedures, we interviewed managers at all levels of FAA, officers of the National Air Traffic Controllers Association and Professional Airways System Specialist organization, the Air Transport Association, and the chair of the Performance-Based Operations Aviation Rulemaking Committee. We also met with representatives of the aviation industry who are involved in RNP design and implementation to ascertain their concerns regarding FAA's design and implementation of RNP procedures and whether there is a market for third party developers. We obtained and reviewed documentation regarding the qualification of third party vendors to design and implement public RNP procedures as well as met with officials of the two vendors.

To determine whether FAA has sufficient mechanisms and sufficient staffing to provide safety oversight, we met with officials of the Flight Standards Service office tasked with overseeing instrument flight procedure developers and the Air Traffic Safety Oversight Office. We obtained and reviewed plans for overseeing third party vendors as well as for implementing the Safety Management System as a safety oversight mechanism. We also obtained and reviewed staffing information for the oversight office. We also obtained and reviewed audit reports from the Air Traffic Safety Oversight Division and the Flight Standards Implementation and Oversight Branch for procedures developed internally and externally.

We conducted this audit from March 2009 through October 2010 in accordance with generally accepted government auditing standards prescribed by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence that provides a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

EXHIBIT B. FACILITIES VISITED OR CONTACTED

FAA Headquarters, Washington DC

- Air Traffic Organization
 - System Operations Services, RNAV/ RNP Program Office
 - Safety Services, Office of Safety Risk Management
- Aviation Safety
 - Flight Standards Service
 - Office of Air Traffic Oversight

Mike Monroney Aeronautical Center, Oklahoma City, OK

- Technical Operations Services, Aviation System Standards
- Flight Standards Service, Flight Procedures Implementation/ Oversight Branch

FAA Field Facilities

- Western Region Flight Procedure Office, Renton, WA
- Western Service Center, Renton, WA
- Alaska Airlines Certificate Management Office, Seattle, WA
- Delta Airlines Certificate Management Office, College Park, GA
- Eastern Region Flight Procedure Office, College Park, GA
- Atlanta Terminal Radar Approach Control, Peachtree City, GA
- Dallas Terminal Radar Approach Control, Dallas, TX

Aviation Stakeholders

- Professional Aviation Safety Specialists, Washington, DC
- Air Transport Association, Washington, DC
- National Air Traffic Controllers Association, Washington, DC
- Mitre Corporation, McLean, VA
- Jeppesen Sanderson, Atlanta, GA
- American Airlines, Fort Worth, TX
- Delta Airlines, Atlanta, GA
- Southwest Airlines, Dallas, TX
- Naverus, Seattle, WA
- Alaska Airlines, Seattle, WA
- The Boeing Company, Everett, WA

EXHIBIT C. MAJOR CONTRIBUTORS TO THIS REPORT

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APPENDIX. AGENCY COMMENTS



Federal Aviation Administration

Memorandum

Date: November 16, 2010

To: Jeffery B. Guzzetti, Assistant Inspector General for Aviation and Special Program Audits

From: Clay Foushee, Director, Audit and Evaluations, AAE-1

Subject: OIG Draft Report: FAA Needs to Implement More Efficient Performance- Based Navigation Procedures and Clarify the Role of Third Parties

The Next Generation Air Transportation System (NextGen) is the Federal Aviation Administration's (FAA) plan to modernize the National Airspace System (NAS). Through NextGen, FAA is addressing the impact of air traffic growth by increasing NAS capacity and efficiency while simultaneously improving safety, reducing environmental impacts, and increasing user access to the NAS. To achieve its NextGen goals, FAA is implementing new Performance-Based Navigation routes and procedures that leverage emerging technologies and aircraft navigation capabilities.

Performance-Based Navigation (PBN) is comprised of Area Navigation (RNAV) and Required Navigation Performance (RNP) and describes the capability to navigate using performance standards. RNAV and RNP specifications facilitate more efficient design of airspace and procedures which collectively result in improved safety, access, capacity, predictability, operational efficiency, and environment. Specifically, improved access and flexibility help to enhance reliability and reduce delays by defining more precise terminal area procedures. RNAV procedures can provide benefit in all phases of flight, including departure, en route, arrival, approach, and transitioning airspace.

PBN is a cornerstone of FAA's NextGen vision. As RNAV and RNP procedures are implemented in the NAS, they may provide additional end-to-end benefits by enabling an integrated procedure design concept at and between busy airports that will continue to enhance safety and capacity for industry and the flying public.

OIG Recommendation 1: Assess its in-house skill mix to determine whether the Agency has the expertise needed to design and deliver more efficient, value-added RNP procedures in a timely manner.

FAA Response: Concur. FAA will assess its capacity to meet the projected increase in demand for RNP procedures in support of NextGen, Metroplex and other airspace optimization initiatives. FAA will complete this assessment by February 1, 2011.

OIG Recommendation 2: Clearly define the role of third parties in developing and implementing RNP procedures, determine where third parties could play a cost-beneficial role in advancing the implementation of new procedures, and issue a report with the results of this evaluation.

FAA Response: Concur. The experience of FAA working with the two third-party instrument flight procedure developers under the Other Transaction Agreement has served as a platform to compare the relative advantages and disadvantages of third-party procedures development as a supplement to the FAA's in-house capability. The FAA will use the results of these efforts to clearly define the future role to be served by third-party developers. The results of the evaluation and determination of future third-party roles will be completed by February 1, 2011.

OIG Recommendation 3: Design an oversight strategy for third parties once the Agency clarifies their role in RNP design and implementation.

FAA Response: Concur. As noted in the report, the Flight Standards Service (AFS) established the Flight Implementation and Oversight Branch (AFS-460) to provide oversight of third-party developers. Presently FAA provides comprehensive oversight for the two authorized third-party vendors for their end to end procedure development activities. Existing staffing and resources are able to meet current demand. FAA provides oversight using traditional AFS surveillance and audit program techniques. To date, the demand for third-party public procedures has been limited. Should the demand for third parties IFP development increase in the future, FAA will adjust its oversight resources accordingly. FAA requests the OIG close this recommendation.

OIG Recommendation 4: Improve the effectiveness of its approach for implementing new flight procedures by:

- a. Performing cost-benefit analyses in close coordination with stakeholders before and after implementing RNP procedures.

FAA Response: Partially concur. The FAA already conducts site-specific analyses of potential benefit mechanisms for each project site. Due to the time and level of effort required, only selected projects are currently assessed post implementation. Under the Metroplex initiative, FAA will establish study teams to identify solutions that will address the unique challenges at 21 specific geographic areas. Study team recommendations will identify the benefits expected for each Metroplex and establish a baseline for measuring post-implementation results. The first two Design and Implementation Teams for North Texas Metro and DC Metro will begin in mid to late February 2011 and will complete work in 2 1/2 to 3 years. As in all large airspace projects, benefits will likely not accrue until completion of the project. The FAA has committed to completing the optimization of airspace and procedures for each of the identified 21 Metroplex areas within 5-7 years.

Appendix. Agency Comments

- b. Aligning Flight Plan goals with producing beneficial RNP procedures that have significant benefits rather than focusing on the number of procedures.

FAA Response: Concur. In alignment with RTCA Task Force 5 and OIG recommendations, FAA is considering a proposal to eliminate numeric PBN targets from its FY-2011 Flight Plan.

OIG Recommendation 5: Improve the safety oversight and coordination process for implementing new flight procedures by:

- a. Resolving the Air Traffic Organization's concerns with the draft guidance that authorizes third parties to develop instrument flight procedures.

FAA Response: Concur. AFS and ATO senior managers continue to be actively engaged in discussions to remedy these concerns and have set a target date of March 31, 2011 for resolving them.

- b. Evaluating and clarifying the 2008 Memorandum of Agreement between the Flight Standards Service and the Air Traffic Safety Oversight Service regarding oversight roles and responsibilities between these FAA offices to ensure that oversight functions are properly coordinated for all instrument flight procedures and enforcement actions are handled consistently.

FAA Response: Concur. Air Traffic Safety Oversight Service (AOV) and AFS managers are currently reviewing the Memorandum of Agreement (MOA). This MOA was developed in order for AFS to assist AOV in audits, when requested. A thorough review of this MOA will be completed by March 31, 2011.

- c. Establishing a procedure for Flight Standards to coordinate with the RNAV/RNP program office on any request from industry to develop special RNP procedures that have national implications to ensure that these procedures do not conflict with procedures that already exist or are being created.

FAA Response: Nonconcur. Existing guidance outlined in FAA Order 8260.43A, Flight Procedures Management Program, set forth adequate procedures for coordination with all concerned lines of businesses on any request from industry to develop special RNP procedures. This guidance has been in effect for seven years.

This FAA Order establishes the Regional Airspace Procedures Team (RAPT). The RAPT is the FAA's regional point of contact responsible for coordinating, prioritizing, and evaluating requests for establishment, amendment, and cancellation of flight procedures within the regional boundaries.

It is intended that the RAPT provide a coordinated FAA response to customer requests and needs related to flight procedures. As directed by the order, the RAPT is specifically responsible for developing and maintaining a process for the receipt, review, control, and tracking of flight procedure requests, suggestions, and initiatives from FAA and other sources so that procedures are compatible with national and international concepts, plans, goals, priorities, and objectives.

Appendix. Agency Comments

The RAPT is also responsible for supporting national programs and industry activities in matters associated with flight procedures. It also provides expertise to users and service providers regarding implementation of satellite-based flight procedures in the National Airspace System and solicits suggestions and recommendations regarding RNAV and RNP implementation.

The Order also specifies that special procedure requests are considered and processed by the RAPT in the same manner as standard procedures. Following recommendation by the RAPT and other required processing and development, special procedures are certified by the Flight Technologies and Procedures Division, AFS-400, and forwarded to the appropriate AFS Division for issuance to general aviation operators via letter of authorization from the local Flight Standards District Office or to air carriers via operations specifications from its certificate holding office.

The specific example referred to on page 15 of the report concerning the Southwest Airlines RNP initiative at Dallas Love (DAL) and Houston Hobby (HOU) airports appears to have been a miscommunication. A review of our records indicates the RNAV/RNP Program Office had a representative at these initial coordination meetings. Additionally, the procedure developer, Naverus, provided the FAA representative with access to the Naverus web portal for the "DAL/HOU Early Adopter Program" where preliminary design graphics were posted. FAA requests that the OIG close this recommendation.