



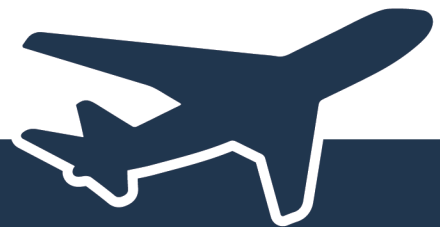
U.S. DEPARTMENT OF TRANSPORTATION
OFFICE OF INSPECTOR GENERAL

**Opportunities Exist for FAA To
Strengthen Its Review and Oversight
Processes for Unmanned Aircraft System
Waivers**

FAA

Report No. AV2019005

November 7, 2018





Opportunities Exist for FAA To Strengthen Its Review and Oversight Processes for Unmanned Aircraft System Waivers

Self-Initiated

Federal Aviation Administration | AV2019005 | November 7, 2018

What We Looked At

Unmanned Aircraft Systems (UAS) represent a substantial economic and technological opportunity for the United States. To advance the safe integration of commercial UAS into the National Airspace System (NAS), the Federal Aviation Administration (FAA) published a rule for small UAS in June 2016. However, the rule does not permit several operations that are highly valued by industry but considered to be higher risk, such as operating beyond line of sight or over people. To accommodate these operations, the rule allows FAA to issue waivers. Given the significant safety implications of integrating UAS into the NAS and an increase in the number of both requested and approved UAS waivers, we initiated an audit of FAA's approval and oversight processes for UAS waivers. Specifically, our objectives were to assess FAA's processes for (1) granting waivers under the rule for small UAS operations and (2) conducting risk-based oversight for UAS operators with waivers.

What We Found

FAA established processes for reviewing and granting waivers but has experienced difficulties obtaining sufficient information, managing the volume of requests, and communicating with applicants, particularly in explaining reasons for denying requests. As a result, FAA's Flight Standards office has disapproved 73 percent of operational waiver requests (e.g., over people and beyond line of sight), and a significant backlog of waiver requests to operate in airspace with manned aircraft exists. Although the Agency has improved its guidance and processes, FAA may continue to experience difficulty with review timeliness and responsiveness, given the growing demand for UAS operations, which could increase the risk that operators may continue to bypass established processes and operate without Agency approval. Further, FAA is still in the early stages of developing a risk-based oversight system for UAS operations. While FAA has developed guidance for planning annual inspections, few UAS operators have received inspections to verify their compliance with regulations and the terms of their waivers. Moreover, the Agency's ability to perform meaningful risk-based surveillance is hindered by limited access to detailed UAS operator, FAA inspection, and risk data. As a result, FAA does not have assurance of operators' compliance with regulations, is not well-positioned to develop an oversight strategy, and is missing opportunities to gather information that will help shape rulemaking and policies.

Our Recommendations

We made eight recommendations to the Federal Aviation Administrator regarding strengthening the Agency's review and oversight processes for UAS waivers. FAA concurred with seven of our recommendations and partially concurred with one recommendation.

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Memorandum

Date: November 7, 2018

Subject: ACTION: Opportunities Exist for FAA To Strengthen Its Review and Oversight Processes for Unmanned Aircraft System Waivers | Report No. AV2019005

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

To: Federal Aviation Administrator



Unmanned Aircraft Systems (UAS) represent a substantial economic and technological opportunity for the United States. The Federal Aviation Administration (FAA) has forecast that the number of UAS in the United States is likely to approach 3 million by 2022, increasing from an estimated 1.2 million in 2017. Since December 2015, FAA has processed more than 1.1 million UAS registrations for commercial operators and hobbyists.¹ However, the growing demand for commercial UAS—for purposes ranging from pipeline inspection and precision agriculture to package delivery—also presents one of the most significant safety challenges FAA has faced in decades. For example, in February 2018, an unauthorized UAS was reported to have flown well above the maximum allowed altitude and close to a commercial passenger jet as it was approaching McCarran International Airport near Las Vegas, NV.

To advance the safe integration of commercial UAS in domestic airspace, FAA published a rule for small UAS (i.e., systems weighing less than 55 pounds) in June 2016.² However, the rule does not permit several potential UAS operations that are highly valued by industry but considered to be higher risk by FAA, such as operating a small UAS beyond line of sight or over people. To accommodate these highly valued operations, the rule allows FAA to issue waivers. These waivers are reviewed and approved by FAA's Flight Standards Service and Air Traffic Organization (ATO). In addition, as part of the rule, all UAS operators

¹ The National Defense Authorization Act of 2018 reinstated the UAS registration requirement, previously rescinded in May 2017 by the U.S. Court of Appeals for the D.C. Circuit in *Taylor v Huerta*. As of May 18, 2018, approximately 187,000 registrations were for commercial operators and the remainder—more than 918,000—were for hobbyists.

² 14 CFR Part 107 (June 2016).

(including those with waivers) that intend to fly in controlled airspace³—such as near an airport—must obtain separate authorization from ATO.

Before the small UAS rule was issued, FAA had to process requests to conduct commercial UAS operations on a case-by-case basis.⁴ As we reported in 2016,⁵ FAA faced challenges keeping pace with the increase in UAS commercial operation requests, overseeing approved UAS operators, and establishing a risk-based oversight process for UAS. Given the significant safety implications of integrating UAS into the National Airspace System (NAS) and an increase in the number of both requested and approved UAS waivers, we initiated an audit of FAA's approval and oversight processes for UAS waivers. Specifically, our objectives were to assess FAA's processes for (1) granting waivers under the rule for small UAS operations and (2) conducting risk-based oversight for UAS operators with waivers.

We conducted this audit 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.

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.

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

³ Controlled airspace is a term that covers the different classifications of airspace within which FAA air traffic control services are provided.

⁴ UAS operations were prohibited prior to the rule, but FAA was allowed to issue regulatory exemptions under the authority granted by Congress in Section 333 of the FAA Modernization and Reform Act of 2012.

⁵ *FAA Lacks a Risk-Based Oversight System for Civil Unmanned Aircraft Systems* (OIG Report No. AV2017018), December 1, 2016). OIG reports are available on our website at <http://www.oig.dot.gov/>.

Results in Brief

FAA established processes for reviewing and granting waivers but has experienced difficulties obtaining sufficient information, managing the volume of waiver requests, and communicating with applicants.

FAA implemented an online application process for operators to submit waiver and airspace authorization requests, including an internal checklist to streamline the review of waiver requests under the small UAS rule. However, FAA has faced several difficulties with its waiver review processes, including processing applications with limited information and responding to the large volume of requests received since the issuance of the small UAS rule. As of May 2018, the Agency has approved about 10 percent of the over 18,900 total waiver requests received by FAA’s Flight Standards and ATO offices. Complex waivers—such as requests to operate beyond visual line of sight—are taking longer for Flight Standards to review due to insufficient safety information provided by applicants, challenges in intra-agency coordination, and lack of guidance to FAA staff and applicants. In addition, ATO has not kept pace with the volume of waiver requests to operate UAS in the same airspace with manned aircraft near airports (also known as “controlled airspace”), resulting in a significant backlog. According to ATO managers, this is due to a lengthy, manual review process and insufficient staff dedicated to reviewing airspace waiver applications. As a result, many UAS operators reported frustration with the application process and told us it had led to some operators bypassing FAA’s approval process altogether. In our survey of small UAS operators,⁶ almost 90 percent reported FAA’s waiver processing was too slow. In addition, FAA has not effectively or consistently communicated with waiver applicants regarding the status and results of their applications, particularly in explaining reasons for denying an application. FAA has taken steps since November 2017 to improve its guidance and processes, including introducing an automated system to expedite airspace authorizations. However, the Agency may continue to experience difficulty with review timeliness and responsiveness, given the growing demand for UAS operations, which could increase the risk that operators may continue to bypass FAA’s established processes and operate without Agency approval.

⁶ We interviewed 18 commercial UAS operators and conducted a survey of 312 operators to obtain their perspectives on FAA’s waiver approval and oversight processes. We received 178 responses for a response rate of 57 percent. For more details, see exhibit A, Scope and Methodology, and exhibit C for a summary of our survey results.

FAA is still in the early stages of developing a risk-based oversight system for commercial UAS operations, including airspace users with waivers.

While FAA has developed guidance for planning annual UAS inspections, the Agency's UAS oversight is neither data-driven nor proactive and lacks key elements of a risk-based oversight system. For example, the guidance does not include risk or operational factors to consider when choosing operators for inspection. Although FAA officials state that they believe small UAS operations to be relatively low-risk in comparison to other types of aircraft operations, not all commercial UAS operators are identical and their risk factors differ, particularly given that waivers have been granted for operating at night, over people, and in busy, complex airspace near major airports. In addition, few UAS operators have received FAA inspections to verify their compliance with regulations and the terms of their waivers. Overall, FAA's ability to perform meaningful risk-based surveillance is hindered by limited access to detailed UAS operator, FAA inspection, and risk data. For example, FAA Headquarters has not provided field office inspectors with information regarding the locations of UAS operations in their area. Moreover, FAA's UAS oversight efforts have primarily focused on outreach and education with limited enforcement action, despite the growth of the industry. Further, while the Agency has provided some guidance on what constitutes prohibited operations over people—a key provision of the small UAS rule—the guidance lacks clarity, leading to inconsistent interpretations by UAS operators. As a result of these issues, FAA does not have assurance that operators are in compliance with regulations, is not well-positioned to develop an oversight strategy for areas of risk in this rapidly-evolving industry, and is missing opportunities to gather information that will help shape rulemaking and impact policies.

We are making eight recommendations to improve the effectiveness of FAA's processes for reviewing applications for UAS waivers and authorizations and for conducting risk-based oversight for UAS operators with waivers.⁷

Background

The FAA Modernization and Reform Act of 2012 was the first step toward allowing commercial UAS into the NAS. This act authorized FAA to approve small, commercial UAS operations on a case-by-case basis using a regulatory

⁷ In some areas, we are not making recommendations because FAA already took action to address issues identified during the course of our review, or is still working on actions to address applicable open recommendations from our 2016 report.

exemption process. In June 2016, FAA published a rule permitting small UAS to fly commercially in certain airspace⁸ with a number of operational restrictions. However, the rule also allows commercial UAS operators to apply for a certificate of waiver⁹ to deviate from several operating provisions if the Agency finds the proposed operation can be performed safely (see table 1).

Table 1. Small UAS Rule Provisions Subject to Waiver

Operations From a Moving Vehicle (§ 107.25)	Daylight Operation (§ 107.29)
Visual Line of Sight (§ 107.31)	Visual Observer (§ 107.33)
Operations of Multiple Small UAS (§ 107.35)	Yielding Right of Way (§ 107.37a)
Operations Over People (§ 107.39)	Operations in Certain Airspace (§ 107.41)
Maximum Ground Speed (§ 107.51a)	Maximum Altitude (§ 107.51b)
Minimum Flight Visibility (§ 107.51c)	Cloud Minimum (§ 107.51d)

Source: OIG analysis of 14 CFR §107.205, *List of regulations subject to waiver*

Small UAS operators desiring to fly in controlled airspace, such as near airports, can either apply for an airspace authorization or a waiver. According to FAA, airspace authorizations are the most direct and efficient mechanism to request access to controlled airspace. FAA may also issue airspace waivers if applicants include information demonstrating that a UAS can operate safely in controlled airspace without having to seek prior air traffic control authorization. Applicants must include information to demonstrate safety mitigations through equipment, technology, and/or other operational parameters. Waivers take longer to process and require these additional safety justifications but are valid for a longer period of time.¹⁰

UAS is a cross-cutting area for FAA, with personnel from numerous FAA offices having roles and responsibilities in the UAS waiver review and oversight processes. This includes Headquarters staff from FAA’s Flight Standards Service and ATO, as well as contractors and field personnel. For example, air traffic controllers are responsible for creating UAS airspace maps for their air traffic tower facilities and assisting ATO Headquarters personnel with reviewing airspace authorization requests. Additionally, Flight Standards inspectors from the 78 field offices nationwide are responsible for conducting oversight via inspections and investigations of UAS operators (see figure 1).

⁸ UAS operations are allowed by the rule in airspace where FAA air traffic control services are not provided (Class G). Operation in all other “controlled” airspace classes requires authorization from ATO (Class B, C, D, and E).

⁹ UAS operators flying under the small UAS rule must pay \$5 to register their aircraft; however, FAA does not require operators to pay to obtain a waiver or authorization.

¹⁰ Waivers are valid for up to 2 years, whereas authorization times vary. Authorizations can be for a specific time requested by the applicant (e.g., 7 days, 20 days) up to a maximum of 1 year.

Figure 1. FAA Roles and Responsibilities Related to UAS Waivers

Select Roles & Responsibilities	Air Traffic Organization (ATO)		Flight Standards Service (AFS)	
	Headquarters	Towers (Field)	Headquarters	Offices (Field)
Approve waivers for: <ul style="list-style-type: none"> • Yielding right of way • Operations in certain airspace • Going above maximum altitude 	●		●	
Approve waivers for: <ul style="list-style-type: none"> • Operations beyond visual line of sight • Operations from a moving vehicle • Operations at night • Operations without a visual observer • Operations of multiple UAS • Operations over people • Maximum ground speed • Minimum flight visibility • Cloud minimum 	●		●	
Review & approve airspace authorizations	●	●		
Create & update UAS facility maps		●		
Develop UAS oversight & safety policy			●	
Perform UAS operator oversight, surveillance, inspections, & investigations				●
KEY: ● - Primary responsibility ● - Coordination, if needed				

Source: OIG analysis of FAA information

FAA has permitted small UAS to be operated by hobbyists for recreational, non-commercial uses under the special rule for model aircraft,¹¹ and the Agency uses an exemption process to authorize operations for UAS weighing more than 55 pounds. In addition, UAS operated by Federal, State, or local government agencies can choose to operate under the small UAS rule, or can operate through a separate public-use authorization process.

FAA is currently engaged in developing rulemaking to lessen the need for individual waivers. FAA plans to collect data derived from the current waiver process to inform future policy decisions and rulemaking efforts. Specifically, the

¹¹ 14 CFR Part 101, Subpart E—Special Rule for Model Aircraft (June 2016). After the conclusion of our audit work, Congress passed the 2018 FAA Reauthorization Act (Pub. L. 115-254, October 5, 2018), which sets forth new requirements for recreational operation of unmanned aircraft.

Agency has two UAS rulemakings in process related to broadening allowable UAS operations: (1) operations over people and (2) expanded operations. However, it is uncertain what types of operations FAA will allow in these rulemaking projects or when they will be issued for public comment. For example, although the proposed rule for allowing operations over people was originally scheduled to be published in December 2016, FAA currently estimates the proposed rule will be published in December 2018.

FAA Is Experiencing Difficulties With Obtaining Sufficient Information, Managing the Volume of Waiver Requests, and Communicating With Applicants

FAA established processes for reviewing and granting waivers under the small UAS rule. However, the Agency has faced several difficulties with its waiver review processes, including managing the volume of requests and processing applications with limited information. In addition, the Agency has not effectively and consistently communicated with waiver applicants regarding the status and results of their applications. As a result, many UAS operators reported frustration with timeliness of the application process and FAA responsiveness.

FAA Implemented Review Processes but Is Having Difficulty Obtaining Sufficient Information and Managing the Volume of Waiver Requests

Upon the issuance of the small UAS rule, FAA implemented an online application process, including developing an internal checklist, to assist Agency staff and contractors¹² in reviewing applications and deciding whether or not they are approved.¹³ Overall, between Flight Standards and ATO, FAA has approved about

¹² FAA uses contractors in Flight Standards to review less complex waiver applications, and in ATO to review airspace authorization applications.

¹³ The results of how completely the application meets the checklist criteria determine whether FAA approves, denies, or sends a letter requesting further information from the applicant. If the checklist is less than 50 percent complete, the application is automatically denied. If the checklist is 100 percent complete, the application is approved. If the checklist is 50-99 percent complete, FAA sends a "request for information" letter.

1,800 (10 percent) of the more than 18,900 total waiver requests it had received as of May 2018 (see table 2). The commercial activities that are typically granted waivers for UAS operations are filmmaking, photography, real estate, and construction.

Table 2. Number of Waiver Requests Received by Approval Status as of May 2018

Status	No. of Flight Standards Waivers	No. of ATO Waivers	Total Waivers
Approved	1,615 (16.2%)	187 (2.1%)	1,802 (9.5%)
Disapproved	7,277 (73.2%)	1,935 (21.5%)	9,212 (48.7%)
In Queue	451 (4.5%)	5,909 (65.8%)	6,360 (33.6%)
Withdrawn/Other/Request For Information	603 (6.1%)	955 (10.6%)	1,558 (8.2%)
Total	9,946	8,986	18,932

Source: OIG analysis of FAA data as of May 11, 2018

Flight Standards has consistently met its established goal to review 80 percent of waiver applications within 90 days, but has disapproved the majority of them primarily due to receiving insufficient information. Although Flight Standards met its timeliness goal, ATO has not kept pace with the volume of airspace waiver requests.

Limited Information Impacts FAA’s Ability To Approve Waivers

FAA’s Flight Standards has disapproved nearly three-quarters of waiver applications (73 percent), primarily due to incomplete information or an insufficient safety case. For example, many waiver applications we reviewed lacked critical information such as the type of lighting to be installed, or details about using visual observers.¹⁴ FAA has emphasized that it is the applicant’s responsibility to determine and offer risk mitigations for proposed operations. In addition, FAA’s Flight Standards has determined that waiver applications for certain provisions are generally considered to be less complicated and lower risk, because the risk mitigation steps needed to operate a UAS safely under these provisions are well established. For example, FAA has determined that the risks associated with night flying are mitigated by an operator having adequate aircraft lighting. Less complex applications are easier for FAA staff and contractors to review and determine if the applicant has met the established criteria. However,

¹⁴ For UAS operations, a visual observer is someone who assists the pilot to see and avoid other air traffic, including aircraft and other objects aloft or on the ground.

more complex applications—including those for UAS operations conducted beyond a pilot's visual line of sight and over people—require more complicated, intensive analysis. As such, FAA considers these applications to be higher risk and more complex.

Our analysis of FAA data shows that nearly 85 percent of approved waivers have been for less complex, night flying operations. While the Agency has approved some more complex waiver requests, such as for flying over people or operating a UAS beyond a pilot's line of sight, Flight Standards has been slower to approve the complex applications. Agency data from January 2018 shows that 30 percent of less complex waivers were approved within 90 days, while less than 4 percent of complex waivers were approved within that timeframe. According to an FAA official, this is due to multiple factors, including:

- Lack of sufficient information from applicants,
- Challenges of working across FAA lines of business, and
- Lack of formal policy and guidance for FAA and applicants.

Based on our review of FAA's current guidance along with Agency and user comments, FAA has not received sufficient information from waiver applicants in part due to the lack of specificity in its application guidance¹⁵ for UAS operators. For example, the guidance instructed operators who were applying to fly beyond visual line of sight to provide the method by which the pilot would be able to continuously determine operational status of their aircraft, such as position and altitude, but did not provide more specific instructions or examples of potential methods that would be acceptable to mitigate the risks. These include safety mitigations, such as actions the UAS pilot would take or procedures they would follow regarding yielding right of way to manned aircraft or the test data needed to prove acceptable aircraft system reliability. Overall, this lack of specificity contributed to FAA staff fielding multiple information request exchanges between the Agency and applicants before deciding whether to approve waiver applications—a process that can take months.

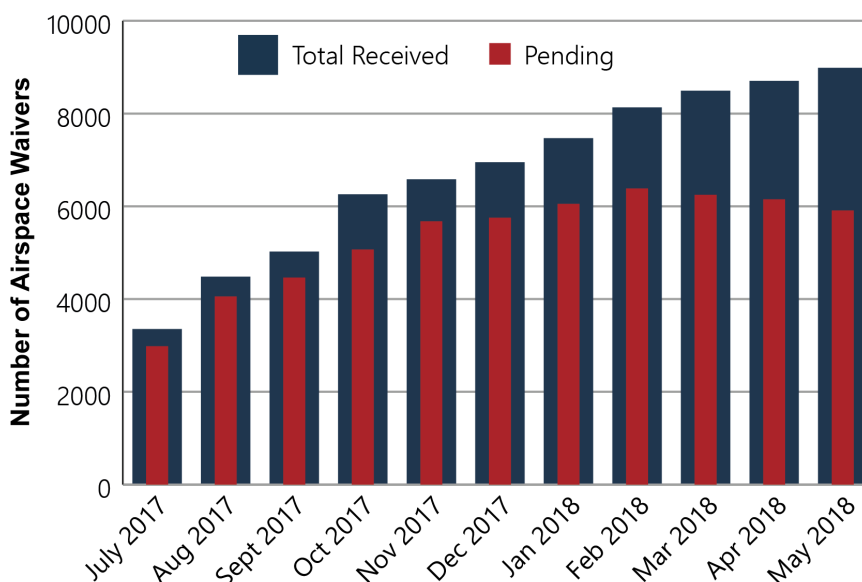
While the majority of UAS operators that responded to our survey indicated FAA's waiver application guidance was sufficient, nearly a third of respondents reported FAA's guidance was not clear or sufficiently detailed, and 87 percent reported that the process to obtain a waiver was too slow. In addition, in 5 of the 30 waiver applications we reviewed, it took between 112 and 229 days for FAA to take action. FAA recently issued new application guidelines, but the Agency has acknowledged it faces challenges keeping up with the rapid pace and demand of this evolving industry.

¹⁵ FAA Performance-Based Standards for Part 107 Waiver Holders, August 26, 2016.

The Volume of Requests To Operate UAS in Airspace With Manned Aircraft Is Growing, and ATO's Backlog Is Significant

ATO has struggled to keep pace with the high demand for airspace requests from UAS operators that want to operate in the same airspace as manned aircraft. As a result, ATO has experienced delays, particularly in processing airspace waiver requests. ATO has received almost 9,000 waiver applications to operate UAS in controlled airspace, including near major airports. While ATO has made some progress in recent months to reduce its backlog, the Agency has only reviewed 2,122 (24 percent), with 5,909 (66 percent) still pending review as of May 2018 (see figure 2). The remaining 955 waiver requests (11 percent) were transferred by ATO to be processed as authorizations.

Figure 2. Total Waivers To Operate UAS in Airspace With Manned Aircraft, Received and Pending



Source: OIG analysis of FAA data as of May 11, 2018

ATO's airspace waiver request backlog is due to a number of factors. First, ATO is responsible for processing multiple types of airspace request applications. ATO reviews airspace waiver applications—which permit operations in certain controlled airspace for a period of 6 to 24 months—as well as airspace authorization applications that allow operations in certain controlled airspace for a period of less than 6 months. Any commercial UAS operator seeking to fly in the same airspace with manned aircraft must obtain one of these two types of airspace permissions, separately and independently from any Flight Standards

waivers. From August 2016 through May 2018, ATO received nearly 43,000 airspace authorization applications and reviewed almost 35,000 (81 percent) of them.

Second, according to ATO managers, the airspace request backlog is due to the time-consuming nature of the review process and a lack of staff assigned to review requests. ATO personnel primarily used a time-intensive and manual process to review each airspace request (both waivers and authorizations). According to FAA, this process took over 6 months for airspace waivers and an average of 5 to 7 weeks for authorizations. ATO had 25 personnel—including 15 contract staff—assigned to the airspace application review team. While ATO has not yet performed a formal workforce assessment, ATO representatives we interviewed said that they needed more staff to keep up with the volume of requests given the nature of the work and manual process. For example, from July 2017 through May 2018, ATO received an average of 3,793 airspace requests a month.

Finally, while ATO has goals for processing authorizations, it lacks performance goals for the volume and timeliness of airspace waiver processing. In fiscal year 2017, ATO established a performance goal to respond to 80 percent of the first 9,800 airspace authorization applications within 90 days of receipt. FAA indicated it exceeded its goal by processing 93 percent of authorizations within 90 days.¹⁶ However, while ATO implemented two new goals in fiscal year 2018 for authorizations,¹⁷ it has not instituted any performance goals for processing airspace waiver applications.

In contrast, Flight Standards established an initial goal of responding to 80 percent of the first 9,800 UAS waiver applications within 90 days of receipt in fiscal year 2017, and continued this goal to cover the first 9,800 applications received in fiscal year 2018. Further, Flight Standards added another performance target this year to maintain an average waiver processing time of 50 days through the end of the year.

¹⁶ According to FAA, while ATO met their initial goal for the first 9,800 applications, it did not meet the processing goal for the remaining applications received for that year. For the whole year, ATO processed 15,593 of the 22,336 applications received for a 70 percent processing rate.

¹⁷ ATO's fiscal year 2018 goals are to reduce average airspace authorization processing time by at least 15 percent and to have 50 percent of all authorizations processed by the new automated system, LAANC—the Low Altitude Authorization and Notification Capability.

According to our survey respondents, 94 percent reported FAA’s airspace authorization processing was too slow, and more than 50 percent stated they have observed FAA’s processing time is getting slower. Some UAS operator comments about timeliness from our survey are shown in figure 3.

FAA Has Taken Steps To Enhance the Waiver Application Review and Approval Process

Since November 2017, FAA has implemented a number of improvements to automate and expedite reviews:

- In November 2017, to help improve review timeliness, FAA published more specific guidance to operators regarding elements to include in their waiver applications.¹⁹ FAA also revised its application guidance for airspace waivers. The revisions ask operators to specifically include information regarding the technology equipped on the UAS in order to fly safely within approved operational areas.
- Also in November 2017, ATO launched a pilot test of the Low Altitude Authorization and Notification Capability (LAANC),²⁰ a new automated system intended to expedite and streamline the review process for

Figure 3. Selected Operator Comments About FAA Processing Times for Waivers and Airspace Authorizations

- “Timeliness is absolutely critical...There is no way [...to operate...] at a moment’s notice without this critical issue being addressed. Business is being lost as a result of this.”
- “It is a tough ask, but there needs to be a system improvement to approve waiver and authorization requests faster. A company cannot wait up to 90 days to be approved to do a job when the client wants it done in a few weeks.”
- “It is clear there is a lack of personnel to approve waivers and authorizations in a timely manner.”
- “The time it takes for waivers and authorizations hurts legal businesses like ours who fight to follow the rules and advocate for them....This failure by FAA has given rise to an illegal underground market of UAS operators who do not follow the rules and do not apply for waivers....”
- “Get the LAANC¹⁸ system up and running fast for [airspace authorizations]....”
- “LAANC is a step in the right direction....”

Source: UAS operator responses from OIG survey

¹⁸ LAANC is a new FAA automated system that processes commercial UAS operator airspace authorization requests almost instantly.

¹⁹ For additional details, see *Waiver Safety Evaluation Guidelines*, November 2017.

²⁰ LAANC was first deployed to eight test sites across the United States in November 2017 as a prototype evaluation, followed by a nationwide incremental rollout which began April 30, 2018. As of October 2018, LAANC is now active across nearly 300 air traffic facilities covering approximately 500 U.S. airports.

airspace authorizations. The system uses maps with designated areas and altitudes, pre-approved by FAA, to provide most operators with an authorization to fly in airspace near airports almost instantly.²¹ In late 2017, ATO also began tracking the average total number of days spent processing airspace authorization applications, including manually-processed and LAANC-processed applications. However, it is not clear how this performance metric will be used or if they will track it past September 2018.

- In January 2018, FAA introduced a revised application portal on its UAS website, FAA DroneZone, to clarify and simplify the online submission process for all waiver and authorization applications. According to FAA officials, the Agency is continuing to make enhancements to the system.

Initial feedback from UAS operators we interviewed regarding these changes has been positive, and preliminary FAA data about LAANC, as well as our visits with UAS operators in LAANC test areas, indicate this system has already helped accelerate processing times. However, FAA officials acknowledged it will take time for the Agency to develop policy, regulations, airworthiness standards, processes, and guidance to industry to ensure the safety of the NAS.

FAA Has Not Effectively Communicated With Applicants

FAA has not effectively communicated with applicants regarding the status and results of their applications due to weaknesses in its application and feedback processes. For example, until January 2018, the Agency's application portal for UAS waivers and airspace authorizations—now called the FAA DroneZone—did not allow operators to track their application status. The system did not generate tracking numbers for submitted applications, nor did it provide confirmation that the application was received. As a result, operators we interviewed were dissatisfied with FAA's application tracking and feedback process. For example:

- 10 of 18 (56 percent) operators we interviewed expressed dissatisfaction about not receiving a receipt of confirmation from the system and/or a system-generated "tracking number" for their application.
- 13 of 18 (72 percent) operators we interviewed indicated frustration about the lack of transparency and information relayed through FAA's application portal.

²¹ Requests to operate for longer periods of time or outside designated areas still require manual review by the Agency.

To address these concerns, FAA updated the online portal to include an application tracking mechanism for operators, and the portal now automatically generates application submission numbers.

However, our analysis identified other issues in FAA's communication with waiver applicants. Specifically, Flight Standards did not consistently provide standardized responses to operators for denied waiver applications or requests for information. While the Agency has used standard letters to communicate with operators regarding application status, FAA's internal process did not ensure Agency staff and contractors were consistent with the information provided in the letters. For example, we found that more than half²² of the application packages included the standard letter from FAA for denying an application or requesting more information. However, 40 percent included an expanded response letter—not the standard letter—containing additional explanatory details on why the application was denied or the specific information that the application should contain.

The standard templates that most applicants received were broad, lacked specificity, and did not share the explicit reasons for denials. While those denial letters did cite the regulatory provision that was not satisfied, they did not provide details about what FAA believed was needed from an applicant to fully answer FAA's request. Operators in our survey reported that FAA's inconsistent feedback has been a challenge while navigating the application process. For example, 51 percent of respondents who had a denied application stated FAA did not adequately explain the basis of their denied waiver or authorization applications. One respondent stated that "explanation of denial of our [night flying] waiver...was not specific enough, causing us to make repeated applications, which have all been denied."

FAA initially told us Flight Standards staff are allowed to use judgment to decide when to send the standard letter or a more detailed response, and that their decision is subjective based on the level of detail and knowledge presented in the application. Also according to FAA officials, they do not provide detailed reasons for denying waivers because they believe the burden of proof is on the applicant and want the operators to develop adequate safety mitigations independently of the Agency. However, without clarity from FAA regarding the reasons for denying applications, FAA may continue to receive applications with incomplete information or insufficient safety cases. This lack of communication results in additional review time, exacerbates FAA's application backlog given their resource constraints, and inhibits the transfer of critical technological and safety information.

²² We reviewed 23 application packages that FAA either denied or requested more information and found that 14 of them included the standard template.

After we discussed our results and preliminary recommendations with the Agency in May 2018, Flight Standards began using a new standard letter for disapproving applications in July 2018. This new letter details the information applicants should include to address risks posed by the waiver request and provides links for further assistance. FAA is also planning future changes to its letters for requesting more information. We have not evaluated the impact of these recent changes.

In addition, more than two-thirds of UAS operators we surveyed responded that they received consistent information from different FAA representatives during the application process; however, nearly a third of respondents (32 percent) disagreed. For example, one operator described receiving conflicting information about rules for flying in controlled airspace from three different FAA divisions. Other operators responded with examples of inconsistent and incorrect information about application procedures and permitted airspace classes. Inconsistent Agency responses could contribute to UAS operator confusion and frustration with the waiver and authorization processes.

Further, frustration with a lack of Agency timeliness and responsiveness could increase the frequency that operators bypass the FAA waiver and authorization process altogether. In other words, operators may chance flying in airspace with manned aircraft without FAA's approval. Our analysis of FAA records and interviews with operators shows this is already occurring. For example, one operator we interviewed said it is well known among the UAS community that a large number of commercial UAS operators fly in contravention of FAA rules and/or without FAA airspace approvals. These concerns are further reflected in the following examples of operator responses to our survey:

- "Our company is consistently underbid by people who don't follow the rules."
- "95 percent of my competitors did not care about the regulations and flew for commercial purposes. They built their show reels, gained business and in some cases flew unsafely."
- "With the lack of enforcement of violators of the current rules many [small] UAS pilots are skipping the certification process or just [plain] ignoring the rules."

These high-risk UAS operations impact the safety of not just other aviators, but the general public as well.

FAA Is Still in the Early Stages of Developing a Risk-Based Oversight Process for UAS Operators

FAA has yet to develop a robust, risk-based, data-driven oversight system for commercial UAS operations, including those operating with waivers. Complicating this effort is a limited pool of UAS operator and inspection data available to inspectors—essential elements of a risk-based oversight system—and difficulties with identifying operators after incidents have already occurred. The Agency’s UAS oversight to date has primarily consisted of outreach and education rather than enforcement. However, this outreach has been limited in some areas of the small UAS rule. As a result of these issues, FAA does not have assurance that operators are in compliance with regulations. Furthermore, due to a limited pool of data, FAA is not well-positioned to develop an oversight strategy for areas of risk in this rapidly-evolving industry, and is missing opportunities to gather information that will help shape rulemaking and impact policies.

FAA’s UAS Oversight Process Is Not Yet Fully Risk-Based and Data-Driven

Despite taking steps to develop a framework for UAS oversight, FAA still lacks a comprehensive risk-based surveillance system. These systems are intended to target priorities and oversight resources based on data-supported analysis and assessment of risks. Limited access to UAS operator data, as well as FAA inspection and incident data, hinders FAA’s ability to develop an oversight strategy for areas of risks in this rapidly evolving industry.

FAA’s Inspection Guidance Is Limited

According to FAA Flight Standards representatives, the Agency has developed a risk-based oversight process for commercial UAS operators through the inclusion of a UAS provision in the most recent annual inspector guidelines.²³ These guidelines became effective October 2017, more than a year after the Agency began allowing commercial UAS operations under the small rule. However, the guidelines still lack key elements of a risk-based system as defined by FAA’s safety risk management guidance,²⁴ such as performing work at aviation entities to collect, manage, monitor, and analyze hazard and risk data, as well as

²³ FY2018 National Flight Standards Work Program Guidelines (NPG) – FAA Order 1800.56R, Issued July 25, 2017.

²⁴ Safety Management System (SMS) – FAA Order 8000.369B, Issued March 18, 2016; Safety Risk Management Policy – FAA Order 8040.4B, Issued May 2, 2017.

conducting surveillance and sampling to assess conformity and identify risk. For example, the UAS inspection guidelines:

- Do not currently *require* Flight Standards field offices to conduct any UAS operator inspections. The guidelines merely instruct the office to plan²⁵ (as opposed to conduct) at least one operator inspection per year, and there are currently an estimated 110,000 commercial UAS operators in the United States and that is expected to grow to over 450,000 operators by 2022. There is also no requirement to conduct any inspections of UAS operators with waivers and/or airspace authorizations.²⁶ As a result, inspections of UAS operators have been limited, and FAA is missing important opportunities to gather information on how UAS operate in the real world that can be used to shape rulemaking and impact policies. While some of the UAS operators responding to our survey (21 of 173) indicated they had been contacted or visited by FAA, only seven of them (4 percent) indicated they have been visited by FAA regarding their operations, and even these few visits were not necessarily formal inspections.
- Do not include risk or operational factors for FAA field office inspectors to consider when selecting which UAS operators to visit for their one annual “planned” inspection. For example, the guidelines do not instruct inspectors to determine the operating location, frequency of operations, or type of activity they are engaged in. They do, however, state that “when practical,” the site visit should be conducted on a waiver holder.

FAA is not requiring inspections in part because, according to Agency leadership, small UAS are generally considered low-risk operations as compared to other types of aircraft in the NAS and should be considered low-priority work for field inspectors. As a result, according to FAA inspectors, most of the UAS oversight work they perform is not proactive, but rather reactive to complaints and incidents. For example, UAS inspectors at four of the five field offices we visited stated that their UAS surveillance primarily consists of responding to complaints and that they do not conduct routine proactive surveillance of UAS operations. As a result, the Agency does not obtain a sufficient volume of UAS operator inspection data to establish a baseline risk assessment profile and make informed decisions.

²⁵ FAA has defined in its NPG that R-items are required, based on critical oversight issues and risks identified nationally, and are a top priority. P-items are planned and should be completed, but are flexible based on changes in the operator or aviation environment.

²⁶ In contrast, the requirements contained in the Agency’s national inspector guidance for other types of operators, require FAA inspectors to conduct oversight on a sample of operators in their area of responsibility.

While FAA considers small UAS operations to be relatively low risk, some level of risk exists, and given the expanding and dynamic nature of this industry, periodic inspections would provide operational data to continually inform FAA's risk determination. For example, not all commercial UAS operators are the same and their risk factors differ, particularly given that waivers have been granted for operating at night and over people. Operators vary in size, ranging from one-person operations to large companies with fleets of more than 40 unmanned aircraft operating across the country. Moreover, FAA has approved over 20,000 authorizations for UAS operations in airspace with manned aircraft, including nearly 2,900 approvals in the airspace closest to major airports,²⁷ such as Atlanta Hartsfield-Jackson, Chicago O'Hare, Los Angeles, and New York John F. Kennedy International airports. A large number of UAS operating in busy airspace may present greater risks.

Further, last year's research from FAA's Center of Excellence on the potential impact of UAS collisions also highlights the importance of mitigating risks associated with UAS operations.²⁸ Specifically, the research shows that even small UAS can cause greater structural damage to aircraft than bird strikes and damage to engine components, such as fan blades. FAA has not yet identified the full range of risks but has future research planned on engine ingestion of UAS in collaboration with engine manufacturers, as well as additional airborne collision studies with helicopters and general aviation aircraft, beginning this year and running through fiscal year 2021.

While there have not yet been any confirmed in-flight collisions between a small UAS and a manned commercial aircraft in the United States, there have already been close encounters with commercial aircraft and a confirmed collision between a UAS and a manned military helicopter. Further, a collision between a drone and a commercial jet occurred in Canada in October 2017. In response, Canada's Transportation Safety Board cautioned in February 2018 that use of drones within controlled airspace poses a serious risk to aviation safety. Despite these recent incidents, FAA does not yet require inspectors to conduct inspections of commercial UAS operations or have procedures in place within its National Flight Standards Work Program Guidelines to periodically sample UAS operators to validate current risk assessments.

²⁷ Class B airspace is the controlled airspace surrounding the nation's busiest airports in terms of airport operations or passenger enplanements, from the surface to 10,000 feet mean sea level (MSL).

²⁸ *The UAS Air-to-Air Collision Severity Evaluation Final Report, Alliance for System Safety of UAS through Research Excellence (ASSURE)*, November 2017.

FAA Lacks Key Operator Data That Would Enhance Oversight

FAA field offices lack important information about UAS waiver operators, limiting their ability to conduct risk-based oversight. FAA guidance instructs field inspectors to, “if practical,” plan to conduct a UAS operator inspection at an operator with a waiver. However, FAA field offices may not be aware of all the waiver operators in their area. This is because the only FAA list of UAS waiver holders that includes operating locations and contact data is maintained at the Headquarters level. Although FAA does maintain a list of operators with waivers on its public website (see figure 4), the Agency does not provide tailored, area-specific lists of waiver operators to field offices nor do they provide guidance to inspectors on how to obtain this information.

Figure 4. FAA Waiver Holder List

Date of Issuance	Expiration Date	Company Name	Responsible Person	Waivered Regulation
6/05/2018	6/30/2022	Robert Riddick	Robert Riddick (PDF)	107.29
6/05/2018	6/30/2022	Darren Proppe	Darren Proppe (PDF)	107.29
6/05/2018	6/30/2022	Paradise Valley Police Department	Bryan Marshall (PDF)	107.29
6/05/2018	6/30/2022	Hoverfly Technologies Inc.	Arief Azis (PDF)	107.29
6/05/2018	6/30/2022	Colin Milka	Colin Milka (PDF)	107.29
6/05/2018	6/30/2022	Blaine Davis	Blaine Davis (PDF)	107.29
6/04/2018	6/30/2022	Van Vorst Films	Herbert Clegg (PDF)	107.29
6/04/2018	6/30/2022	City of Stillwater	Rob Hill (PDF)	107.29
6/04/2018	6/30/2022	Memphis Fire Department	Alton Merritt (PDF)	107.29
6/01/2018	6/30/2022	Aerial Services, Inc.	Jason Dolf (PDF)	107.29
6/01/2018	6/30/2022	Bryce Borders	Bryce Borders (PDF)	107.29
5/31/2018	5/31/2022	Trinity Services & Consulting, LLC	Shane McKinzie (PDF)	107.29
5/31/2018	5/31/2022	Carlsbad Police Dept.	Shaun Lawton (PDF)	107.29
5/31/2018	5/31/2022	Eric Hanegmon	Eric Hanegmon (PDF)	107.29
5/31/2018	5/31/2022	B&C Aerial Solutions	Waytt Bowles (PDF)	107.29
5/30/2018	5/31/2022	Christopher Tristan	Christopher Tristan (PDF)	107.29
5/30/2018	5/31/2022	Patrick Ladd	Patrick Ladd (PDF)	107.29
5/29/2018	5/31/2022	Jason Costanzo	Jason Costanzo (PDF)	107.29
5/29/2018	5/31/2022	Unmanned Tactical Systems	Khanh Quach (PDF)	107.29
5/29/2018	5/31/2022	Serge Azadian Photography	Serge Azadian (PDF)	107.29
5/29/2018	5/31/2022	Earnest McCoy	Earnest McCoy (PDF)	107.29
5/29/2018	5/31/2022	Aerobotics, LLC	Dacoda Bartels (PDF)	107.29
5/29/2018	5/31/2022	Nicholas Link	Matthew Zdunich (PDF)	107.29
5/29/2018	5/31/2022	Kendall County Sheriff's Office	Jason Flanders (PDF)	107.29
5/29/2018	5/31/2022	DCPD	Matthew Henry (PDF)	107.29

Source: FAA

While inspectors can request information on waiver-holders individually from FAA Headquarters, not all inspectors are aware of this option. Inspectors at all

five of the FAA field offices we spoke with confirmed they had limited means of knowing who was flying commercial UAS in their areas of responsibility.

Additionally, the contact data FAA has for a UAS waiver operator is not a reliable indicator of where those operators are actually flying. The operator's street address (as listed on its application) is included on the approved waiver—information that is accessible to field inspectors and the general public on the FAA website. The waivers do not, however, give any indication of where the operator actually plans to operate the UAS. For example:

- One commercial UAS operator with an Austin, TX, address on its airspace waiver has over 400 authorizations to fly in controlled airspace near 440 different airports; however, only one of those authorizations are for airspace near the Austin area.
- Another UAS operator, while holding both a waiver for night flying and 40 authorizations to fly in controlled airspace across 12 States, did not have any approved authorizations to fly in the controlled airspace within 40 miles of the airport nearest the operator's base of operations.

Airspace authorizations, on the other hand, specify *where* operators are approved to fly UAS and, sometimes, *when* they will be operating. For example, we reviewed authorizations indicating both the precise latitude/longitude coordinates and the specific radius of a planned flight area, as well as specific dates and times of flight operations. However, as with waiver-holder data, operator airspace approval data (by nearest airport) is maintained at FAA Headquarters—not distributed to field offices. Moreover, airspace approval data are not posted publically, nor is a list of airspace approvals distributed to the field offices. As a result, inspectors have limited knowledge of which UAS operators are actively operating in their area of responsibility, which significantly restricts their ability to conduct risk-based inspections.

Another oversight complexity for FAA is how to identify and locate UAS operators, should the Agency need to contact them or take enforcement action after an incident. As directed by Congress in 2016,²⁹ FAA chartered an aviation rulemaking committee to inform the Agency on available technologies for UAS remote identification and tracking, standards, and implementation strategies. The committee's December 2017 report provided FAA with recommendations in multiple areas, including methods for remote identification and tracking information and broadcasting identification for UAS. The Agency is planning to publish a proposed rule in March 2019 based on these recommendations regarding available technologies, requirements, and operations. However, until such a rule is implemented—which is uncertain—FAA does not have a

²⁹ FAA Extension, Safety, and Security Act of 2016—Pub. L. No. 114-190 (2016).

mechanism to identify, locate, and manage which UAS operators— both hobbyist and commercial, including those with waivers—are operating in the NAS at any given time, and where.

Limited Inspection Data Hinder FAA’s Ability To Identify Risks and Shape Future Policy and Rulemaking

FAA has not yet collected sufficient inspection data needed to identify risks and plan surveillance. As with other safety surveillance work they perform, FAA field inspectors are instructed to record UAS oversight activities and inspections using specific codes in FAA’s internal inspection records system.³⁰ In addition, the small UAS rule stated that data collected from UAS inspections will be used to assess risk and be shared with various organizations in FAA to inform policy decisions and rulemaking efforts. However, while FAA inspectors have recorded results of their investigations of UAS complaints, more than 1 year after FAA issued the rule we identified only 131 records in FAA’s database that are coded as UAS surveillance activities nationwide, and only about 10 percent of those activities were completed on a waiver holder. In addition, while there are 78 different field offices nationwide, nearly three-quarters of the inspections were conducted by just four field offices.

Our analysis of FAA inspections found multiple instances of operators violating provisions of the small UAS rule. For example, FAA documented several incidents where commercial operators were flying their UAS over people and in airspace with manned aircraft without authorization to do so, including over exhibitions and concerts and while performing building inspections. Some of these records also showed violations by waiver holders. For example, one inspector discovered during an onsite visit that while the commercial UAS operator possessed a waiver granting permission for night operations, the operator lacked proper training to fly at night, could not provide information about its anti-collision lights required for night flying, and did not have the correct identification number on its aircraft. Despite these safety findings, the inspection record was closed following a letter to the operator and no enforcement action was taken.

While FAA has conducted multiple safety studies on potential hazards of UAS operations,³¹ the Agency does not yet have enough UAS inspection data to conduct a meaningful assessment and develop an overall, baseline risk profile of commercial UAS operating in the NAS. As a result, FAA will continue to have difficulty formulating a robust, risk-based oversight structure. Further, according to the small UAS rule, one of the intents of the waiver provision was to collect

³⁰ Program Tracking and Reporting Subsystem (PTRS).

³¹ See for example: FAA, *Safety Risk Management Document [SRMD] for Establishing a Hazard Analysis for Unmanned Aircraft Operations in FAA Controlled Class D Airspace*, (September 2016), conducted as required by the FAA Modernization and Reform Act of 2012.

inspection data to inform future FAA policy. By not performing UAS operator surveillance, FAA is falling short of meeting this intent and missing the opportunity to shape the direction of future policy.

FAA Has Conducted Outreach Efforts but Has Not Clarified Key Operational Provisions of the Rule

The small UAS rule states that FAA will conduct outreach to educate the public on small UAS policy, and FAA has undertaken multiple efforts. For example:

- The FAA Safety Team (FAASTeam)³² conducted numerous seminars aimed at educating the public on the regulations for both recreational and commercial UAS operations.
- The Unmanned Aircraft Safety Team (UAST) formed in August 2016 as a Government-industry partnership committed to ensuring safe UAS operations in the NAS. UAST is creating a framework for data sharing with UAS manufacturers and has surveyed UAS operators several times to inquire about problems and issues facing the UAS community.
- FAA's Law Enforcement Assistance Program (LEAP)³³ has fostered educational outreach opportunities for local law enforcement agencies (such as State and City police departments and Federal Bureau of Investigations branches) regarding their legal responsibilities concerning UAS activity.

Despite these outreach efforts, we found wide variations in the interpretation of certain key provisions of the small UAS rule that have important distinctions. For example, the rule specifically prohibits operations over people, unless they are under a safe cover or are "directly participating" in the operation. FAA specified in the rule that directly participating people refers only to those directly involved in the operation of the UAS, such as the pilot and visual observers. However, accompanying guidance to operators does not specifically define what flying "directly over" a person encompasses, or what constitutes a "directly participating" (or non-participating) person, and what is excluded.

³² FAASTeam is an educational outreach group comprised of FAA Headquarters and field personnel that develops and provides national safety promotion initiatives as well as national policy and guidance to shift the General Aviation safety culture towards the reduction of accidents.

³³ LEAP is run by FAA Headquarters Office of Investigations, Investigations Division, and special agents assigned to regional security divisions, centers and field offices.

As a result, in both operator site visits and in our survey of waiver holders, we found varying levels of understanding and different interpretations of what “over people” and “directly participating” mean. For example, in our survey, when asked how they would define a non-participating person, 21 percent of respondents replied anyone not employed by the company while 19 percent said anyone who has not signed a liability waiver—neither of which is correct, according to FAA. In addition, operators provided diverse interpretations of which “operations over people” are prohibited by the rule. Operator responses varied, including:

- no “operations directly above a human being”
- no “flying over crowds or groups of people”
- no flying directly over any persons but “one foot laterally away from a person is sufficient”
- no flying over anyone “unaware of” or “involved in” the operation, and
- no flying “in a cylinder immediately above.”

Clear guidance and enforcement action when warranted are particularly important because the commercial UAS industry is driven by many non-traditional aviators—new UAS pilots without prior experience operating traditional manned aircraft. For example, as of May 2018, over 60 percent of the individuals with a UAS Remote Pilot Certificate³⁴ have never held an aircraft pilot’s license. With UAS, FAA is now responsible for regulating and overseeing a population of operators that do not necessarily understand FAA’s safety culture.

The Agency has issued some enforcement actions for UAS operators flying over people, beyond visual line of sight, at night, and in controlled airspace without waivers, pilot’s licenses, and registrations. However, many more violations are closed with no action due to a lack of operator data or are resolved without any pursuant enforcement actions. The lack of FAA clarification, guidance, and strong enforcement when warranted may result in many UAS operators continuing to operate outside the confines of the rule while believing they are actually operating in compliance with the rule.

³⁴ According to FAA’s Pilot Registry Database, as of May 1, 2018, the Agency has issued 86,453 active UAS remote pilot certificates. Of those remote pilots, there are 52,661 that have only received a UAS pilot certificate and 33,679 (39 percent) that have been certified to fly UAS as well as manned aircraft.

Conclusion

Meeting the regulatory challenges of an evolving and diverse commercial UAS industry, while simultaneously working to advance emerging UAS technologies safely, continues to be one of the most significant issues facing FAA. The Agency has taken many steps to accommodate UAS in the NAS, but much work remains to safely integrate UAS into the same airspace as manned aircraft, and the safety dimensions of this evolving technology are uncertain and changing continuously. FAA is still challenged to collect UAS data needed to assess potential safety hazards, educate non-traditional aviators on its safety culture, and effectively implement a risk-based oversight system. The lack of data hinders the Agency's ability to accurately measure and mitigate the safety risks UAS could pose and transition effectively from waiver-based operations to full integration into the NAS.

Recommendations

To improve the effectiveness of the UAS waiver approval and oversight processes, we recommend that the Federal Aviation Administrator:

1. Conduct a workforce assessment of the staff assigned to review airspace waiver and authorization requests to determine if Air Traffic Organization (ATO) staffing is adequate, and take appropriate action based on the results.
2. Assess performance statistics for ATO's non-automated airspace waiver request process to determine if establishing volume and timeliness goals would enhance the process and if so, develop and implement these goals.
3. Use performance metrics for Low Altitude Authorization and Notification Capability (LAANC) to evaluate the system's effect on application processing volume and timeliness and take appropriate action based on the results.
4. Develop and implement internal controls to improve consistency in the use of standard template responses when corresponding with applicants regarding requests for information.
5. Update National Flight Standards Work Program Guidelines to require field offices perform inspections on a sample of commercial UAS operators in their area for a 2-year period, which will increase available inspection data for creating a risk profile of UAS.

6. Using available inspection and risk data, develop a baseline risk assessment profile of small commercial UAS operators, including those operators with waivers and airspace authorizations, to inform inspector surveillance planning decisions, as well as procedures to periodically update this risk assessment profile using future inspection data.
7. Issue guidance to field offices regarding where and how to obtain Agency information on waiver and/or authorization-holding UAS operators, to help inform their inspection planning.
8. Provide clarifying guidance to UAS operators on FAA's website or by other means regarding the small UAS rule provision relating to operations "over people."

Agency Comments and OIG Response

We provided FAA with our draft report on September 10, 2018, and received its response on October 10, 2018, which is included as an appendix to this report. FAA concurred with seven of our eight recommendations (1, 2, 3, 4, 6, 7, and 8) and provided planned completion dates for each. Therefore, we consider these recommendations resolved but open pending completion of planned actions.

FAA partially concurred with recommendation 5 to require field offices to perform inspections on a sample of commercial UAS operators in their area for a 2-year period. The Agency did not agree with the need to conduct an additional 2 years' worth of sample inspections to accumulate inspection data. However, it did agree to implement new items for UAS oversight during fiscal year 2019 and include these items in its National Work Program Guidelines by August 31, 2019, which meets the intent of our recommendation. Therefore, we consider recommendation 5 resolved but open pending completion of planned actions.

While FAA agreed with our report, the Agency noted that it believes two statements in the report are misleading:

- First, FAA disagreed with our statement that the Agency has not provided field office inspectors with information regarding the locations of UAS operations in their area. FAA noted that a list of operators with waivers is available to FAA inspectors and the public on the Agency's website, which we acknowledged in our report. However, as we also noted in our report, FAA does not provide tailored, area-specific lists of operators to field offices nor do they provide guidance on how to obtain this information. In its response, FAA added that the key challenge to UAS surveillance is the nature of UAS flights and the lack of tracking technology. While we agree that UAS present challenges to FAA and tracking technology is important,

ATO does maintain some information on where and when UAS will be operating that has not been provided to inspectors. As such, we recommended FAA issue guidance on where and how to obtain Agency information on UAS operators to help inform inspection plans. The Agency agreed to do so by August 31, 2019 (recommendation 7).

- Second, FAA disagreed with our conclusion that the Agency's ability to approve certain waivers is impacted because of limited information and samples provided to applicants. FAA stated that it does not believe that providing sample mitigations to applicants to speed its review of waivers is appropriate. While our report highlights the lack of specific guidance and information as a contributing factor for lengthy reviews, we acknowledged that FAA took action to provide more specific guidance. Our recommendation focuses on improving the consistency of information provided to applicants, which FAA agreed to implement by the end of this year (recommendation 4). Congress has also recognized the lack of guidance to applicants as an issue and has directed the Agency in the FAA Reauthorization Act of 2018³⁵ to publish a sample of approved safety justifications for waivers and airspace authorizations.

Actions Required

We consider all eight recommendations resolved but open pending completion of the planned actions.

³⁵ Pub. L. 115-254, § 352, October 5, 2018.

Exhibit A. Scope and Methodology

We conducted this performance audit between May 2017 and September 2018 in accordance with generally accepted Government auditing standards as prescribed by the Comptroller General of the United States. 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. Our objectives were to assess FAA's processes for (1) granting waivers under the rule for small UAS operations, and (2) conducting risk-based oversight of UAS operators with waivers.

To assess FAA's process for granting waivers, we reviewed relevant internal policies and guidance to operators, including FAA's waiver review checklist, operator application instructions, and performance-based standards. We collected and analyzed waiver and airspace authorization documentation for both a check of consistency of FAA review processes, as well as to validate timeliness of Agency review. Specifically, we selected a non-generalizable sample of 30 submitted applications out of 4,706 submitted to FAA between October 2016 and December 2017, including 19 approved applications and 11 denied applications. We used a random sample to select the first 10 approved applications. For the remaining 20 applications, we selected at least one application for every waivable provision of the small UAS rule and a mix of applications to include small and large corporations. We interviewed FAA Headquarters representatives, including both contractors and permanent staff, responsible for evaluating UAS waiver and authorization applications to obtain information on the review, approval, and follow-up processes.

To assess FAA's processes for conducting risk-based oversight of UAS operators with waivers, we interviewed FAA managers and inspectors at 2 of 9 regional offices and 5 of 78 field offices. We selected these field offices because they were responsible for oversight in five of the top six States with the largest number of operators possessing both a small UAS waiver and at least one airspace authorization, as determined by analyzing the statistician-created universe of UAS operators as of September 2017. Specifically, we visited the Atlanta, GA, FAA field office during our initial audit work due to its proximity to our office and because it was in the top 10 States. In subsequent audit work, we visited FAA field offices corresponding with the top four States—California, Florida, Texas, and Arizona. We selected the two regional offices because they held responsibility for three of five field offices visited and were in close proximity to two of them. Our results are not generalizable. We discussed the processes for and challenges of performing commercial UAS operator oversight, conducting communication and

outreach efforts within the local community, and assessing data available to them to plan and perform risk-based surveillance. We reviewed oversight criteria and guidance documentation, including Flight Standards National Work Program Guidelines outlining surveillance planning requirements, and Flight Standards inspector guidance on performing and recording inspections, investigations, and compliance and enforcement actions. We also collected and analyzed data from FAA's Program Tracking and Reporting Subsystem to ascertain the volume of and findings from Agency inspections completed on UAS operators, including waiver-holders.

In addition, we conducted interviews with 18 of 312 UAS operators who had at least one waiver and airspace authorization as of September 2017. Specifically, we selected operators in the five States corresponding with the FAA offices visited. We selected UAS operators within those geographic areas based on proximity to the FAA office and a mix of operation types and sizes. We conducted these interviews to learn about their experiences applying for and obtaining a waiver and/or authorization, communication with FAA during the application process, and FAA oversight of their commercial UAS operations. Our results are not generalizable.

Furthermore, to obtain these experiences and perspectives from a larger universe, we developed and conducted an Internet-based survey of small UAS operators from October 31, 2017, to December 18, 2017. The survey questionnaire contained 26 questions and was distributed to a universe of 312 small UAS commercial operators that comprised the entire population of operators who held both a waiver and at least one airspace authorization, according to FAA data as of September 18, 2017. This survey was administered in accordance with the Council of the Inspector General on Integrity and Efficiency (CIGIE) guidance on conducting surveys, and was tested both internally and externally prior to distribution. We received 178 responses for a response rate of 57 percent, and all survey responses were de-identified. CIGIE guidance³⁶ states surveys must achieve a minimum level of response for responses to be meaningful; we considered our achieved response rate sufficient for purposes of this audit as we sent the survey to gain insight into operators' perspectives and to obtain examples of their viewpoints, experiences, and concerns. Exhibit C summarizes our UAS operator survey results.

Finally, we met with representatives from the Small UAV Coalition, the Association for Unmanned Vehicle Systems International, the Air Line Pilots Association, and the Airline Owners and Pilots Association to obtain the

³⁶ CIGIE Paperwork Reduction Act Working Group, *Guide on the Inspector General Empowerment Act's Exemption to the Paperwork Reduction Act: Conducting Surveys as Part of Audit, Investigation, Inspection, Evaluation, and Other Review Work* (August 2017).

perspectives of these industry groups and their respective members regarding the small UAS waiver process and the Agency's risk-based oversight of commercial UAS operators.

Exhibit B. Organizations Visited or Contacted

Federal Aviation Administration Headquarters

Flight Standards Service, General Aviation and Commercial Division

UAS Integration Office

Air Traffic Organization, Mission Support Services, Emerging Technologies Team

Flight Standards Service, Flight Technologies and Procedures Division

FAA Flight Standards District Offices (FSDO)

Atlanta FSDO, College Park, GA

South Florida FSDO, Miramar, FL

North Texas FSDO, Irving, TX

San Jose FSDO, San Jose, CA

Scottsdale FSDO, Scottsdale, AZ

FAA Regional Offices

Southern Region, College Park, GA

Southwest Region, Fort Worth, TX

Unmanned Aircraft System Operators

Alert5 International

Ascend Aerials

Birds Eye Productions

BNSF Railway
Cable News Network (CNN)
Desert Drones Imagery
Expert Aerial Solutions
Flying Robot Aerials
General Dynamics
Georgia Department of Transportation
Intel Corporation
JRI Media
marX The Spot Films Inc.
PrecisionHawk
Presenting in Pixels
Sparky's Video Productions
Vid Flight
X (formerly Google X)

Other Organizations

Air Line Pilots Association
Aircraft Owners and Pilots Association
Association for Unmanned Vehicle Systems International
Small Unmanned Aerial Vehicles Coalition
Unmanned Aircraft Safety Team

Exhibit C. Results Summary: OIG Survey of UAS Waiver Holders

Question	Response
How would you describe the length of time it took for your Part 107 waiver application request(s) to be approved by FAA?	87% - Too Slow 11% - Adequate/Timely 2% - Faster Than Expected
If you have more than one waiver, what change—if any—have you observed in the length of time it took to get subsequent waivers approved by FAA?	47% - Avg. Processing Time Is Slower 11% - Avg. Processing Time Is Faster 42% - No Change
How would you describe the length of time it took for your controlled airspace authorization request(s) to be approved by FAA?	94% - Too Slow 5% - Adequate/Timely 1% - Faster Than Expected
If you have more than one authorization, what change—if any—have you observed in the length of time it took to get those subsequent authorizations approved by FAA?	54% - Avg. Processing Time Is Slower 11% - Avg. Processing Time Is Faster 35% - No Change
Have you spoken with an FAA representative in person, via phone, or by email during the waiver or airspace authorization application process?	93% - Yes 7% - No
If you spoke with more than one person, did you receive consistent information or answers from the different sources?	68% - Yes 32% - No
If you were denied any application for a waiver/airspace authorization, did FAA adequately explain the basis for its decision by articulating what elements were lacking from your original application to cause the denial?	49% - Yes 51% - No
Do FAA's performance-based standards for waivers and airspace authorizations, as posted on FAA's website, provide clear and sufficient information for you to complete your application?	69% - Yes 31% - No
Do you think that a practical flying skills demonstration should be a mandatory part of the UAS 107 pilot certificate requirements?	58% - Yes 29% - No 13% - No Opinion
Have you ever been visited or contacted by FAA inspectors regarding your Part 107 operations?	12% - Yes 88% - No
How many times have you been visited or contacted by FAA inspectors regarding your Part 107 operations?	1 - Avg. # Onsite Visits 2 - Avg. # Other Contacts
Were any of these FAA visits or contacts made while you were conducting active UAS flight operations?	26% - Yes 74% - No

Question	Response
<p>What did FAA indicate was the purpose of the visit or contact made?</p> <p><i>Response totals add to greater than 100% because the question indicated respondents were to "Check all that apply."</i></p>	<p>41% - Education / Outreach 41% - Investigation 45% - Other 9% - Inspection 5% - Don't Know</p>
<p>What were the results of any FAA visits or contacts?</p> <p><i>Response totals add to greater than 100% because the question indicated respondents were to "Check all that apply."</i></p>	<p>45% - Oral Guidance / Counseling 9% - Informational / Advisory Letter 0% - Legal Enforcement 60% - Other</p>
<p>What documentation did FAA inspectors request during their visit/contact?</p> <p><i>Response totals add to greater than 100% because the question indicated respondents were to "Check all that apply."</i></p>	<p>58% - None 37% - Pilot Certificate 16% - Waiver / Airspace Authorization 11% - Operations Manual 5% - Aircraft / Pilot Flight Logs 5% - Aircraft Maintenance Records 5% - Don't Remember</p>
<p>How do you define "non-participating person" in your UAS operation?</p> <p><i>Response totals add to greater than 100% because the question indicated respondents were to "Check all that apply."</i></p>	<p>67% - Anyone Not Involved in Actually Flying or Operating the UAS 33% - Other 21% - Anyone Not Employed by the Company 19% - Anyone Who Has Not Signed a Liability Waiver 3% - Don't Know</p>
<p>What were your most significant challenges — if any — during the waiver or airspace authorization application and approval process?</p> <p><i>Response totals add to greater than 100% because the question indicated respondents were to "Check all that apply."</i></p>	<p>94% - Timeliness of FAA Response 54% - Lack of FAA Feedback During Process 39% - Unclear FAA Guidance / Standards 26% - Inconsistent Information From FAA When Contacted 23% - Other</p>
<p>What type of UAS commercial operations are you involved in?</p> <p><i>Response totals add to greater than 100% because the question indicated respondents were to "Check all that apply."</i></p>	<p>79% - Filmmaking/ Photography 69% - Real Estate 68% - Construction 51% - Infrastructure 43% - Education / Research / Training 34% - Emergency Response / Search & Rescue 27% - Insurance 20% - Agriculture 12% - Security</p>

Exhibit D. List of Acronyms

ATO	Air Traffic Organization
ASSURE	Alliance for System Safety of UAS through Research Excellence
DOT	Department of Transportation
FAAST	FAA Safety Team
FAA	Federal Aviation Administration
FSDO	Flight Standards District Office
LEAP	Law Enforcement Assistance Program
LAANC	Low Altitude Authorization and Notification Capability
MSL	Mean Sea Level
NAS	National Airspace System
NPG	National Work Program Guidelines
OIG	Office of Inspector General
PTRS	Program Tracking and Reporting Subsystem
SMS	Safety Management System
UAST	Unmanned Aircraft Safety Team
UAS	Unmanned Aircraft Systems

Exhibit E. Major Contributors to This Report

ROBIN KOCH	PROGRAM DIRECTOR
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Appendix. Agency Comments




Federal Aviation Administration

Memorandum

Date: October 10, 2018

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 Administration's (FAA) Response to Office of Inspector General (OIG) Draft Report: Oversight Processes for Unmanned Aircraft System (UAS) Waivers

The FAA is committed to continuous refinement of the UAS waiver process, operator education, and targeted surveillance opportunities. The Agency implemented two programs, DroneZone and Low Altitude Authorization Notification Capability (LAANC), which have reduced the average number of days for operational waiver processing to fewer than 25 days for decision. For airspace authorizations, LAANC provides nearly instantaneous authorization for locations where the service is available. In mid-2018, the FAA began a live webinar series on how to write a complete waiver application, reaching tens of thousands of viewers, answering more than 500 questions, and connecting with nearly 5 million users via social media. Finally, since Part 107 became a rule, UAS oversight activities have increased from 131 UAS inspection records in FAA's Program Tracking and Reporting Subsystem in the first year to over 5,000 records by the end of the second year. UAS investigations have become the fourth most investigated issue by the FAA.

As part of our continuous effort to promote UAS safety, the following actions are underway or completed:

- Updates to DroneZone every three weeks with user-friendly enhancements for waivers, registrations, and education;
- formed partnerships with industry to enable expanded UAS operations, developed technologies critical to the safe and efficient integration of UAS into the National Airspace System, and provided educational outreach to UAS operators;
- used social media to inform and instruct UAS operators in safety analysis, operational planning, and Part 107 eligibility for waivers; and
- implemented an expanded oversight plan that will enhance data collection. Starting in Fiscal Year 2019, each Safety Assurance office will have specific UAS surveillance tasks to plan and perform as part of the FAA's annual work program requirements.

The FAA believes that some of the statements in the draft report are misleading:

- The OIG is incorrect to state, “FAA Headquarters has not provided field office inspectors with information regarding the locations of UAS operations in their area.” The FAA maintains a list of Part 107 waivers granted and a list of Section 333 exemptions granted. This information is available to FAA inspectors and the public on the FAA’s website. However, a key challenge in UAS surveillance is the nature of flights. UAS do not operate out of fixed locations such as airports and currently have no requirements for transponders or any other identification or tracking technology. This limitation hampers the FAA and its inspectors from knowing the real-time location of an operating UAS and the physical location of the remote pilot operating it.
- We also disagree with the OIG’s assertions that our ability to approve certain waivers is impacted because of limited information and samples provided to applicants. We do not agree that providing sample mitigations to applicants to speed waiver processing is appropriate. The purpose of the waiver system is to ensure operators possess the requisite knowledge, skill, and safety culture to operate in the National Airspace System without placing others at an unacceptable level of increased risk. The waiver process separates potentially careless or reckless operators from operators who are responsible, educated, and safety oriented by allowing them to demonstrate they have the ability to participate in the planning and preparation required of a professional aviator.

Upon preliminary review, the FAA concurs with recommendations 1, 2, 3, 4, 6, 7, and 8 and plans to complete actions to implement the recommendations as follows: Recommendations 4 and 8 by December 31, 2018; Recommendations 2, 3, and 6 by January 31, 2019; Recommendation 1 by June 30, 2019; and Recommendation 7 by August 31, 2019.

FAA partially concurs with recommendation 5 to update the National Flight Standards Work Program Guidelines, to require field offices to perform inspections on a sample of commercial UAS operators in their area for a 2-year period. The FAA has already collected sufficient data to develop a targeted, risk-based oversight plan and will continue to collect data during implementation of the plan. The Agency does not agree that there is a need for field offices to conduct an additional two-years’ worth of sample inspections to accumulate inspection data. We plan to implement new surveillance items for UAS oversight via Notice by January 31, 2019 and include the information in the National Flight Standards Work Program Guidelines by August 31, 2019.

We appreciate this opportunity to respond to 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.

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