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# *Office of Inspector General*

# *Audit Report*

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## **FAA LACKS A RISK-BASED OVERSIGHT PROCESS FOR CIVIL UNMANNED AIRCRAFT SYSTEMS**

*Federal Aviation Administration*

*Report Number: AV-2017-018*

*Date Issued: December 1, 2016*





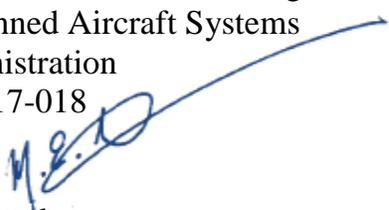
# Memorandum

U.S. Department of  
Transportation

Office of the Secretary  
of Transportation  
Office of Inspector General

Subject: **ACTION:** FAA Lacks a Risk-Based Oversight  
Process for Civil Unmanned Aircraft Systems  
Federal Aviation Administration  
Report Number AV-2017-018

Date: December 1, 2016

From: Matthew E. Hampton   
Assistant Inspector General  
for Aviation Audits

Reply to  
Attn. of: JA-10

To: Federal Aviation Administrator

The growing demand for commercial Unmanned Aircraft Systems (UAS)—for purposes ranging from filmmaking and precision agriculture to package delivery—presents one of the most significant safety challenges for the Federal Aviation Administration (FAA) in decades. Analysts predict that as much as \$93 billion will be invested in the technology worldwide over the next 10 years. FAA recently forecasted 1.9 million units in potential annual sales of UAS in 2016, which could increase to 4.3 million units sold annually by 2020.

Historically, FAA limited commercial UAS operations due in part to the lack of regulations governing their use. To address this regulatory gap, Congress granted FAA the authority in Section 333 of the FAA Modernization and Reform Act of 2012<sup>1</sup> to determine whether some UAS could operate prior to the establishment of regulations without an airworthiness certificate. Using this authority, FAA has approved over 5,500<sup>2</sup> commercial UAS to operate by exempting them from regulatory requirements. Additionally, in December 2015, FAA began requiring small UAS owners to register with FAA. Since then, FAA has received more than 500,000 UAS registrations. FAA also recently released the small unmanned aircraft rule,<sup>3</sup> which defines the operational limitations and pilot requirements for small UAS (i.e., systems weighing less than 55 pounds).

<sup>1</sup> Pub. L. No. 112-095 (2012).

<sup>2</sup> Number of exemptions issued as of August 2016.

<sup>3</sup> 14 CFR Part 107 (June 2016).

As we reported in 2014,<sup>4</sup> UAS operations present new safety oversight challenges for FAA. Given the significant and complex challenges of safely integrating UAS into the National Airspace System (NAS) and the increasing number of UAS operations, we conducted an audit of FAA's processes for approving civil UAS operations and overseeing the safe operation of UAS. Our objectives were to assess (1) FAA's process for exempting civil UAS from regulatory requirements and (2) FAA's safety oversight processes for civil UAS operations.<sup>5</sup>

We conducted our work in accordance with generally accepted Government auditing standards. Exhibit A details our scope and methodology, and exhibit B lists the organizations we visited or contacted.

## RESULTS IN BRIEF

FAA streamlined its process in 2015 for exempting civil UAS from regulatory requirements in response to increasing requests for exemptions and concerns over lengthy approval times. This enabled FAA to increase its processing rate, and the rate of exemptions granted increased over five-fold in 1 month. However, FAA's process does not verify that operators actually meet or understand the conditions and limitations<sup>6</sup> of their exemptions either before or after the application is approved. Instead, FAA relies solely on information provided up front by applicants. As a result, we identified instances where exemption holders were not in compliance with their approval (e.g., flying a UAS without a required pilot's license) or did not understand certain exemption provisions (e.g., prohibited night operations). FAA also does not track exemption holders beyond the mailing address submitted during the application process. As a result, FAA has limited knowledge of where UAS actually operate and limited means to oversee those exempted operators.

While FAA has taken some steps to advance UAS technology, the Agency has not established a risk-based safety oversight process for civil UAS operations—a key tool for focusing resources on a range of emerging risks. Moreover, FAA safety inspectors have received only limited UAS-related training and guidance. For example, as of April 2016, there were no formal, instructor-led training courses and only two outdated online courses available to inspectors focused on UAS technology. In addition, FAA field offices, which are responsible for oversight, do not receive sufficient information regarding UAS operators—such as where or when most UAS will be operating in their jurisdiction—from Agency Headquarters, hindering their ability to provide proactive oversight. At the same time, reports of UAS sightings to FAA primarily from pilots have risen to over 100 per month. Despite this increase in

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<sup>4</sup> *FAA Faces Significant Barriers To Safely Integrate Unmanned Aircraft Systems Into the National Airspace System* (OIG Report No. AV-2014-061), June 26, 2014. OIG reports are available on our Web site at <http://www.oig.dot.gov/>.

<sup>5</sup> We focused our review on small UAS which weigh less than 55 pounds.

<sup>6</sup> The conditions and limitations of exemptions include items such as the requirement to operate UAS within line of sight of the operator and to maintain and inspect UAS to ensure that it is in a condition for safe operation.

reported UAS events, FAA's enforcement actions for operators who violate UAS requirements have been limited, in part because FAA thus far has prioritized operator education over enforcement. In the absence of a risk-based oversight system, FAA inspectors respond primarily to incidents only after they are reported. FAA also lacks a robust data reporting and tracking system for UAS activity, and the information available is difficult to analyze and collected in a fragmented manner throughout the Agency. For example, one FAA office received reports indicating that an approved UAS operator was flying regularly at night—outside of exemption limitations—but due to a lack of routine analysis, this office did not provide the information to the field for further investigation until an FAA inspector requested it 4 months later in response to a complaint. As a result, FAA is currently restricted to a reactive approach to UAS oversight, rather than proactively identifying and mitigating risks with a rapidly advancing technology.

We are making several recommendations to enhance the effectiveness of FAA's oversight of civil unmanned aircraft systems.

## BACKGROUND

Introducing UAS into the NAS is challenging for both FAA and the aviation community because FAA has to integrate them into the busiest, most complex airspace in the world. UAS come in a variety of shapes and sizes and serve diverse purposes ranging from large UAS that can be used for military and agricultural use to smaller UAS used for photography and package delivery, among other purposes. Figure 1 depicts examples of large and small unmanned aircraft.

**Figure 1. Examples of Large and Small Unmanned Aircraft**



Source: FAA

FAA is still organizing the Agency to address the challenges presented by UAS technology. In 2012, FAA established the UAS Integration Office, within its Flight Standards division, to facilitate the safe integration of UAS into the NAS. Initially, the Office consolidated both Aviation Safety and Air Traffic Organization personnel under one structure within Flight Standards. However, in 2015, FAA began transitioning the UAS Integration Office to operate as a separate office within FAA's

current organizational structure and outside of Flight Standards. A new UAS integration executive, who reports directly to the Associate Administrator for Aviation Safety, was hired to manage the new office. As of July 2016, FAA had not yet fully completed the Office's formal transition.

In 2012, Congress enacted the FAA Modernization and Reform Act of 2012, which contained several provisions designed to further integrate UAS into the NAS. Section 333 of the act grants the Secretary of Transportation the authority to determine whether an airworthiness certificate is required for a UAS to operate safely in the NAS. In September 2014, FAA began using this authority to grant case-by-case exemptions for UAS commercial operators who could demonstrate their operations would not adversely affect the safety of the NAS. This process was the primary means by which UAS could perform commercial operations prior to the publication of the small UAS rule. Recreational users can choose to operate under the small UAS rule or under Section 336 of the act—the special rule for model aircraft. In addition, UAS operated by Federal, State, or local governmental agencies can operate under the small UAS rule or are authorized through a separate public-use authorization process.

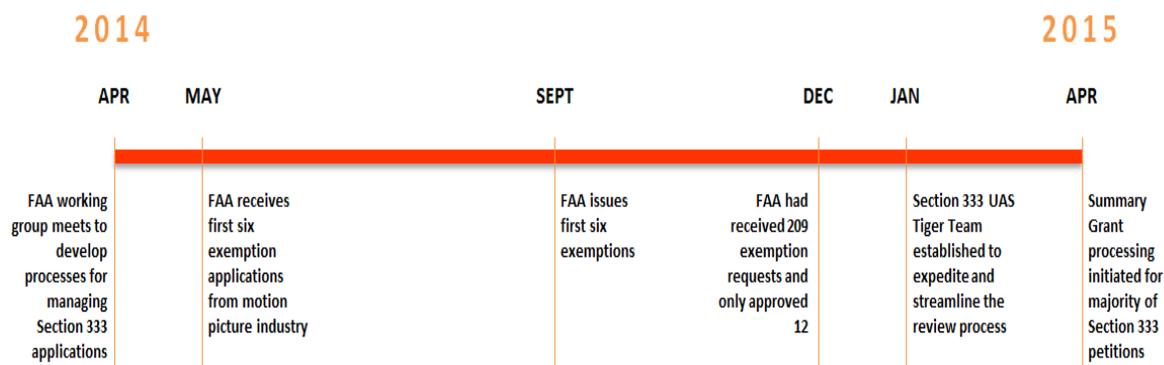
After our review was substantially completed, FAA published the small UAS rule in June 2016. While FAA anticipates the rule will now be the primary method for authorizing small UAS operations in the NAS, it includes an option for operators to apply for a certificate of waiver to deviate from sections of the rule, such as night flying and beyond line-of-sight operations, as long as the proposal demonstrates an equivalent level of safety. According to FAA officials, because the new rule is generally more permissive than Section 333 exemptions, Section 333 operators will most likely begin flying under the rule. However, the exemption process will still exist for aircraft weighing more than 55 pounds.

## **INCREASED DEMAND FOR SMALL UAS COMMERCIAL OPERATIONS LED FAA TO EXPEDITE EXEMPTIONS**

When Congress granted FAA the authority to provide exemptions from regulatory requirements to UAS operators, FAA initially adopted a conservative, time-intensive approach to reviewing applications that took as long as 215 days. However, due to a rapid increase in exemption requests and concerns with the lengthy approval time, FAA leveraged existing processes to transition to a more expedited, streamlined approach for the majority of applications.

FAA's expedited approach uses contractors and a template for processing the majority of requests, known as summary grants. If a proposed operator submits an exemption request that is substantially similar in detail to already granted exemptions (e.g., will operate below 400 feet, away from people and airports, during the day, and within visual line of sight), it receives approval in an expedited manner.

**Figure 2. Timeline of Section 333 UAS Working Group and Increase in Exemption Applications**



Source: OIG analysis of FAA data

After FAA revised the approval process, the number of exemptions it granted monthly rapidly increased from 34 in March 2015 to 314 in May 2015. The number of exemptions has continued to rise, with over 5,500 approved as of July 2016. This new process also enabled the Agency to meet its internal 120-day goal for processing exemption applications, a goal it has continued to meet until recently due to a substantial increase in the number of exemption applications. Now that the small UAS rule is in place, it is expected that exemption applications for small UAS will diminish over time. However, the exemption process will remain in place for UAS weighing over 55 pounds. Our findings from this review provide insights into the challenges FAA will face as it implements the new rule and reviews additional exemptions for large UAS.

Although FAA's streamlined practice expedited exemptions, FAA's process did not verify that the operators could meet the conditions and limitations of their exemptions either before or after the application is approved, such as the requirement to have a pilot certificate. Instead, FAA relied solely on information provided by applicants. Specifically, during the exemption review process, the applicant must submit information to FAA regarding the nature of its proposed operation, including the make/model of the UAS flown. Contractors use a checklist to determine whether the application contains sufficient information to go forward. This checklist includes items such as the regulations the applicant is seeking relief from and why granting the exemption would not adversely affect safety. All exemptions receive a final review from FAA Rulemaking personnel and are ultimately approved by the Director of Flight Standards.

At the time of our review, FAA also did not verify that the over 5,500 approved operators thoroughly understood the conditions for operating UAS technology within

the limitations of their exemption, such as by conducting knowledge tests.<sup>7</sup> While FAA employees and contractors review the information within the exemption, we identified examples of operators who claimed they did not understand certain exemption provisions, such as prohibited night operations, or flying too close to people not participating in the operation.

In addition, FAA does not track exemption holders by operating location. After receipt of an exemption, the operator receives a blanket Certificate of Waiver or Authorization (COA) from the ATO, which allows commercial UAS operations anywhere within the United States at or below 400 feet except near airports.<sup>8</sup> Exemption-holders are required to submit monthly COA activity reports if they operate their UAS (which includes the location of that operation), but the rulemaking office does not track the location of exemption holders beyond the mailing address submitted during the application process. This is problematic because exemption applicants often use attorneys to prepare and file their exemption requests. In that case, FAA only has the address of the attorney who filed the request, not the UAS operator's address. FAA officials stated that they recognize that the location of a UAS flight could affect the inherent risk of the operation, but have not established a comprehensive system to track this information. As a result, the Agency has limited knowledge of where UAS operate, and limited means to oversee those operators following a granted exemption. FAA has begun providing field offices with information on operators' base location but this does not necessarily include all operating locations.

## **FAA LACKS A RISK-BASED OVERSIGHT SYSTEM FOR CIVIL UAS OPERATIONS**

FAA does not have a fully developed risk-based process to oversee UAS operations, a key tool for focusing resources on a range of emerging risks, such as increased reports of UAS operating near airports. Additionally, aviation safety inspectors have not received sufficient guidance and training on UAS oversight, and FAA oversight offices receive limited information regarding operators in their jurisdiction, hindering their ability to proactively oversee operators. Moreover, as civil UAS operations—and reported sightings of UAS by pilots and other sources<sup>9</sup>—have increased significantly in the past year and a half, FAA's actions have focused primarily on operator education rather than enforcement. FAA also lacks an automated data and

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<sup>7</sup> Part 107 includes a requirement that small UAS pilots complete an aeronautical knowledge test.

<sup>8</sup> On March 29, 2016, FAA raised the "blanket" altitude authorization from 200 feet to 400 feet. This resolved contradictory language between the Section 333 exemptions and their corresponding blanket COAs. Restrictions near airports include not flying within 5 nautical miles if it is a towered airport, 3 nautical miles if it is non-towered, but has an instrument approach procedure, and 2 nautical miles if it has no tower and no instrument approach procedure.

<sup>9</sup> While sightings are primarily reported by pilots, reports also come from air traffic controllers, law enforcement officers, and the general public.

reporting tracking system for current UAS activity and has not established a centralized database for reporting and classifying UAS incidents.

### **Aviation Safety Inspectors Receive Limited Guidance and Training on UAS Oversight**

According to FAA officials, the current Flight Standards policy and processes require continual updating of inspector guidance, a complete review every 3 years, and inclusion of inspector feedback. However, FAA has issued limited guidance to its inspector workforce regarding oversight of civil UAS operations. In August 2015, FAA issued a notice to inspectors regarding FAA's policy to use education and outreach as a primary means to resolve incidents related to unauthorized UAS operations. While the notice provided inspectors with information on responding to unauthorized UAS activity, the Agency has not provided comprehensive guidance on how to conduct proactive oversight, including that of the over 5,500 operators it has already authorized to operate commercially. In March 2016, FAA cancelled this guidance because the Agency determined that inspectors should use the existing inspector handbook chapter on compliance and enforcement for regular certificated manned aircraft. While FAA has dedicated a portion of its inspector handbook to UAS, the Agency is still developing sections, including responsibilities of UAS inspectors.

In addition, FAA has not yet developed sufficient training on UAS oversight, although efforts are underway to do so. FAA safety inspectors we interviewed routinely expressed their frustration at the lack of UAS-related training. As of April 2016, there were only two online courses available to inspectors focused on UAS, and neither was updated to reflect the rapidly evolving UAS industry, such as increasing commercial operations—the most recent having been last revised in January 2014. FAA has recently added modules on UAS to its traditional accident investigation courses, and has other training on UAS in development. However, there are no in-person, instructor-led dedicated UAS training courses at FAA's Oklahoma City training center, and an FAA training official stated that it is unknown when or if the Agency will develop them. As a result, most FAA inspectors still have limited knowledge about when and how to conduct oversight of UAS operators.

To help spread awareness about UAS oversight issues among aviation safety inspectors, FAA initiated a program in 2015 to designate one to two safety inspectors in each FAA oversight office as "UAS focal points." These inspectors are responsible for being liaisons with the UAS Integration Office and serving as an information source for office personnel. Their requirements include taking online UAS training and participation in the weekly teleconference calls with the UAS Integration Office. According to FAA, the Agency formed an Oversight and Compliance Focal Team in

March 2016, to facilitate communication and outreach activities between field personnel and UAS policy offices at the Headquarters level.

While the UAS focal point inspectors we interviewed found aspects of these teleconferences helpful, inspectors at three of the four offices we visited were frustrated at the lack of direct answers to the questions asked from the field, and thought the presentations were not relevant to their day-to-day work. Inspectors told us that greater attention is needed on the Agency's interpretation of UAS operating rules and what their exact roles and responsibilities were. Meeting minutes from the weekly teleconferences also illustrate that inspectors are uncertain or concerned about several areas, including the requirements for when a UAS operator can fly close to an airport and how to classify accidents/incidents.

### **FAA Oversight Offices Receive Limited Information Regarding Section 333 Operators in Their Jurisdiction**

FAA's oversight of UAS is also limited because local oversight offices receive no notice of UAS flight activity in their region. For example, local FAA oversight offices do not receive notification when UAS operators have been given approval to operate in their assigned areas. While Section 333 exemptions are posted online, there is no way to search them by zip code, and the address provided to FAA may not correspond to where the approved UAS operations are taking place. For example, we identified 1 operator who flew UAS in 12 locations across 6 states in the span of 1 month. As a result, inspectors may not be aware of UAS operating in their area and are unable to conduct proactive checks of UAS operations. Under the small UAS rule, inspectors will be faced with similar challenges.

The only time local inspectors are routinely informed of a UAS operation is if the UAS operator is directly engaged in filmmaking, as filmmakers are required to submit a plan of activities to the local FAA office. However, unlike for manned aircraft, where the office can either accept or reject a plan of activities for the proposed filmmaking operation, there is no requirement for FAA to review and either accept or reject activity plans for UAS operators. While inspectors in two offices we reviewed took corrective action when they noted a hazard in submitted UAS filmmaking plans, other offices may not take similar actions as there was no specific guidance to do so.

Without receiving information about UAS operations in their areas, inspectors' ability to conduct planned oversight of UAS is limited. At this time, FAA has not made conducting planned surveillance a priority because small UAS operations are considered low risk. However, while small UAS may pose a low risk if operated according to the conditions and limitations set forth in exemptions and the provisions of their COA, the full range of safety risks are unknown. For example, FAA does not yet know the effect a small UAS would have if ingested into an aircraft engine. FAA is currently conducting studies to determine the effect of a small UAS impacting a

transport category airplane. Engine-ingestion is one potential risk, but other potential hazards exist such as impact with helicopter tail rotors, aircraft cockpits, fuel systems, and wing structure.

In addition, the implications for FAA's long term approach to oversight are also uncertain. Some FAA officials compared UAS oversight to that for general aviation operations. While there are some similarities, unlike UAS, general aviation aircraft do receive annual inspections under FAA's designee program. In addition, general aviation aircraft can usually be detected on radar and use known airports; small UAS are not detectable by FAA's current radar system and can depart from virtually anywhere.

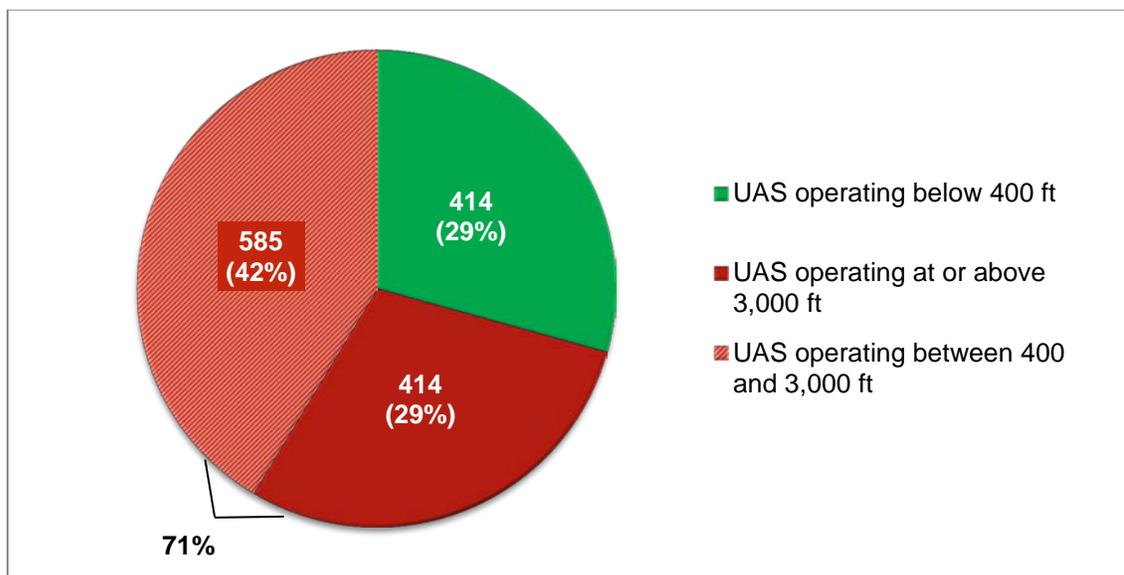
### **FAA's Actions Taken for UAS Violations Focus Primarily on Operator Education**

As the number of UAS operating in the NAS increases, FAA faces additional oversight and enforcement challenges. UAS sightings by pilots and other sources have increased dramatically, with over 1,100 UAS events reported to FAA in 2015 compared to just 238 in 2014, according to UAS event data. The number of monthly reports has increased from over 60 in August 2015 to over 100 in March 2016. As shown in figure 3, 71 percent of reported sightings occurred at altitudes at or above the 400 feet maximum FAA-authorized altitude for civil UAS—with 42 percent of those sightings between 400 feet and 3,000 feet, and 29 percent of sightings reported at altitudes at or above 3,000 feet, approaching areas where other aircraft operate. Twenty-one percent of sightings were reported to be within 500 feet of the aircraft. Finally, 4 percent of sightings resulted in a pilot of a manned aircraft taking evasive action and/or declaring a near miss.<sup>10</sup> It is important to note that FAA has not verified the validity of the reports received by air traffic, but the data indicate that a number of UAS operators may be flying their aircraft outside of FAA guidelines.

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<sup>10</sup> OIG conducted an analysis of 1,411 UAS events reported between November 2014 and January 2016.

**Figure 3. UAS Event Reports Above and Below 400 Feet**



Source: OIG analysis of FAA data

FAA has taken limited enforcement actions in response to these incidents. This is in part because, unlike with most manned aircraft, FAA cannot always identify the operator and locate the aircraft when these events occur. As of April 2016, the Agency had initiated 30 enforcement actions; 12 of these are open and 18 are closed, with the total amount in civil penalties collected equaling \$22,805. One of the enforcement cases, which involved 3 years of investigations, involves an operator cited for 47 unauthorized UAS flights in congested airspace and over heavily populated cities with a proposed penalty of \$1.9 million.

This limited number of enforcement actions is also due to FAA's current oversight philosophy, which places a priority on operator education over enforcement. FAA's guidance on responding to unauthorized UAS operations issued in August 2015 states FAA will use outreach and education to encourage voluntary compliance. It also provides inspectors with limited guidance regarding how to investigate an unauthorized operation, and suggests formal disciplinary action only if willful noncompliance is evident after educational outreach has first been attempted. In comparison to the 30 enforcement actions initiated by FAA as of April 2016, FAA has issued at least 625 education letters over that same time period.

Many UAS violations occur by unauthorized operators, presenting further enforcement challenges. However, inspectors provided us with examples of approved operators that did not follow the conditions and limitations governing their operation. For example:

- One operator was contacted by local law enforcement after operating 1 mile away from a major airport—this is in direct violation of the operator’s approval, which prohibits operations within 5 nautical miles of an airport without a formal agreement. When contacted by the local FAA office, the operator informed them he was unaware of the operating limitations because he did not read and comprehend his exemption. FAA issued a warning letter to the operator.
- A local FAA office learned that an exemption holder planned to operate a UAS in a filmmaking activity that was not permitted in their exemption’s conditions and limitations. FAA advised them not to proceed with the filmmaking activity. However, the operator proceeded anyway, and FAA took an enforcement action.

In addition to education and outreach, FAA has taken steps to identify and detect UAS operations and increase awareness among operators, such as requiring them to register their aircraft and pursuing technology to detect UAS operating near airports. However, the Agency has taken action primarily after incidents occur. As a result, FAA is currently restricted to a reactive approach to UAS oversight, rather than proactively identifying and mitigating risks.

### **FAA Lacks a Robust Data Reporting and Tracking System for UAS Activity and Data**

FAA lacks a comprehensive, centralized data reporting and tracking system for civil UAS activity, further limiting its ability to conduct effective risk-based oversight. Currently, FAA receives civil UAS data from a variety of sources, but these data do not go to the same offices within FAA. For example, FAA maintains UAS data in both its Air Traffic Organization (ATO) and in Flight Standards. Agency officials told us in January 2016 that MITRE<sup>11</sup> was planning to conduct a gap analysis of UAS data prior to creating a centralized database. However, as of April 2016, FAA has not tasked MITRE with further work on a database because the Agency is in the process of defining its data requirements, according to FAA representatives.

In addition to lacking a centralized database, FAA has not established a process to effectively share and analyze UAS oversight information across the Agency. In particular, performance and operational data collected by ATO on monthly UAS activity are not regularly shared with Flight Standards. All civil COA holders, which include all exemption holders, are required to submit monthly activity reports describing the aircraft used, operating location, and any incidents that occurred. This information currently goes to the ATO but is only shared with Flight Standards upon request. We identified one incident in which an exemption holder was operating at night and without a registration number on their UAS, which is not in compliance

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<sup>11</sup> MITRE Corporation manages a Federally Funded Research and Development Center (FFRDC) for FAA known as the Center for Advanced Aviation System Development (CAASD). CAASD is an organization that assists FAA with scientific research and analysis.

with the conditions of their exemption. ATO received reports indicating these actions were occurring for 4 months, but no action was taken because these reports are not routinely analyzed. A regional inspector only discovered this ongoing activity after requesting these reports as part of an investigation prompted by a complaint.

Furthermore, the database used by inspectors to log UAS-related activities lacks consistency and does not lend itself to analysis. Specifically, FAA inspectors use the Program Tracking and Reporting Subsystem (PTRS)<sup>12</sup> to record UAS incidents, such as UAS operating over crowded stadiums, public parks, near airports, and hitting pedestrians. While FAA has directed inspectors to use a particular designator for UAS entries, the database is not capable of robust analysis. This is due to a lack of standardization in data entries and the wide variety of items that can be entered under the UAS designator, ranging from training and meeting attendance to complaints received from citizens. As a result, FAA's ability to track UAS incidents, identify trends, and assess risk remains significantly limited.

## **CONCLUSION**

The proliferation of civil UAS activity in the United States presents substantial technological and commercial opportunities for American businesses, but also a significant safety challenge for FAA and the aviation community. While FAA has taken many steps to advance use of UAS, the Agency has not yet established a risk-based approach to UAS oversight to most effectively identify and mitigate UAS safety risks. Such an approach will require sufficient guidance and training for inspectors, establishing the capacity for integrated UAS data and analysis, and some means to verify and evaluate UAS operators' compliance beyond responding to reported incidents. Unless FAA can adopt a more proactive approach to civil UAS oversight, the Agency cannot ensure that approved UAS are operating safely in our airspace.

## **RECOMMENDATIONS**

To enhance the effectiveness of FAA's oversight of civil UAS, we recommend that the Federal Aviation Administrator:

1. Establish specific milestones to update and maintain UAS guidance to keep pace with technological developments and incorporate inspector feedback.
2. Develop comprehensive and updated training for safety inspectors on UAS technologies and Agency rules and guidance related to UAS oversight.

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<sup>12</sup> FAA database that provides for the collection, storage, retrieval, and analysis of information resulting from FAA inspections and surveillance (e.g., airline inspections).

3. Initiate a periodic process to perform inspections of commercial UAS operators based on operational factors (e.g., location, number of operations, and type of activity) to verify knowledge of and compliance with FAA requirements and to inform the development of a risk-based oversight plan.
4. Design and implement a risk-based and prioritized oversight plan for UAS to help ensure safe operations of UAS.
5. Develop and implement a process to coordinate existing disparate UAS databases within FAA to facilitate data mining and safety analysis.
6. Implement a process to share UAS data with field oversight offices to assist inspectors in risk-based and proactive oversight of civil UAS operations.

## **AGENCY COMMENTS AND OFFICE OF INSPECTOR GENERAL RESPONSE**

We provided FAA with our draft report on October 5, 2016, and received its response on November 2, 2016, which is included as an appendix to this report. FAA concurred with all six of our recommendations. FAA proposed appropriate planned actions and completion dates for recommendations 5 and 6, and we consider these recommendations resolved but open pending completion of the planned actions. We are requesting that FAA provide additional information for recommendations 1 through 4, as detailed below.

FAA requested that we close recommendations 1 and 2, stating that the Agency updated its inspector guidance concurrently with the new UAS rule and updated the training in July 2016. However, we need additional information to determine whether the guidance and training meet the intent of our recommendations and if FAA plans to develop additional guidance. This is important given the rapidly evolving nature of UAS technology and its impact on the inspector workforce. Therefore, we request that the Agency provide us with the specific updated guidance and training course materials, and milestones for any planned reviews to determine if future updates are needed.

FAA requested that we close recommendation 3, stating the Agency already has a periodic inspection process in place and has determined that the Agency's current risk-based oversight plan for manned aircraft is applicable to UAS; thus, a separate plan is unnecessary. However, FAA did not provide information on the operational factors inspectors should use in selecting operators for inspection (e.g., location, number of operations, and type of activity) or the frequency of its periodic inspection process. Further, it is not clear whether FAA is referring to its oversight process for general aviation or commercial airline operations—there are important differences in

the level and thoroughness of oversight among varying types of operators. As we note in our report, some FAA officials compared UAS oversight to that for general aviation operations. Therefore, we request that FAA provide additional information on how it will determine the operational factors that will be used in selecting UAS operators for inspection, the frequency of its periodic inspection process, and the risk-based plan for manned aircraft that FAA intends to use to oversee UAS.

FAA requested that we close recommendation 4, stating it had established guidance for site visits of UAS operators. While FAA's guidance provides steps for performing inspections, it is not clear how the Agency will prioritize its inspections to target higher risk operators. Furthermore, given that FAA does not plan to implement a process to share UAS data—a key element of a risk-based approach—with field offices until November 2017, it is unclear how FAA's process constitutes a risk-based oversight plan. Therefore, we request that the Agency provide us with clarification and information on how it intends to oversee UAS operators, including the risk-based elements that will be used to prioritize inspections and guide Agency oversight efforts.

## **ACTIONS REQUIRED**

FAA provided appropriate planned actions and completion dates for recommendations 5 and 6, and we consider them resolved but open pending completion of the planned actions. For recommendations 1 through 4, we are requesting that FAA provide additional information, as detailed above. In accordance with DOT Order 8000.1C, we request that FAA provide this information within 30 days of the date of this report. Until we receive this additional information, we consider these recommendations open and unresolved.

We appreciate the courtesies and cooperation of FAA representatives during this audit. If you have any questions concerning this report, please call me at (202) 366-0500 or Robin P. Koch, Program Director, at (404) 562-3770.

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cc: DOT Audit Liaison, M-1  
FAA Audit Liaison, AAE-100

## **EXHIBIT A. SCOPE AND METHODOLOGY**

We conducted this review between October 2015 and October 2016 in accordance with generally accepted Government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide 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.

We conducted our audit work at multiple FAA offices. We met with officials from the UAS Integration Office to acquire updated information on their evolving roles and responsibilities concerning civil UAS integration. We visited the FAA rulemaking and air traffic offices at headquarters to observe the processing of Section 333 applications and associated Certificates of Waiver or Authorization (COA). We met with representatives of 4 of 77 Flight Standards District Offices (FSDO). These offices were chosen because they have high rates of UAS activity. We spoke with aviation safety inspectors tasked as UAS “focal points” to obtain their perspectives on civil UAS and the challenges they are facing with integration. We also interviewed air traffic controllers at air traffic control towers (ATCT) with high UAS activity. Additionally, we spoke with regional UAS specialists.

To assess FAA’s process for exempting civil UAS from certification requirements, we reviewed policies and procedures pertaining to Section 333 exemptions and general UAS oversight. We obtained a list of approved exemptions and reviewed select exemptions, as well as the materials used to evaluate them, including checklists. We obtained and reviewed the small UAS rule published in June 2016.

To assess how FAA conducts oversight for civil UAS operations, we interviewed safety inspectors and UAS focal points to inquire about their current surveillance activities for UAS. We reviewed FAA inspection records and correspondence, as well as enforcement data. We also questioned air traffic controllers about their experiences with UAS and the Agency guidance available to them. We also obtained and reviewed the UAS safety events reported to the internal air traffic database by pilots, law enforcement agencies, citizens, and air traffic control facilities between November 2014 and March 2016.

## EXHIBIT B. ORGANIZATIONS VISITED OR CONTACTED

### Federal Aviation Administration:

Flight Standards Service	Washington, DC
UAS Integration Office	Washington, DC
Emerging Technologies Team	Washington, DC
Office of Rulemaking	Washington, DC
Office of the Chief Counsel	Washington, DC
Southern Region	College Park, GA
Western Pacific Region	Lawndale, CA
Van Nuys FSDO	Van Nuys, CA
Long Beach FSDO	Long Beach, CA
New York FSDO	Garden City, NY
South Florida FSDO	Miami, FL
Burbank ATCT	Burbank, CA
John F. Kennedy ATCT	Jamaica, NY
LaGuardia ATCT	Queens, NY
Miami ATCT	Miami, FL

### Other Organizations

Amazon.com, Incorporated	Washington, DC
Small UAV Coalition	Washington, DC

**EXHIBIT C. MAJOR CONTRIBUTORS TO THIS REPORT**

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## Federal Aviation Administration

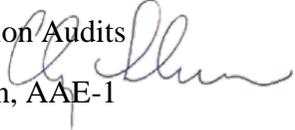
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# Memorandum

Date: November 2, 2016

To: Matthew E. Hampton, Assistant Inspector General for Aviation Audits

From: H. Clayton Foushee, Director, Office of Audit and Evaluation, AAE-1 

Subject: Federal Aviation's (FAA) Response to the Office of Inspector General (OIG)  
Draft Report: FAA Lacks a Risked-Based Oversight Process for Civil  
Unmanned Aircraft Systems (UAS)

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The FAA has made significant progress toward integrating Unmanned Aircraft Systems (UAS) into the National Airspace System (NAS). A significant regulatory milestone was accomplished on August 29, 2016, when Part 107 of Title 14 of the Code of Federal Regulations became effective. This rule enables small UAS operations conducted within visual line-of-sight of the operator. Prior to the finalization of this rule, exemptions were granted based upon the authority in Section 333 of the FAA Modernization and Reform Act of 2012, which allowed commercial UAS operations in specific, low-risk situations. The new rule greatly reduces the need for exemptions. The FAA also published an Advisory Circular (AC) and updated its guidance to inspectors. These documents provide clarity for operators, as well as Agency oversight personnel. The FAA also conducted training in each Flight Standards District Office between June and August 2016 to provide safety inspectors a clear understanding of the Part 107 rule.

In December 2015, the Agency also issued an Interim Final Rule on Registration and Marking Requirements for Small Unmanned Aircraft, which applies to UAS weighing over 0.55 lbs. (250 grams) and under 55 lbs. The FAA used the registration process to educate users about how to safely operate UAS in the NAS. Prior to completing the process, registrants read and acknowledge safety guidelines, which include instructions prohibiting flight near manned aircraft and always within visual line-of-sight of the operator.

The new registration requirement also enables law enforcement and regulators to identify an operator quickly in the event of an incident or accident. In January 2015, the FAA published guidance for the law enforcement community on the UAS website and is actively engaged with law enforcement agencies at the federal, state and local levels. The FAA also encourages citizens to call local law enforcement if they feel someone is endangering people or property on the ground or in the sky and to report incidents to the FAA Hotline. Local law enforcement officials routinely work with local FAA field offices to ensure that reported safety issues are investigated and addressed.

The use of technology to meet the safety and security needs of airports is another primary focus of the UAS oversight program. As part of the “UAS Detection near Airports” initiative, the Agency is performing an assessment of UAS detection and tracking technology in cooperation with its interagency partners. The goal of this evaluation is to determine whether there is suitable technology which can be deployed at airports to detect and potentially disable UAS encroaching in controlled airspace.

The FAA concurs with the 6 recommendations, as written. We have already implemented recommendations 1 through 4 and request closure. For recommendation 1, we published AC 107-2 on June 21, 2016 and updated inspector guidance concurrent with the implementation of Part 107. For recommendation 2, the Part 107 small UAS course was updated on July 15, 2016. With regard to recommendation 3, we already have a periodic process in place. We have determined that the existing manned aircraft, risk-based oversight plan is applicable to UAS, and therefore, a separate plan specifically for unmanned aircraft is not necessary. For recommendation 4, guidance for conducting site visits of UAS operations was updated in FAA Order 8900.1, Volume 16, Chapter 5, on August 29, 2016. The Agency will implement recommendation 6 by November 1, 2017, and recommendation 5 will be implemented by March 30, 2018, due to the amount of external stakeholder coordination that will be required.

We appreciate this opportunity to offer additional perspective on the OIG draft report. Please contact H. Clayton Foushee at (202) 267-9000 if you have any questions or require additional information about these comments.