DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Parts 21, 43, 45, 47, 61, 91, 101, 107, and 183

[Docket No.: FAA–2015–0150; Notice No. 15–01]

RIN 2120–AJ60

Operation and Certification of Small Unmanned Aircraft Systems

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: The FAA is proposing to amend its regulations to adopt specific rules to allow the operation of small unmanned aircraft systems in the National Airspace System. These changes would address the operation of unmanned aircraft systems, certification of their operators, registration, and display of registration markings. The proposed rule would also find that airworthiness certification is not required for small unmanned aircraft system operations that would be subject to this proposed rule. Lastly, the proposed rule would prohibit model aircraft from endangering the safety of the National Airspace System.

DATES: Send comments on or before April 24, 2015.

ADDRESSES: Send comments identified by docket number FAA–2015–0150 using any of the following methods:

- *Federal eRulemaking Portal:* Go to *http://www.regulations.gov* and follow the online instructions for sending your comments electronically.
- *Mail:* Send comments to Docket Operations, M–30; U.S. Department of Transportation (DOT), 1200 New Jersey Avenue SE., Room W12–140, West Building Ground Floor, Washington, DC 20590–0001.
- *Hand Delivery or Courier:* Take comments to Docket Operations in Room W12–140 of the West Building Ground Floor at 1200 New Jersey Avenue SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.
- *Fax:* Fax comments to Docket Operations at 202–493–2251.

Privacy: In accordance with 5 U.S.C. 553(c), DOT solicits comments from the public to better inform its rulemaking process. DOT posts these comments, without edit, including any personal information the commenter provides, to *www.regulations.gov,* as described in the system of records notice (DOT/ALL–14 FDMS), which can be reviewed at *www.dot.gov/privacy.*

Docket: Background documents or comments received may be read at *http://www.regulations.gov* at any time. Follow the online instructions for accessing the docket or go to the Docket Operations in Room W12–140 of the West Building Ground Floor at 1200 New Jersey Avenue SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: For technical questions concerning this action, contact Lance Nuckolls, Office of Aviation Safety, Unmanned Aircraft Systems Integration Office, AFS–80, Federal Aviation Administration, 490 L'Enfant Plaza East, SW., Suite 3200, Washington, DC 20024; telephone (202) 267–8447; email *UAS-rule@faa.gov.*

For legal questions concerning this action, contact Alex Zektser, Office of Chief Counsel, International Law, Legislation, and Regulations Division, AGC–220, Federal Aviation Administration, 800 Independence Avenue SW., Washington, DC 20591; telephone (202) 267–3073; email *Alex.Zektser@faa.gov.*

SUPPLEMENTARY INFORMATION:

Authority for This Rulemaking

This rulemaking is promulgated under the authority described in the FAA Modernization and Reform Act of 2012 (Public Law 112–95). Section 333 of Public Law 112–95 directs the Secretary of Transportation [1] to determine whether ''certain unmanned aircraft systems may operate safely in the national airspace system.'' If the Secretary determines, pursuant to section 333, that certain unmanned aircraft systems may operate safely in the national airspace system, then the Secretary must ''establish requirements for the safe operation of such aircraft systems in the national airspace system.'' [2]

This rulemaking is also promulgated pursuant to 49 U.S.C. 40103(b)(1) and (2), which charge the FAA with issuing regulations: (1) To ensure the safety of aircraft and the efficient use of airspace; and (2) to govern the flight of aircraft for purposes of navigating, protecting and identifying aircraft, and protecting individuals and property on the ground. In addition, 49 U.S.C. 44701(a)(5), charges the FAA with prescribing regulations that the FAA finds necessary for safety in air commerce and national security.

Finally, the model-aircraft component of this rulemaking incorporates the statutory mandate in section 336(b) that preserves the FAA's authority, under 49 U.S.C. 40103(b) and 44701(a)(5), to pursue enforcement ''against persons operating model aircraft who endanger the safety of the national airspace system.''

List of Abbreviations and Acronyms Frequently Used in This Document

AC Advisory Circular
AGL Above Ground Level
ACR Airman Certification Representative
ARC Aviation Rulemaking Committee
ATC Air Traffic Control
CAFTA–DR Dominican Republic-Central America-United States Free Trade Agreement
CAR Civil Air Regulation
CFI Certified Flight Instructor
CFR Code of Federal Regulations
COA Certificate of Waiver or Authorization
DPE Designated Pilot Examiner
FR Federal Register
FSDO Flight Standards District Office
ICAO International Civil Aviation Organization
NAFTA North American Free Trade Agreement
NAS National Airspace System
NOTAM Notice to Airmen
NPRM Notice of Proposed Rulemaking
NTSB National Transportation Safety Board
PIC Pilot in Command
Pub. L. Public Law
PMA Parts Manufacturer Approval
TFR Temporary Flight Restriction
TSA Transportation Security Administration
TSO Technical Standard Order
UAS Unmanned Aircraft System
U.S.C. United States Code

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[1] The primary authority for this rulemaking is based on section 333 of Public Law 112–95 (Feb. 14, 2012). In addition, this rulemaking also relies on FAA statutory authorities. Thus, for the purposes of this rulemaking, the terms ''FAA,'' ''the agency,'' ''DOT,'' and ''the Secretary,'' are used synonymously throughout this document.

[2] Public Law 112–95, section 333(c). In addition, Public Law 112–95, section 332(b)(1) requires the Secretary to issue ''a final rule on small unmanned aircraft systems that will allow for civil operation of such systems in the national airspace system, to the extent the systems do not meet the requirements for expedited operational authorization under sections 333 of [Pub. L. 112–95].''

I. Executive Summary

A. Purpose of the Regulatory Action

This rulemaking proposes operating requirements to allow small unmanned aircraft systems (small UAS) to operate for non-hobby or non-recreational purposes. A small UAS consists of a small unmanned aircraft (which, as defined by statute, is an unmanned aircraft weighing less than 55 pounds [3]) and equipment necessary for the safe and efficient operation of that aircraft. The FAA has accommodated non-recreational small UAS use through various mechanisms, such as special airworthiness certificates, exemptions, and certificates of waiver or authorization (COA). This proposed rule would be the next phase of integrating small UAS into the NAS.

The following are examples of possible small UAS operations that could be conducted under this proposed framework:

- Crop monitoring/inspection;
- Research and development;
- Educational/academic uses;
- Power-line/pipeline inspection in hilly or mountainous terrain;
- Antenna inspections;
- Aiding certain rescue operations such as locating snow avalanche victims;
- Bridge inspections;
- Aerial photography; and
- Wildlife nesting area evaluations.

Because of the potential societally beneficial applications of small UAS, the FAA has been seeking to incorporate the operation of these systems into the national airspace system (NAS) since 2008. In April 2008, the FAA chartered the small UAS Aviation Rulemaking Committee (ARC). In April 2009, the ARC provided the FAA with recommendations on how small UAS could be safely integrated into the NAS. Since that time, the FAA has been working on a rulemaking to incorporate small UAS operations into the NAS.

In 2012, Congress passed the FAA Modernization and Reform Act of 2012 (Pub. L. 112–95). Section 333 of Public Law 112–95 directed the Secretary to determine whether UAS operations posing the least amount of public risk and no threat to national security could safely be operated in the NAS and if so, to establish requirements for the safe operation of these systems in the NAS, prior to completion of the UAS comprehensive plan and rulemakings required by section 332 of Public Law 112–95. As part of its ongoing efforts to integrate UAS operations in the NAS in accordance with section 332, and as authorized by section 333 of Public Law 112–95, the FAA is proposing to amend its regulations to adopt specific rules for the operation of small UAS in the NAS.

Based on our experience with the certification, exemption, and COA process, the FAA has developed the framework proposed in this rule to enable certain small UAS operations to commence upon adoption of the final rule and accommodate technologies as they evolve and mature. This proposed framework would allow small UAS operations for many different non-recreational purposes, such as the ones discussed previously, without requiring airworthiness certification, exemption, or a COA.

[3] Public Law 112–95, sec. 331(6).

B. Summary of the Major Provisions of the Regulatory Action

Specifically, the FAA is proposing to add a new part 107 to Title 14 Code of Federal Regulations (14 CFR) to allow for routine civil operation of small UAS in the NAS and to provide safety rules for those operations. Consistent with the statutory definition, the proposed rule defines small UAS as those UAS weighing less than 55 pounds. To mitigate risk, the proposed rule would limit small UAS to daylight-only operations, confined areas of operation, and visual-line-of-sight operations. This proposed rule also addresses aircraft registration and marking, NAS operations, operator certification, visual observer requirements, and operational limits in order to maintain the safety of the NAS and ensure that they do not pose a threat to national security. Below is a summary of the major provisions of the proposed rule.

SUMMARY OF MAJOR PROVISIONS OF PROPOSED PART 107

Operational Limitations	• Unmanned aircraft must weigh less than 55 lbs. (25 kg). • Visual line-of-sight (VLOS) only; the unmanned aircraft must remain within VLOS of the operator or visual observer. • At all times the small unmanned aircraft must remain close enough to the operator for the operator to be capable of seeing the aircraft with vision unaided by any device other than corrective lenses. • Small unmanned aircraft may not operate over any persons not directly involved in the operation. • Daylight-only operations (official sunrise to official sunset, local time). • Must yield right-of-way to other aircraft, manned or unmanned. • May use visual observer (VO) but not required. • First-person view camera cannot satisfy ''see-and-avoid'' requirement but can be used as long as requirement is satisfied in other ways. • Maximum airspeed of 100 mph (87 knots). • Maximum altitude of 500 feet above ground level. • Minimum weather visibility of 3 miles from control station. • No operations are allowed in Class A (18,000 feet & above) airspace. • Operations in Class B, C, D and E airspace are allowed with the required ATC permission. • Operations in Class G airspace are allowed without ATC permission • No person may act as an operator or VO for more than one unmanned aircraft operation at one time. • No operations from a moving vehicle or aircraft, except from a watercraft on the water. • No careless or reckless operations. • Requires preflight inspection by the operator. • A person may not operate a small unmanned aircraft if he or she knows or has reason to know of any physical or mental condition that would interfere with the safe operation of a small UAS. • Proposes a microUAS category that would allow operations in Class G airspace, over people not involved in the operation, and would require airman to self-certify that they are familiar with the aeronautical knowledge testing areas.
Operator Certification and Responsibilities	• Pilots of a small UAS would be considered ''operators''. • Operators would be required to: ○ Pass an initial aeronautical knowledge test at an FAA-approved knowledge testing center. ○ Be vetted by the Transportation Security Administration. ○ Obtain an unmanned aircraft operator certificate with a small UAS rating (like existing pilot airman certificates, never expires). ○ Pass a recurrent aeronautical knowledge test every 24 months. ○ Be at least 17 years old. ○ Make available to the FAA, upon request, the small UAS for inspection or testing, and any associated documents/records required to be kept under the proposed rule. ○ Report an accident to the FAA within 10 days of any operation that results in injury or property damage. ○ Conduct a preflight inspection, to include specific aircraft and control station systems checks, to ensure the small UAS is safe for operation.
Aircraft Requirements	• FAA airworthiness certification not required. However, operator must maintain a small UAS in condition for safe operation and prior to flight must inspect the UAS to ensure that it is in a condition for safe operation. Aircraft Registration required (same requirements that apply to all other aircraft). • Aircraft markings required (same requirements that apply to all other aircraft). If aircraft is too small to display markings in standard size, then the aircraft simply needs to display markings in the largest practicable manner.
Model Aircraft	• Proposed rule would not apply to model aircraft that satisfy all of the criteria specified in section 336 of Public Law 112–95. • The proposed rule would codify the FAA's enforcement authority in part 101 by prohibiting model aircraft operators from endangering the safety of the NAS.

Operator Certification: Under the proposed rule, the person who manipulates the flight controls of a small UAS would be defined as an ''operator.'' A small UAS operator would be required to pass an aeronautical knowledge test and obtain an unmanned aircraft operator certificate with a small UAS rating from the FAA before operating a small UAS. In order to maintain his or her operator certification, the operator would be

required to pass recurrent knowledge tests every 24 months subsequent to the initial knowledge test. These tests would be created by the FAA and administered by FAA-approved knowledge testing centers. Although a specific distant vision acuity standard is not being proposed, this proposed rule would require the operator to keep the small unmanned aircraft close enough to the control station to be capable of seeing that aircraft through his or her unaided (except for glasses or contact lenses) visual line of sight. The operator would also be required to actually maintain visual line of sight of the small unmanned aircraft if a visual observer is not used.

Visual Observer: Under the proposed rule, an operator would not be required to work with a visual observer, but a visual observer could be used to assist the operator with the proposed visual-line-of-sight and see-and-avoid requirements by maintaining constant visual contact with the small unmanned aircraft in place of the operator. While an operator would always be required to have the capability for visual line of sight of the small unmanned aircraft, this proposed rule would not require the operator to exercise this capability if he or she is augmented by at least one visual observer. No certification requirements are being proposed for visual observers. A small UAS operation would not be limited in the number of visual observers involved in the operation, but the operator and visual observer(s) must remain situated such that the operator and any visual observer(s) are all able to view the aircraft at any given time. The operator and visual observer(s) would be permitted to communicate by radio or other communication-assisting device, so they would not need to remain in close enough physical proximity to allow for unassisted oral communication.

Since the operator and any visual observers would be required to be in a position to maintain or achieve visual line of sight with the aircraft at all times, the proposed rule would effectively prohibit a relay or ''daisy-chain'' formation of multiple visual observers by requiring that the operator must always be capable of seeing the small unmanned aircraft. Such arrangements would potentially expand the area of a small UAS operation and pose an increased public risk if there is a loss of aircraft control.

Operational Scope: A small UAS operator would be required to see and avoid all other users of the NAS in the area in which the small UAS is operating. The proposed rule contains operating restrictions designed to help ensure that the operator is able to yield right-of-way to other aircraft at all times.

The proposed rule would limit the exposure of small unmanned aircraft to other users of the NAS by restricting small UAS operations in controlled airspace. Specifically, small UAS would be prohibited from operating in Class A airspace, and would require prior permission from Air Traffic Control to operate in Class B, C, or D airspace, or within the lateral boundaries of the surface area of Class E airspace designated for an airport. The risk of collision with other aircraft would be further reduced by limiting small UAS operations to a maximum airspeed of 87 knots (100 mph) and a maximum altitude of 500 feet above ground.

Further, in order to enable maximum visibility for small UAS operation, the proposed rule would restrict small UAS to daylight-only operations (sunrise to sunset), and impose a minimum weather-visibility of 3 statute miles (5 kilometers) from the small UAS control station.

Aircraft Maintenance: Under the proposed rule, the operator of a small UAS would be required to conduct a preflight inspection before each flight operation, and determine that the small UAS (aircraft, control station, launch and recovery equipment, etc.) is safe for operation.

Airworthiness: Pursuant to section 333(b)(2) of Public Law 112–95, the Secretary has determined that small UAS subject to this proposed rule would not require airworthiness certification because the safety concerns associated with small UAS operation would be mitigated by the other provisions of this proposed rule. Rather, this proposed rule would require the operator to ensure that the small UAS is in a condition for safe operation by conducting an inspection prior to each flight.

Registration and Marking: This proposed rule would apply to small unmanned aircraft the current registration requirements that apply to all aircraft. Once a small unmanned aircraft is registered, this proposed rule would require that aircraft to display its registration marking in a manner similar to what is currently required of all aircraft.

C. Costs and Benefits

This proposed rule reflects the fact that technological advances in small UAS have led to a developing commercial market for their uses by providing a safe operating environment for them and for other aircraft in the NAS. In time, the FAA anticipates that the proposed rule would provide an opportunity to substitute small UAS operations for some higher risk manned flights, such as inspecting towers, bridges, or other structures. The use of small unmanned aircraft would avert potential fatalities and injuries to those in the aircraft and on the ground. It would also lead to more efficient methods of performing certain commercial tasks that are currently performed by other methods. The FAA has not quantified the benefits for this proposed rulemaking because we lack sufficient data. The FAA invites commenters to provide data that could be used to quantify the benefits of this proposed rule.

For any commercial operation occurring because this rule is enacted, the operator/owner of that small UAS will have determined the expected revenue stream of the flights exceeds the cost of the flights operation. In each such case this rule helps enable new markets to develop.

The costs are shown in the table below.

TOTAL AND PRESENT VALUE COST SUMMARY BY PROVISION

[Thousands of current year dollars]

Type of cost	Total costs (000)	7% P.V. (000)
Applicant/small UAS operator:		
Travel Expense	$151.7	$125.9
Knowledge Test Fees	2,548.6	2,114.2
Positive Identification of the Applicant Fee	434.3	383.7
Owner:		
Small UAS Registration Fee	85.7	70.0
Time Resource Opportunity Costs:		

TOTAL AND PRESENT VALUE COST SUMMARY BY PROVISION—Continued

[Thousands of current year dollars]

Type of cost	Total costs (000)	7% P.V. (000)
Applicants Travel Time	296.1	245.3
Knowledge Test Application	108.9	90.2
Physical Capability Certification	20.0	17.7
Knowledge Test Time	1,307.1	1,082.9
Small UAS Registration Form	220.5	179.7
Change of Name or Address Form	14.9	12.3
Knowledge Test Report	154.9	128.5
Pre-flight Inspection	Not quantified	
Accident Reporting	Minimal cost	
Government Costs:		
TSA Security Vetting	1,026.5	906.9
FAA—sUAS Operating Certificate	39.6	35.0
FAA—Registration	394.3	321.8
Total Costs	6,803.1	5,714.0

* Details may not add to row or column totals due to rounding.

II. Background

This NPRM addresses the operation, airman certification, and registration of civil small UAS.

A small UAS consists of a small unmanned aircraft and associated elements that are necessary for the safe and efficient operation of that aircraft in the NAS. Associated elements that are necessary for the safe and efficient operation of the aircraft include the interface that is used to control the small unmanned aircraft (known as a control station) and communication links between the control station and the small unmanned aircraft. A small unmanned aircraft is defined by statute as ''an unmanned aircraft weighing less than 55 pounds.'' [4] Due to the size of a small unmanned aircraft, the FAA envisions considerable potential business and non-business applications, particularly in areas that are hard to reach for a manned aircraft.

The following are examples of possible small UAS operations that could be conducted under this proposed framework:

- Crop monitoring/inspection;
- Research and development;
- Educational/academic uses;
- Power-line/pipeline inspection in hilly or mountainous terrain;
- Antenna inspections;
- Aiding certain rescue operations such as locating snow avalanche victims;
- Bridge inspections;
- Aerial photography; and
- Wildlife nesting area evaluations.

The following sections discuss: (1) The public risk associated with small UAS operations; (2) the current legal framework governing small UAS operations; and (3) the FAA's ongoing efforts to incorporate small UAS operations into the NAS.

A. Analysis of Public Risk Posed by Small UAS Operations

Small UAS operations pose risk considerations that are different from the risk considerations associated with manned-aircraft operations. On one hand, certain operations of a small unmanned aircraft, discussed more fully in section III.D of this preamble, have the potential to pose significantly less risk to persons and property than comparable operations of a manned aircraft. The typical total takeoff weight of a general aviation aircraft is between 1,300 and 6,000 pounds. By contrast, the total takeoff weight of a small unmanned aircraft is less than 55 pounds. Consequently, because a small unmanned aircraft is significantly lighter than a manned aircraft, in the event of a mishap, the small unmanned aircraft would pose significantly less risk to persons and property on the ground. As such, a small UAS operation whose parameters are well defined so it does not pose a significant risk to other aircraft would also pose a smaller overall public risk or threat to national security than the operation of a manned aircraft.

However, even though small UAS operations have the potential to pose a lower level of public risk in certain types of operations, the unmanned nature of the small UAS operations raises two unique safety concerns that are not present in manned-aircraft operations. The first safety concern is whether the person operating the small unmanned aircraft, who would be physically separated from that aircraft during flight, would have the ability to see manned aircraft in the air in time to prevent a mid-air collision between the small unmanned aircraft and another aircraft. As discussed in more detail below, the FAA's regulations currently require each person operating an aircraft to maintain vigilance ''so as to see and avoid other aircraft.'' [5] This is one of the fundamental principles for collision avoidance in the NAS.

For manned-aircraft operations, ''see and avoid'' is the responsibility of persons on board an aircraft. By contrast, small unmanned aircraft operations have no human beings physically on the unmanned aircraft with the same visual perspective and the ability to see other aircraft in the manner of a manned-aircraft pilot. Thus, the challenge for small unmanned aircraft operations is to ensure that the person operating the small unmanned aircraft is able to see and avoid other aircraft.

In considering this issue, the FAA examined to what extent existing technology could provide a solution to this problem. The FAA notes that advances in technologies that use ground-based radar and aircraft sensors to detect the reply signals from aircraft ATC transponders have provided significant improvement in the ability to detect other aircraft in close proximity to each other. The Traffic Collision Avoidance System also has the ability to provide guidance to flight crews to maneuver appropriately to avoid a mid-air collision. Both of these technologies have done an excellent job in reducing the mid-air collision rate between manned aircraft. Unfortunately, the equipment required to utilize these widely available technologies is

[4] Sec. 331(6) of Public Law 112–95.

[5] 14 CFR 91.113(b).

currently too large and heavy to be used in small UAS operations. Until this equipment is miniaturized to the extent necessary to make it viable for use in small UAS operations, existing technology does not appear to provide a way to resolve the ''see and avoid'' problem with small UAS operations without maintaining human visual contact with the small unmanned aircraft during flight.

The second safety concern with small UAS operations is the possibility that, during flight, the person operating the small UAS may become unable to use the control interface to operate the small unmanned aircraft due to a failure of the control link between the aircraft and the operator's control station. This is known as a loss of positive control. This situation may result from a system failure or because the aircraft has been flown beyond the signal range or in an area where control link communication between the aircraft and the control station is interrupted. A small unmanned aircraft whose flight is unable to be directly controlled could pose a significant risk to persons, property, or other aircraft.

B. Current Statutory and Regulatory Structure Governing Small UAS

Due to the lack of an onboard pilot, small unmanned aircraft are unable to see and avoid other aircraft in the NAS. Therefore, small UAS operations conflict with the FAA's current operating regulations codified in 14 CFR part 91 that apply to general aviation. Specifically, at the heart of the part 91 operating regulations is § 91.113(b), which requires each person operating an aircraft to maintain vigilance ''so as to see and avoid other aircraft.''

The FAA created this requirement in a 1968 rulemaking that combined two previous aviation regulatory provisions, Civil Air Regulations (CAR) §§ 60.13(c) and 60.30.[6] Both of the provisions that were combined to create the ''see and avoid'' requirement of § 91.113(b) were intended to address aircraft collision-awareness problems by requiring that a pilot on board the aircraft look out of the aircraft during flight to observe whether other aircraft are on a collision path with his or her aircraft. Those provisions did not contemplate the use of technology to substitute for the human vision of a pilot on board the aircraft. Similarly, there is no evidence that those provisions contemplated a pilot fulfilling his or her ''see and avoid'' responsibilities from outside the aircraft. To the contrary, CAR section 60.13(c) stated that one of the problems it intended to address was ''preoccupation by the pilot with cockpit duties,'' which indicates that the regulation contemplated the presence of a pilot on board the aircraft.

Because the regulations that resulted in the see-and-avoid requirement of § 91.113(b) did not contemplate that this requirement could be complied with by a pilot who is outside the aircraft, § 91.113(b) currently requires an aircraft pilot to have the perspective of being inside the aircraft as that aircraft is moving in order to see and avoid other aircraft. Since the operator of a small UAS does not have this perspective, operation of a small UAS could not meet the see and avoid requirement of § 91.113(b) at this time.

In addition to currently being prohibited by § 91.113(b), there are also statutory considerations that apply to small UAS operations. Specifically, even though a small UAS is different from a manned aircraft, the operation of a small UAS still involves the operation of an aircraft. This is because the FAA's statute defines an ''aircraft'' as ''any contrivance invented, used, or designed to navigate or fly in the air.'' 49 U.S.C. 40102(a)(6). Since a small unmanned aircraft is a contrivance that is invented, used, and designed to fly in the air, a small unmanned aircraft is an aircraft for purposes of the FAA's statutes.[7]

Because a small UAS involves the operation of an ''aircraft,'' this triggers the FAA's registration and certification statutory requirements. Specifically, subject to certain exceptions, a person may not operate a civil aircraft that is not registered. 49 U.S.C. 44101(a). In addition, a person may not operate a civil aircraft in air commerce without an airworthiness certificate. 49 U.S.C. 44711(a)(1). Finally, a person may not serve in any capacity as an airman on a civil aircraft being operated in air commerce without an airman certificate. 49 U.S.C. 44711(a)(2)(A).[8]

The term ''air commerce,'' as used in the FAA's statutes, is defined broadly to include ''the operation of aircraft within the limits of a Federal airway, or the operation of aircraft that directly affects, or may endanger safety in foreign or interstate air commerce.'' 49 U.S.C. 40102(a)(3). Because of this broad definition, the National Transportation Safety Board (NTSB) has held that ''any use of an aircraft, for purpose of flight, constitutes air commerce.'' [9] Courts that have considered this issue have reached similar conclusions that ''air commerce,'' as defined in the FAA's statute, encompasses a broad range of commercial and non-commercial aircraft operations.[10]

Accordingly, because ''air commerce'' encompasses such a broad range of aircraft operations, a civil small unmanned aircraft cannot currently be operated, for purposes of flight, if: (1) It is not registered (49 U.S.C. 44101(a)); (2) it does not possess an airworthiness certificate (49 U.S.C. 44711(a)(1)); and (3) the airman operating the aircraft does not possess an airman certificate (49 U.S.C. 44711(a)(2)(A)). However, the FAA's current processes for issuing airworthiness and airman certificates were designed to be used for manned aircraft and do not take into account the considerations associated with civil small UAS.

Specifically, obtaining a type certificate and a standard airworthiness certificate, which permits the widest range of aircraft operation, currently takes about 3 to 5 years. Because the pertinent existing regulations do not differentiate between manned and unmanned aircraft, a small UAS is currently subject to the same airworthiness certification process as a manned aircraft. However, it is not practically feasible for many small UAS manufacturers to go through the certification process required of manned aircraft. This is because small UAS technology is rapidly evolving at this time, and consequently, if a small UAS manufacturer goes through a 3-to-5-year process to obtain a type certificate, which enables the issuance of a standard airworthiness certificate, the small UAS would be technologically outdated by the time it completed the certification process. For example, advances in lightweight battery technology may allow new lightweight transponders and power sources within the next 3 to 5 years that are currently unavailable for small UAS operations.

The FAA notes that there are several other certification options available to

[6] *Pilot Vigilance,* 33 FR 10505 (July 24, 1968).

[7] Public Law 112–95 reaffirmed that an unmanned aircraft is indeed an aircraft by defining an unmanned aircraft as ''an *aircraft* that is operated without the possibility of direct human intervention from within or on the aircraft.'' Sec. 331(8), Public Law 112–95 (emphasis added).

[8] The statutes also impose other requirements that are beyond the scope of this rulemaking. For example, 49 U.S.C. 44711(a)(4) prohibits a person from operating as an air carrier without an air-carrier operating certificate.

[9] *Administrator* v. *Barrows,* 7 N.T.S.B. 5, 8–9 (1990).

[10] *See, e.g., United States* v. *Healy,* 376 U.S. 75, 84–85 (1964) (holding that ''air commerce'' is not limited to commercial airplanes); *Hill* v. *NTSB,* 886 F.2d 1275, 1280 (10th Cir. 1989) (''[t]he statutory definition of ''air commerce'' is therefore clearly not restricted to interstate flights occurring in controlled or navigable airspace''); *United States* v. *Drumm,* 55 F. Supp. 151, 155 (D. Nev. 1944) (''any operation of any aircraft in the air space either directly affects or may endanger safety in, interstate, overseas, or foreign air commerce'').

small UAS manufacturers and operators who do not wish to go through the process of obtaining a type certificate and standard airworthiness certificate. However, because each of these options has significant limitations, these options do not provide flexibility for most routine small UAS operations. These certification options are as follows:

• A special airworthiness certificate in the experimental category may be issued to UAS pursuant to 14 CFR 21.191–21.195. This certificate is time-limited, and cannot be used for any activities other than research and development, market surveys, and crew training.

• A special flight permit may be issued pursuant to 14 CFR 21.197. At this time, however, a special flight permit for a UAS is limited to production flight testing of new production aircraft.[11]

• A special airworthiness certificate in the restricted category is issued pursuant to 14 CFR 21.25(a). There are two options for obtaining this certificate.

First, pursuant to § 21.25(a)(2), a certificate may be issued for aircraft accepted by an Armed Force of the United States and later modified for a special purpose.

Second, pursuant to § 21.25(a)(1), a certificate may be issued for aircraft used in special purpose operations, which consist of:

(1) agricultural operations;
(2) forest and wildlife conservation;
(3) aerial surveying;
(4) patrolling (pipelines, power lines, and canals);
(5) weather control;
(6) aerial advertising; and
(7) any other operation specified by the FAA.

As can be seen from the above list, the current certification options are limited to very specific purposes. Accordingly, they do not provide sufficient flexibility for most routine civil small UAS operations within the NAS.

In addition to obtaining an airworthiness certificate, any person serving as an airman in the operation of a small UAS must obtain an airman certificate. 49 U.S.C. 44711(a)(2)(A). The statute defines an ''airman'' to include an individual who is ''in command, or as pilot, mechanic, or member of the crew, who navigates aircraft when under way.'' 49 U.S.C. 40102(a)(8)(A). Because the person operating the small UAS is in command and is a member of the crew who navigates the aircraft, that person is an airman and must obtain an airman certificate.

Under current pilot certification regulations, depending on the type of operation, the operator of the small UAS currently must obtain either a private pilot certificate or a commercial pilot certificate. A private pilot certificate cannot be used to operate a small UAS for compensation or hire unless the flight is only incidental to the operator's business or employment.[12] Typically, to obtain a private pilot certificate, the small UAS operator currently has to: (1) Receive training in specific aeronautical knowledge areas; (2) receive training from an authorized instructor on specific areas of aircraft operation; (3) obtain a minimum of 40 hours of flight experience; and (4) obtain a third-class airman medical certificate.[13] Conversely, holding at least a commercial pilot certificate allows the small UAS to generally be used for compensation or hire, but is more difficult to obtain. In addition to the requirements necessary to obtain a private pilot certificate, applicants for a commercial pilot certificate currently need to also obtain 250 hours of flight time, satisfy extensive testing requirements, and obtain a second-class airman medical certificate.[14]

While these airman certification requirements are necessary for manned aircraft operations, they impose an unnecessary burden for many small UAS operations. This is because a person typically obtains a private or commercial pilot certificate by learning how to operate a manned aircraft. Much of that knowledge would not be applicable to small UAS operations because a small UAS is operated differently than a manned aircraft. In addition, the knowledge currently necessary to obtain a private or commercial pilot certificate would not equip the certificate holder with the tools necessary to safely operate a small UAS. Specifically, applicants for a private or commercial pilot certificate currently are not trained in how to deal with the ''see-and-avoid'' and loss-of-positive-control safety issues that are unique to small unmanned aircraft. Thus, requiring persons wishing to operate a small UAS to obtain a private or commercial pilot certificate imposes the cost of certification on those persons, but does not result in a significant safety benefit because the process of obtaining the certificate does not equip those persons with the tools necessary to mitigate the public risk posed by small UAS operations.

Recognizing the problem of applying the operating rules of part 91 to small UAS operations and the cost imposed on small UAS operations by existing certification processes, the FAA fashioned a temporary solution. Specifically, the FAA issued an advisory circular (AC) 91–57 and a policy statement elaborating on AC 91–57, which provide guidance for the safe operation of ''model aircraft.'' The policy statement defines a ''model aircraft'' as a UAS that is used for hobby or recreational purposes.[15] The policy statement explains that AC 91–57:

> [E]ncourages good judgment on the part of operators so that persons on the ground or other aircraft in flight will not be endangered. The AC contains among other things, guidance for site selection. Users are advised to avoid noise sensitive areas such as parks, schools, hospitals, and churches. Hobbyists are advised not to fly in the vicinity of spectators until they are confident that the model aircraft has been flight tested and proven airworthy. Model aircraft should be flown below 400 feet above the surface to avoid other aircraft in flight. The FAA expects that hobbyists will operate these recreational model aircraft within visual line-of-sight.[16]

Neither AC 91–57 nor the associated policy statement contains any registration or certification requirements.[17]

To date, the FAA has used its discretion[18] to not bring enforcement action against model-aircraft operations that comply with AC 91–57. However, the use of discretion to permit continuing violation of FAA statutes and regulations is not a viable long-term solution for incorporating UAS operations into the NAS. Additionally, because AC 91–57 and the associated policy statement are limited to model aircraft, they do not apply to non-recreational UAS operations. Thus, even with the use of enforcement discretion, because of the difficulty of obtaining the

[11] A special flight permit for production flight testing is not limited to small UAS and can be obtained for unmanned aircraft weighing more than 55 pounds. We emphasize, however, that a special flight permit is limited at this time to production flight testing and will include operational requirements and limitations.

[12] *See* 14 CFR 61.113.

[13] *See* 14 CFR part 61, Subpart E and § 61.23(a)(3)(i).

[14] *See* 14 CFR part 61, Subpart F and § 61.23(a)(2).

[15] *See Unmanned Aircraft Operations in the National Airspace System,* 72 FR 6689, 6690 (Feb. 13, 2007) (explaining how AC 91–57 functions).

[16] *Id.*

[17] The policy statement did, however, explain the COA process that is currently used to allow public aircraft operations with UAS. This process is discussed in detail in section III.C of this preamble. As discussed in that section, this proposed rule would allow public aircraft operations with UAS to voluntarily comply with proposed part 107, but would otherwise leave the existing public aircraft operations COA process unchanged.

[18] As used in this context, ''discretion'' refers to the FAA's power to decide whether to commence an enforcement action.

requisite certification for a small UAS and because operation of a small UAS would violate the see-and-avoid requirement of § 91.113(b), non-recreational civil small UAS operations are effectively prohibited at this time.

C. Integrating Small UAS Operations Into the NAS

To address the issues discussed above, the FAA chartered the small UAS Aviation Rulemaking Committee (ARC) on April 10, 2008. On April 1, 2009, the ARC provided the FAA with recommendations on how small UAS could be safely integrated into the NAS.[19] In 2013, the U.S. Department of Transportation issued a comprehensive plan and subsequently the FAA issued a roadmap of its efforts to achieve safe integration of UAS operations into the NAS.[20]

In 2012, Congress passed the FAA Modernization and Reform Act of 2012 (Pub. L. 112–95). In section 332(b) of Public Law 112–95, Congress directed the Secretary to issue a final rule on small unmanned aircraft systems that will allow for civil operations of such systems in the NAS.[21] In section 333 of Public Law 112–95, Congress also directed the Secretary to determine whether ''certain unmanned aircraft systems may operate safely in the national airspace system.'' To make a determination under section 333, we must assess ''which types of unmanned aircraft systems, if any, as a result of their size, weight, speed, operational capability, proximity to airports and populated areas, and operation within visual line of sight do not create a hazard to users of the national airspace system or the public or pose a threat to national security.'' Public Law 112–95, Sec. 333(b)(1). The Secretary must also determine whether a certificate of waiver or authorization, or airworthiness certification is necessary to mitigate the public risk posed by the unmanned aircraft systems that are under consideration. Public Law 112–95, Sec. 333(b)(2). If the Secretary determines that certain unmanned aircraft systems may operate safely in the NAS, then the Secretary must ''establish requirements for the safe operation of such aircraft systems in the national airspace system.'' Public Law 112–95, Sec. 333(c). The flexibility provided for in section 333 did not extend to airman certification and security vetting, aircraft marking, or registration requirements.

As noted above, section 333(b)(2) provided the Secretary of Transportation with discretionary power as to whether airworthiness certification should be required for certain small UAS.[22] As discussed previously, the FAA's statute normally requires an aircraft being flown outdoors to possess an airworthiness certificate.[23] However, subsection 333(b)(2) allows for the determination that airworthiness certification is not necessary for certain small UAS. The key determinations that must be made in order for UAS to operate under the authority of section 333 are: (1) The operation must not create a hazard to users of the national airspace system or the public; and (2) the operation must not pose a threat to national security.[24] In making these determinations, we must consider the following factors: Size, weight, speed, operational capability, proximity to airports and populated areas, and operation within visual line of sight. Of these factors, operation within visual line of sight is a primary factor for evaluation. At this point in time, we have determined that technology has not matured to the extent that would allow small UAS to be used safely in lieu of visual line of sight without creating a hazard to other users of the NAS or the public, or posing a threat to national security.

This construction of section 333 is a reasonable interpretation that is consistent with the statutory text and reflects Congressional intent in adopting the provision. We invite comments on whether there are well-defined circumstances and conditions under which operation beyond the line of sight would pose little or no additional risk to other users of the NAS, the public, or national security. Finally, we invite comments on the technologies and operational capabilities or procedures needed to allow UAS flights beyond visual line of sight, and how such technologies, capabilities and procedures could be accommodated under this rule or in a future rulemaking.

As a result of its ongoing integration efforts, the FAA seeks to change its regulations to take the first step in the process of integrating small UAS operations into the NAS. This proposal would utilize the airworthiness-certification flexibility provided by Congress in section 333 of Public Law 112–95, and allow some small UAS operations to commence in the NAS.[25]

In addition, to further facilitate the integration of UAS into the NAS, the FAA has selected six test sites to test UAS technology and operations. As of August 2014, all of the UAS test sites, which were selected based on geographic and climatic diversity, are operational and will remain in place for the next 5 years to help us gather operational data to foster further integration, as well as evaluate new technologies. In addition, the FAA is in the process of selecting a new UAS Center of Excellence which will also serve as another resource for these activities. The FAA invites comments on how it can improve or further leverage its test site program to encourage innovation, safe development and UAS integration into the NAS.

III. Discussion of the Proposal

As discussed in the previous section, in order to determine whether certain UAS may operate safely in the NAS pursuant to section 333, the Secretary must find that the operation of the UAS would not: (1) Create a hazard to users of the NAS or the public; or (2) pose a threat to national security. The Secretary must also determine whether small UAS operations subject to this proposed rule pose a safety risk sufficient to require airworthiness certification. The following preamble sections discuss the specific components of this proposed rule, and in section III.J below, we explain how these components work together and allow the Secretary to make the statutory findings required by section 333.

A. Incremental Approach and Privacy

The FAA began its small UAS rulemaking in 2005. In its initial approach to this rulemaking, which the FAA utilized from 2005 until November 2013, the FAA attempted to implement the ARC's recommendations and craft a rule that encompassed the widest possible range of small UAS operations. This approach utilized a regulatory structure similar to the one that the FAA uses for manned aircraft. Specifically, small UAS operations that pose a low risk to people, property, and other

[19] A copy of the small UAS ARC Report and Recommendations can be found in the docket for this rulemaking.

[20] *http://www.faa.gov/about/initiatives/uas/media/uas_roadmap_2013.pdf*

[21] As discussed in more detail further in the preamble, the FAA Modernization and Reform Act of 2012 also contained a provision prohibiting the FAA from issuing rules and regulations for model aircraft meeting certain criteria specified in section 336 of the Act.

[22] Public Law 112–95, sec. 333(b)(2).

[23] 49 U.S.C. 44711(a)(1).

[24] Public Law 112–95, sec. 333(b)(1).

[25] As discussed in section III.B.6 below, 14 CFR part 107 that would be created by this proposed rule would not apply to model aircraft that satisfy all of the statutory criteria specified in section 336 of Public Law 112–95. The FAA has recently published an interpretive rule for public comment explaining the statutory criteria of section 336. *See Interpretation of the Special Rule for Model* Aircraft, 79 FR 36172, 36175 (June 25, 2014).

aircraft would have been subject to less stringent regulation while small UAS operations posing a greater risk would have been subject to more stringent regulation in order to mitigate the greater risk.

In exploring this approach, the FAA found that, as discussed previously, there are two unique safety issues associated with UAS: (1) Extending ''see and avoid'' anti-collision principles to a pilot that is not physically present on the aircraft; and (2) loss of positive control of the unmanned aircraft. In addition, at the time that it was considering this approach, the FAA did not have the discretion necessary to exempt these aircraft from the statutory requirement for airworthiness certification, as the section 333 authority did not come into effect until February 14, 2012. As a result of these issues, the FAA's original broadly-scoped approach to the rulemaking effort took significantly longer than anticipated. Consequently, the FAA decided to proceed with multiple incremental UAS rules rather than a single omnibus rulemaking in order to utilize the flexibility with regard to airworthiness certification that Congress provided in section 333.

Accordingly, at this time, the FAA is proposing a rule that, pursuant to section 333 of Public Law 112–95, will integrate small UAS operations posing the least amount of risk. Because these operations pose the least amount of risk, this proposed rule would treat the entire spectrum of operations that would be subject to this rule in a similar manner by imposing less stringent regulatory burdens that would ensure that the safety and security of the NAS would not be reduced by operation of these UAS. In the meantime, the FAA will continue working on integrating UAS operations that pose greater amounts of risk, and will issue notices of proposed rulemaking for those operations once the pertinent issues have been addressed, consistent with the approach set forth in the UAS Comprehensive Plan for Integration and FAA roadmap for integration.[26] Once the entire integration process is complete, the FAA envisions the NAS populated with UAS that operate well beyond the operational limits proposed in this rule. Those UAS will be regulated differently than the UAS that would be integrated through this rule, and will be addressed in subsequent rulemakings. The FAA has selected this approach because it would allow lower-risk small UAS operations to be incorporated into the NAS immediately instead of waiting until the issues associated with higher-risk UAS operations are resolved.

The approach of this proposal is meant to address low risk operations; to the greatest extent possible, it takes a data-driven, risk-based approach to defining specific regulatory requirements for small UAS operations. It is well understood that regulations that are articulated in terms of the desired outcomes (*i.e.,* ''performance standards'') are generally preferable to those that specify the means to achieve the desired outcomes (*i.e.,* ''design'' standards). According to Office of Management and Budget Circular A–4 (''Regulatory Analysis''), performance standards ''give the regulated parties the flexibility to achieve the regulatory objectives in the most cost-effective way.'' [27]

Design standards have a tendency to lock in certain approaches that limit the incentives to innovate and may effectively prohibit new technologies altogether. The distinction between design and performance standards is particularly important where technology is evolving rapidly, as is the case with small UAS.

In this proposal, the regulatory objectives are to enable integration of small UAS into the NAS in a manner that does not impose unacceptable risk to other aircraft, people, or property. The FAA seeks comment on whether there are additional requirements that could be specified in ways that are more performance-oriented in order to minimize any disincentives to develop new technologies that achieve the regulatory objectives at lower cost.

Recently, the FAA, with the approval of the Secretary, has been issuing exemptions in accordance with 14 CFR part 11 and section 333 of Public Law 112–95 to accommodate an increasing number of small UAS operations that are not for hobby or recreational purposes. If adopted, this rule will eliminate the need for the vast majority of these exemptions. The exemption process will continue to be available for UAS operations that fall outside the parameters of this rule. Such operations may involve the use of more advanced technologies that are not yet mature at the time of this rulemaking.

The FAA also notes that, because UAS-associated technologies are rapidly evolving at this time, new technologies could come into existence after this rule is issued or existing technologies may evolve to the extent that they establish a level of reliability sufficient to allow those technologies to be relied on for risk mitigation. These technologies may alleviate some of the risk concerns that underlie the provisions of this rulemaking like the line of sight rule. Accordingly, the FAA invites comments as to whether the final rule should relax operating restrictions on small UAS equipped with technology that addresses the concerns underlying the operating limitations of this proposed rule, for instance through some type of deviation authority (such as a letter of authorization or a waiver).

The FAA also notes that privacy concerns have been raised about unmanned aircraft operations. Although these issues are beyond the scope of this rulemaking, recognizing the potential implications for privacy and civil rights and civil liberties from the use of this technology, and consistent with the direction set forth in the Presidential Memorandum, *Promoting Economic Competitiveness While Safeguarding Privacy, Civil Rights, and Civil Liberties in Domestic Use of Unmanned Aircraft Systems* (February 15, 2015), the Department and FAA will participate in the multi-stakeholder engagement process led by the National Telecommunications and Information Administration (NTIA) to assist in this process regarding privacy, accountability, and transparency issues concerning commercial and private UAS use in the NAS. We also note that state law and other legal protections for individual privacy may provide recourse for a person whose privacy may be affected through another person's use of a UAS.

The FAA conducted a privacy impact assessment (PIA) of this rule as required by section 522(a)(5) of division H of the FY 2005 Omnibus Appropriations Act, Public Law 108–447, 118 Stat. 3268 (Dec. 8, 2004) and section 208 of the E-Government Act of 2002, Public Law 107–347, 116 Stat. 2889 (Dec. 17, 2002). The assessment considers any impacts of the proposed rule on the privacy of information in an identifiable form. The FAA has determined that this proposed rule would impact the FAA's handling of personally identifiable information (PII). As part of the PIA that the FAA conducted as part of this rulemaking, the FAA analyzed the effect this impact might have on collecting, storing, and

[26] Section 332(a) of Public Law 112–95 requires the Secretary of Transportation to develop a comprehensive plan to safely accelerate the integration of civil UAS into the NAS. This plan must be developed in consultation with representatives of the aviation industry, federal agencies that employ UAS technology in the NAS, and the UAS industry. Section 332(a) also requires the Secretary of Transportation to develop a 5-year roadmap for the introduction of civil UAS into the NAS. Both the comprehensive plan and the roadmap were published in November 2013.

[27] *http://www.whitehouse.gov/sites/default/files/omb/assets/regulatory_matters_pdf/a-4.pdf*

disseminating PII and examined and evaluated protections and alternative information handling processes in developing the proposed rule in order to mitigate potential privacy risks.

As proposed, the process for granting unmanned aircraft operator certificates with a small UAS rating would be brought in line with the process for granting traditional airman certificates. Thus, the privacy implications of this rule to the privacy of the information that would be collected, maintained, stored, and disseminated by the FAA in accordance with this rule are the same as the privacy implications of the FAA's current airman certification processes. These privacy impacts have been analyzed by the FAA in the following Privacy Impact Assessments for the following systems: Civil Aviation Registry Applications (AVS Registry); the Integrated Airman Certification and Ratings Application (IACRA); and Accident Incident Database. These Privacy Impact Assessments are available in the docket for this rulemaking and at *http://www.dot.gov/individuals/privacy/privacy-impact-assessments#Federal* Aviation Administration (FAA).

B. Applicability

To integrate small UAS operations into the NAS, this proposed rule would create a new part in title 14 of the CFR: Part 107. Subject to the exceptions discussed below, proposed part 107 would prescribe the rules governing the registration, airman certification, and operation of civil small UAS within the United States. As mentioned previously, a small UAS is a UAS that uses an unmanned aircraft weighing less than 55 pounds. This proposed rule would allow non-recreational small UAS to operate in the NAS. The operations enabled by this proposed rule would include business, academic, and research and development flights, which are hampered by the current regulatory framework.

Under this proposal, the regulations of part 107, which are tailored to address the risks associated with small UAS operations, would apply to small UAS operations in place of certain existing FAA regulations that impede civil small UAS operations. Specifically, for small UAS operations, the requirements of proposed part 107 would generally replace the airworthiness provisions of part 21, the airman certification provisions of part 61, and the operating limitations of part 91.

However, proposed part 107 would not apply to all small UAS operations. For the reasons discussed below, proposed part 107 would not apply to: (1) Air carrier operations; (2) external load and towing operations; (3) international operations; (4) foreign-owned aircraft that are ineligible to be registered in the United States; (5) public aircraft; (6) certain model aircraft; and (7) moored balloons, kites, amateur rockets, and unmanned free balloons.

1. Air Carrier Operations

When someone is transporting persons or property by air for compensation, that person is considered an air carrier by statute and is required to obtain an air carrier operating certificate.[28] Because there is an expectation of safe transportation when payment is exchanged, air carriers are subject to more stringent regulations to mitigate the risks posed to persons or non-operator-owned property on the aircraft.

The FAA notes that some industries may desire to transport property via UAS.[29] Proposed part 107 would not prohibit this type of transportation so long as it is not done for compensation and the total weight of the aircraft, including the property, is less than 55 pounds. For example, research and development operations transporting property could be conducted under proposed part 107, as could operations by corporations transporting their own property within their business under the other provisions of this proposed rule.

The FAA seeks comment on whether UAS should be permitted to transport property for payment within the other proposed constraints of the rule, *e.g.,* the ban on flights over uninvolved persons, the requirements for line of sight, and the intent to limit operations to a constrained area. The FAA also seeks comment on whether a special class or classes of air carrier certification should be developed for UAS operations.

2. External Load and Towing Operations

The FAA considered allowing small unmanned aircraft to conduct external-load operations and to tow other aircraft or objects. These operations involve a greater level of public risk due to the dynamic nature of external-load configurations and inherent risks associated with the flight characteristics of a load that is carried, or extends, outside the aircraft fuselage and may be jettisonable. These types of operations may also involve evaluation of the aircraft frame for safety performance impacts, which may require airworthiness certification.

Given the risks associated with external load and towing operations, the FAA cannot find that a certification is not required. However, the FAA invites comments, with supporting documentation, on whether external-load UAS operations and towing UAS operations should be permitted, whether they would require airworthiness certification, whether they would require higher levels of airman certification, whether they would require additional operational limitations, and on other relevant issues.

3. International Operations

At this time, the FAA also proposes to limit this rulemaking to small UAS operations conducted entirely within the United States. The International Civil Aviation Organization (ICAO) recognizes that:

> The safe integration of UAS into non-segregated airspace will be a long-term activity with many stakeholders adding their expertise on such diverse topics as licensing and medical qualification of UAS crew, technologies for detect and avoid systems, frequency spectrum (including its protection from unintentional or unlawful interference), separation standards from other aircraft, and development of a robust regulatory framework.[30]

ICAO has further stated that ''[u]nmanned aircraft . . . are, indeed aircraft; therefore existing [ICAO standards and recommended practices] SARPs apply to a very great extent. The complete integration of UAS at aerodromes and in the various airspace classes will, however, necessitate the development of UAS-specific SARPs to supplement those already existing.'' [31] ICAO has begun to issue and amend SARPs to specifically address UAS operations. For example, the standard contained in paragraph 3.1.9 of Annex 2 (Rules of the Air) to the Convention on International Civil Aviation states that ''A remotely piloted aircraft shall be operated in such a manner as to minimize hazards to persons, property or other aircraft and in accordance with the conditions specified in Appendix 4.'' This appendix sets forth detailed conditions ICAO Member States must require of civil UAS operations for the ICAO Member State to comply with the Annex 2, paragraph 3.1.9 standard. ICAO standards in Annex 7 (Aircraft Nationality and Registration Marks) to the Convention also require remotely

[28] 49 U.S.C. 44711(a)(4).

[29] Property that is transported as an external load is discussed in the next section of the preamble.

[30] *ICAO Circular 328 (Unmanned Aircraft Systems (UAS))* (2011).

[31] *Id.*

piloted aircraft to ''carry an identification plate inscribed with at least its nationality or common mark and registration mark'' and be ''made of fireproof metal or other fireproof material of suitable physical properties.'' For remotely piloted aircraft, this identification plate must be ''secured in a prominent position near the main entrance or compartment or affixed conspicuously to the exterior of the aircraft if there is no main entrance or compartment.''

While we embrace the basic principle that UAS operations should minimize hazards to persons, property or other aircraft, we believe that it is possible to achieve this goal with respect to certain small UAS operations in a much less restrictive manner than current ICAO standards require. Accordingly, the FAA proposes, for the time being, to limit the applicability of proposed part 107 to small UAS operations that are conducted entirely within the United States. The FAA envisions that international operations would be dealt with in a future FAA rulemaking. The FAA believes that the experience that the FAA will gain with UAS operations under this rule will assist with future rulemakings. The FAA also anticipates that ICAO will continue to revise and more fully develop its framework for UAS operations to better reflect the diversity of UAS operations and types of UAS and to distinguish the appropriate levels of regulation in light of those differences.

The FAA notes that under Presidential Proclamation 5928, the territorial sea of the United States, and consequently its territorial airspace, extends to 12 nautical miles from the baselines of the United States determined in accordance with international law. Thus, UAS operating in the airspace above the U.S. territorial sea would be operating within the United States for the purposes of this proposed rule.

The FAA also emphasizes that proposed part 107 would not prohibit small UAS operators from operating in international airspace or in other countries; however, the proposed rule also would not provide authorization for such operations. UAS operations that do not take place entirely within the United States would need to obtain all necessary authorizations from the FAA and the relevant foreign authorities outside of the part 107 framework, as that framework would not apply to operations that do not take place entirely within the United States. It is important to note that Article 8 of the Convention on International Civil Aviation, to which the U.S. is a party, provides:

> No aircraft capable of being flown without a pilot shall be flown without a pilot over the territory of a contracting State without special authorization by that State and in accordance with the terms of such authorization. Each contracting State undertakes to insure that the flight of such aircraft without a pilot in regions open to civil aircraft shall be so controlled as to obviate danger to civil aircraft.

Accordingly, UAS operations in foreign countries may not take place without the required authorizations and permission of that country.

4. Foreign-Owned Aircraft That Are Ineligible for U.S. Registration

The FAA proposes to limit the scope of this rulemaking to U.S.-registered aircraft. Under 49 U.S.C. 44103 and 14 CFR 47.3, an aircraft can be registered in the United States only if it is not registered under the laws of a foreign country and meets one of the following ownership criteria:

- The aircraft is owned by a citizen of the United States;
- The aircraft is owned by a permanent resident of the United States;
- The aircraft is owned by a corporation that is not a citizen of the United States, but that is organized and doing business under U.S. Federal or state law and the aircraft is based and primarily used in the United States; or
- The aircraft is owned by the United States government or a state or local governmental entity.

An aircraft that does not satisfy the above criteria is typically owned by a foreign person or entity and is subject to special operating rules.[32] As previously noted, the ICAO framework for international UAS operations is at a relatively early stage in its development. Accordingly, proposed part 107 would only apply to small unmanned aircraft that meet the criteria specified in § 47.3, which must be satisfied in order for an aircraft to be eligible for U.S. registration. The FAA notes existing U.S. international trade obligations do permit certain kinds of operations, known as specialty air services. Specialty air services are generally defined as any specialized commercial operation using an aircraft whose primary purpose is not the transportation of goods or passengers, including but not limited to aerial mapping, aerial surveying, aerial photography, forest fire management, firefighting, aerial advertising, glider towing, parachute jumping, aerial construction, helilogging, aerial sightseeing, flight training, aerial inspection and surveillance, and aerial spraying services. The FAA will consult with the Secretary to determine the process through which it might permit foreign-owned small unmanned aircraft to operate in the United States. The FAA invites comments on the inclusion of foreign-registered small unmanned aircraft in this new framework.

As provided by 49 U.S.C. 40105(b)(1)(A), the FAA Administrator must carry out his responsibilities under Part A (Air Commerce and Safety) of title 49, United States Code, consistently with the obligations of the U.S. Government under international agreements. The FAA invites comments regarding whether the proposed rule needs to be modified to ensure that it is consistent with any relevant obligations of the United States under international agreements.

5. Public Aircraft Operations

This proposed rule would also not apply to public aircraft operations with small UAS that are not operated as civil aircraft. This is because public aircraft operations, such as those conducted by the Department of Defense, the National Aeronautics and Space Administration, and the National Oceanic and Atmospheric Administration, are not required to comply with civil airworthiness or airman certification requirements to conduct operations. However, these operations are subject to the airspace and air-traffic rules of part 91, which include the ''see and avoid'' requirement of § 91.113(b). Because unmanned aircraft operations currently are incapable of complying with § 91.113(b), the FAA has required public aircraft operations that use unmanned aircraft to obtain an FAA-issued Certificate of Waiver or Authorization (COA) providing the public aircraft operation with a waiver/deviation from the ''see and avoid'' requirement of § 91.113(b).

The existing COA system has been in place for over eight years, and has not caused any significant human injuries or other significant adverse safety impacts.[33] Accordingly, this proposed rule would not abolish the COA system. However, this proposed rule would provide public aircraft operations with greater flexibility by giving them the option to declare an operation to be a civil operation and comply with the provisions of proposed part 107 instead

[32] *See, e.g.,* 14 CFR part 91, subpart H (specifying operating rules for foreign civil aircraft).

[33] The FAA has been issuing COAs to public aircraft operations using UAS for over 20 years; however, prior to 2005, those COAs were issued using different processes.

of seeking a COA from the FAA. Because proposed part 107 would address the risks associated with small UAS operations, there would be no adverse safety effects from allowing public aircraft operations to be voluntarily conducted under proposed part 107.[34]

6. Model Aircraft

Proposed part 107 would not apply to model aircraft that satisfy all of the criteria specified in section 336 of Public Law 112–95. Section 336 of Public Law 112–95 defines a model aircraft as an ''unmanned aircraft that is—(1) capable of sustained flight in the atmosphere; (2) flown within visual line of sight of the person operating the aircraft; and (3) flown for hobby or recreational purposes.'' [35] Because section 336 of Public Law 112–95 defines a model aircraft as an ''unmanned aircraft,'' a model aircraft that weighs less than 55 pounds would fall into the definition of small UAS under this rule.

However, Public Law 112–95 specifically prohibits the FAA from promulgating rules regarding model aircraft that meet all of the following statutory criteria: [36]

- The aircraft is flown strictly for hobby or recreational use;
- The aircraft is operated in accordance with a community-based set of safety guidelines and within the programming of a nationwide community-based organization;
- The aircraft is limited to not more than 55 pounds unless otherwise certified through a design, construction, inspection, flight test, and operational safety program administered by a community-based organization;
- The aircraft is operated in a manner that does not interfere with and gives way to any manned aircraft; and
- When flown within 5 miles of an airport, the operator of the aircraft provides the airport operator and the airport air traffic control tower (when an air traffic facility is located at the airport) with prior notice of the operation.

Because of the statutory prohibition on FAA rulemaking regarding model aircraft that meet the above criteria, model aircraft meeting these criteria would not be subject to the provisions of proposed part 107. Likewise, operators of model aircraft excepted from part 107 by the statute would not need to hold an unmanned aircraft operator's certificate with a small UAS rating. However, the FAA emphasizes that because the prohibition on rulemaking in section 336 of Public Law 112–95 is limited to model aircraft that meet all of the above statutory criteria, model aircraft weighing less than 55 pounds that fail to meet all of the statutory criteria would be subject to proposed part 107.

In addition, although Public Law 112–95 excepted certain model aircraft from FAA rulemaking, it specifically states that the law's exception does not limit the Administrator's authority to pursue enforcement action against those model aircraft operators that ''endanger the safety of the national airspace system.'' [37] This proposed rule would codify the FAA's enforcement authority in part 101 by prohibiting model aircraft operators from endangering the safety of the NAS.

The FAA also notes that it recently issued an interpretive rule explaining the provisions of section 336 and concluding that ''Congress intended for the FAA to be able to rely on a range of our existing regulations to protect users of the airspace and people and property on the ground.'' [38] In this interpretive rule, the FAA gave examples of existing regulations the violation of which could subject model aircraft to enforcement action. Those regulations include:

- Prohibitions on careless or reckless operation and dropping objects so as to create a hazard to persons or property (14 CFR 91.13 and 91.15);
- Right-of-way rules for converging aircraft (14 CFR 91.113);
- Rules governing operations in designated airspace (14 CFR part 73 and §§ 91.126 through 91.135); and
- Rules relating to operations in areas covered by temporary flight restrictions and notices to airmen (NOTAMs) (14 CFR 91.137 through 91.145).[39]

The FAA notes that the above list is not intended to be an exhaustive list of all existing regulations that apply to model aircraft meeting the statutory criteria of Public Law 112–95, section 336. Rather, as explained in the interpretive rule, ''[t]he FAA anticipates that the cited regulations are the ones that would most commonly apply to model aircraft operations.'' [40]

7. Moored Balloons, Kites, Amateur Rockets, and Unmanned Free Balloons

Lastly, proposed part 107 would not apply to moored balloons, kites, amateur rockets, and unmanned free balloons. These types of aircraft currently are regulated by the provisions of 14 CFR part 101. Because these aircraft are already incorporated into the NAS through part 101 and because the safety risks associated with these specific aircraft are already mitigated by the regulations of part 101, there is no need to make these aircraft subject to the provisions of proposed part 107.

C. Definitions

Proposed part 107 would create a new set of definitions to address the unique aspects of a small UAS. Those proposed definitions are as follows.

1. Control Station

Proposed part 107 would define a ''control station'' as an interface used by the operator to control the flight path of the small unmanned aircraft. In a manned aircraft, the interface used by the pilot to control the flight path of the aircraft is a part of the aircraft and is typically located inside the aircraft flight deck. Conversely, the interface used to control the flight path of a small unmanned aircraft is typically physically separated from the aircraft and remains on the ground during aircraft flight. Defining the concept of a control station would clarify the interface that is considered part of the small UAS under this regulation.

2. Corrective Lenses

Proposed part 107 would also define ''corrective lenses'' as spectacles or contact lenses. As discussed in the Operating Rules section of this preamble, this proposed rule would require the operator and/or visual observer to have visual line of sight of the small unmanned aircraft with vision that is not enhanced by any device other than corrective lenses. This is because spectacles and contact lenses do not restrict a user's peripheral vision while other vision-enhancing devices may restrict that vision. Because peripheral vision is necessary in order for the operator and/or visual observer to be able to see and avoid other air traffic in the NAS, this proposed rule would limit the circumstances in which vision-enhancing devices other than spectacles or contact lenses may be used.

[34] The FAA notes that section 334(b) of Public Law 112–95 requires the FAA to develop standards regarding the operation of public UAS by December 31, 2015.

[35] Sec. 336(c) of Public Law 112–95.

[36] Sec. 336(a) of Public Law 112–95.

[37] Sec. 336(b) of Public Law 112–95.

[38] *Interpretation of the Special Rule for Model Aircraft,* 79 FR 36172, 36175 (June 25, 2014). This document was issued as a notice of interpretation and has been in effect since its issuance on June 25, 2014. However, we note that the FAA has invited comment on this interpretation, and may modify the interpretation as a result of comments that were received.

[39] *Id.* at 36175–76.

[40] *Id.* at 36176.

3. Operator and Visual Observer

Because of the unique nature of small UAS operations, this proposed rule would create two new crewmember positions: The operator and the visual observer. These positions are discussed further in section III.D.1 of this preamble.

4. Small Unmanned Aircraft

Public Law 112–95 defines a ''small unmanned aircraft'' as ''an unmanned aircraft weighing less than 55 pounds.'' [41] This statutory definition of small unmanned aircraft does not specify whether the 55-pound weight limit refers to the total weight of the aircraft at the time of takeoff (which would encompass the weight of the aircraft and any payload on board), or simply the weight of an empty aircraft.

This proposed rule would define a small unmanned aircraft as an unmanned aircraft weighing less than 55 pounds, including everything that is on board the aircraft. The FAA proposes to interpret the statutory definition of small unmanned aircraft as referring to total weight at the time of takeoff because heavier aircraft generally pose greater amounts of public risk in the event of an accident. In the event of a crash, a heavier aircraft can do more damage to people and property on the ground. The FAA also notes that this approach would be similar to the approach that the FAA has taken with other aircraft, such as large aircraft, light-sport aircraft, and small aircraft.[42]

5. Small Unmanned Aircraft System (Small UAS)

This proposed rule would define a small UAS as a small unmanned aircraft and its associated elements (including communication links and the components that control the small unmanned aircraft) that are required for the safe and efficient operation of the small unmanned aircraft in the NAS. Except for one difference, this proposed definition would be similar to the definition of ''unmanned aircraft system'' provided in Public Law 112–95.[43] The difference between the two definitions is that the proposed definition in this rule would not refer to a pilot-in-command because, as discussed further in this preamble, this proposed rule would create a new position of operator to replace the traditional manned-aviation positions of pilot and pilot-in-command for small UAS operations.

6. Unmanned Aircraft

Lastly, this proposed rule would define an unmanned aircraft as an aircraft operated without the possibility of direct human intervention from within or on the aircraft. This proposed definition would codify the definition of ''unmanned aircraft'' specified in Public Law 112–95.[44]

D. Operating Rules

As discussed earlier in this preamble (section III.A), instead of a single omnibus rulemaking that applies to all small UAS operations, the FAA has decided to proceed incrementally and issue a rule governing small UAS operations that pose the least amount of risk. Subpart B of this proposed rule would specify the operating constraints of these operations. The FAA emphasizes that it intends to conduct future rulemaking(s) to incorporate into the NAS small UAS operations that pose a greater level of risk than the operations that would be permitted by this proposed rule. However, those operations present additional safety issues that the FAA needs more time to address. In the meantime, under this proposed rule, operations that could be conducted within the proposed operational constraints would be incorporated into the NAS.

The FAA also considered whether to further subdivide small UAS into different categories of unmanned aircraft that would be regulated differently based on their weight, operational characteristics, and operating environment. This subdivision would have been based on five category groups (Groups A through E). Each of these groups would have been regulated based on its specific weight and operating characteristics.

This is the framework that the FAA used in its initial approach to this rulemaking. However, because this framework attempted to integrate a wide range of UAS operations posing different risk profiles whose integration raised policy questions on which data was either limited or unavailable, the FAA's initial approach would have been unduly burdensome on all UAS groups that would have been covered under that approach. For example, UAS in Group A, which posed the least safety risk under the FAA's initial framework, would have been required to: (1) Obtain a permit to operate (PTO) from the FAA, which would have to be renewed after one year; (2) file quarterly reports with the FAA providing their operational data; (3) establish a level of airworthiness that would be sufficient to obtain an airworthiness certification (the initial approach would have merged airworthiness certification into the PTO); (4) obtain a pilot certificate by passing a knowledge test, a practical test, and completing required ground training with an FAA-certificated instructor; (5) obtain a NOTAM from the FAA prior to conducting certain UAS operations (the operator would do this by filing notice with the FAA); and (6) maintain records documenting the complete maintenance history of the UAS.

After extensive deliberation, the FAA ultimately determined that such a regulatory framework was too complex, costly, and burdensome for both the public and the FAA. The FAA then examined the entire small UAS category of aircraft (unmanned aircraft weighing less than 55 pounds) in light of the new authority provided for under section 333 of Public Law 112–95 and determined that appropriate operational risk mitigations could be developed to allow the entire category of small UAS to avoid airworthiness certification and be subject to the least burdensome level of regulation that is necessary to protect the safety and security of the NAS. Furthermore, the FAA decided to also substantially simplify the operational limitations and airman (operator) certification requirements in a manner that would equally accommodate all types of small UAS business users with the least amount of complexity and regulatory burden.

The FAA believes that treating small UAS as a single category without airworthiness certification would accommodate a large majority of small UAS businesses and other non-recreational users of UAS. The operational limits in this proposed rule would mitigate risk associated with small UAS operations in a way that would provide an equivalent level of safety to the NAS with the least amount of burden to business and other non-recreational users of even the smallest UAS. The FAA invites comments, with supporting documentation, on whether the regulation of small UAS should be further subdivided based on the size, weight, and operating environment of the small UAS.

1. Micro UAS Classification

In addition to part 107 as proposed, the FAA is considering including a

[41] Sec. 331(6) of Public Law 112–95.

[42] *See* 14 CFR 1.1 (referring to ''takeoff weight'' for large, light-sport, and small aircraft in the definitions for those aircraft).

[43] Sec. 331(9) of Public Law 112–95. Public Law 112–95 defines an ''unmanned aircraft system'' as ''an unmanned aircraft and associated elements (including communication links and the components that control the unmanned aircraft) that are required for the pilot in command to operate safely and efficiently in the national airspace system.''

[44] Sec. 331(8) of Public Law 112–95.

micro UAS classification. This classification would be based on the UAS ARC's recommendations, as well as approaches adopted in other countries that have a separate set of regulations for micro UAS.

In developing this micro UAS classification, the FAA examined small UAS policies adopted in other countries. In considering other countries' aviation policies, the FAA noted that each country has its unique aviation statutory and rulemaking requirements, which may include that country's unique economic, geographic, and airspace density considerations. Canada is our only North American neighbor with a regulatory framework for small UAS. The chart below summarizes Transport Canada's operational limitations for micro UAS (4.4 pounds (2 kilograms) and under) and compares it with the regulatory framework in proposed part 107 as well as the micro UAS classification that the FAA is considering.

COMPARISON OF CANADIAN RULES GOVERNING MICRO UAS CLASS WITH PROVISIONS OF PROPOSED PART 107 AND MICRO UAS SUB-CLASSIFICATION

Provision	Canada	Small UAS NPRM	Micro UAS Sub-classification
Definition of Small UAS	Up to 4.4 lbs (2 kg)	Up to 55 lbs (24 kg)	Up to 4.4 lbs (2 kg).
Maximum Altitude Above Ground	300 feet	500 feet	400 feet.
Airspace Limitations	Only within Class G airspace	Allowed within Class E in areas not designated for an airport. Otherwise, need ATC permission. Allowed within Class B, C and D with ATC permission. Allowed in Class G with no ATC permission.	Only within Class G airspace.
Distance from people and structures	100 feet laterally from any building, structure, vehicle, vessel or animal not associated with the operation and 100 feet from any person.	Simply prohibits UAS operations over any person not involved in the operations (unless under a covered structure).	Flying over any person is permitted.
Ability to extend operational area	No	Yes, from a waterborne vehicle	No.
Autonomous operations	No	Yes	No.
Aeronautical knowledge required	Yes; ground school	Yes; applicant would take knowledge test.	Yes; applicant would self-certify.
First person view permitted	No	Yes, provided operator is visually capable of seeing the small UAS.	No.
Operator training required	Yes, ground school	No	No.
Visual observer training required	Yes	No	No.
Operator certificate required	No	Yes (must pass basic UAS aeronautical test).	Yes (no knowledge test required).
Preflight safety assessment	Yes	Yes	Yes.
Operate within 5 miles of an airport	No	Yes	No.
Operate in a congested area	No	Yes	Yes.
Liability insurance	Yes, $100,000 CAN	No	No.
Daylight operations only	Yes	Yes	Yes.
Aircraft must be made out of frangible materials.	No	No	Yes.

The FAA is considering the following provisions for the micro UAS classification:

- The unmanned aircraft used in the operation would weigh no more than 4.4 pounds (2 kilograms). This provision would be based on the ARC's recommendations and on how other countries, such as Canada, subdivide their UAS into micro or lightweight UAS;
- The unmanned aircraft would be made out of frangible materials that break, distort, or yield on impact so as to present a minimal hazard to any person or object that the unmanned aircraft collides with. Examples of such materials are breakable plastic, paper, wood, and foam. This provision would be based on the ARC's recommendations;
- During the course of the operation, the unmanned aircraft would not exceed an airspeed of 30 knots. This provision would be based on the ARC's recommendation, which was concerned with damage that could be done by unmanned aircraft flying at higher speeds;
- During the course of the operation, the unmanned aircraft would not travel higher than 400 feet above ground level (AGL). This provision would be based on the ARC's recommendations;
- The unmanned aircraft would be flown within visual line of sight; first-person view would not be used during the operation; and the aircraft would not travel farther than 1,500 feet away from the operator. These provisions would be based on ARC recommendations and Canada's requirements for micro UAS;
- The operator would maintain manual control of the flight path of the unmanned aircraft at all times, and the operator would not use automation to control the flight path of the unmanned aircraft. This provision would be based on ARC recommendations and Canada's requirements for micro UAS;
- The operation would be limited entirely to Class G airspace. This provision would be based on Canada's requirements for micro UAS; and
- The unmanned aircraft would maintain a distance of at least 5 nautical miles from any airport. This provision would be based on Canada's requirements for micro UAS.

The operational parameters discussed above may provide significant additional safety mitigations. Specifically, a very light (micro) UAS operating at lower altitudes and at lower speeds, that is made up of materials that break or yield easily upon impact, may pose a much lower risk to persons, property, and other NAS users than a UAS that does not operate within these

parameters. Additionally, limiting the micro UAS operation entirely to Class G airspace, far away from an airport, and in close proximity to the operator (as well as limiting the unmanned aircraft's flight path to the operator's constant manual control) would significantly reduce the risk of collision with another aircraft. Accordingly, because the specific parameters of a micro UAS operation described above would provide additional safety mitigation for those operations, the FAA's micro UAS approach would allow micro UAS to operate directly over people not involved in the operation. Under the FAA's micro UAS approach, the operator of a micro UAS also would be able to operate using a UAS airman certificate with a different rating (an unmanned aircraft operator certificate with a micro UAS rating) than the airman certificate that would be created by proposed part 107. No knowledge test would be required in order to obtain an unmanned aircraft operator certificate with a micro UAS rating; instead, the applicant would simply submit a signed statement to the FAA stating that he or she has familiarized him or herself with all of the areas of knowledge that are tested on the initial aeronautical knowledge test that is proposed under part 107.

The FAA is also considering whether to require, as part of the micro UAS approach, that the micro UAS be made out of frangible material. A UAS that is made out of frangible material presents a significantly lower risk to persons on the ground, as that UAS is more likely to shatter if it should impact a person rather than injuring that person. Without the risk mitigation provided by frangible-material construction, the FAA would be unable to allow micro UAS to operate directly over a person not involved in the operation. The FAA notes that, currently, a majority of fixed-wing small UAS are made out of frangible materials that would satisfy the proposed requirement. The FAA invites comments on whether it should eliminate frangibility from the micro UAS framework.

The FAA also invites commenters to submit data and any other supporting documentation on whether the micro UAS classification should be included in the final rule, and what provisions the FAA should adopt for such a classification. The FAA invites further comments, with supporting documentation, estimating the costs and benefits of implementing a micro UAS approach in the final rule. Finally, the FAA invites comments to assess the risk to other airspace users posed by the lesser restricted integration of micro UAS into the NAS. The FAA notes, however, that due to statutory constraints, the FAA would be unable to eliminate the requirement to hold an airman certificate and register the unmanned aircraft even if it were to adopt a micro UAS approach in the final rule.

During the course of this rulemaking, the FAA also received a petition for rulemaking from UAS America Fund LLC. This petition presented the FAA with an alternative approach to regulating micro UAS, complete with a set of regulatory provisions that would be specific to micro UAS operations. Because the FAA was already in the process of rulemaking at the time this petition was filed, pursuant to 14 CFR 11.73(c), the FAA will not treat this petition as a separate action, but rather, will consider it as a comment on this rulemaking. Accordingly, the FAA has placed a copy of UAS America Fund's rulemaking petition in the docket for this rulemaking and invites comments on the suggestions presented in this petition. Any comments received in response to the proposals in the petition will be considered in this rulemaking.

2. Operator and Visual Observer

As briefly mentioned earlier, this proposed rule would create two new crewmember positions: An operator and a visual observer. The FAA proposes these positions for small UAS operations instead of the traditional manned-aircraft positions of pilot, flight engineer, and flight navigator. This is being proposed because, by their very nature, small UAS operations are different from manned aircraft operations, and this necessitates a different set of qualifications for crewmembers.

i. Operator

The FAA proposes to define an operator as a person who manipulates the flight controls of a small UAS. Flight controls include any system or component that affects the flight path of the aircraft. The position of operator would be somewhat analogous to the position of a pilot who controls the flight of a manned aircraft. However, the FAA proposes to create the position of an operator rather than expand the existing definition of pilot to emphasize that, even though the operator directly controls the flight of the unmanned aircraft, the operator is not actually present on the aircraft.

The FAA notes that even though a small UAS operator is not a pilot, the operator would still be considered an airman and statutorily required to obtain an airman certificate. The statutory flexibility provided in section 333 of Public Law 112–95 is limited to airworthiness certification and does not extend to airman certification. Thus, as mentioned previously, the FAA's statute prohibits a person without an airman certificate from serving in any capacity as an airman with respect to a civil aircraft used or intended to be used in air commerce.[45] The statute defines an ''airman,'' in part, as an individual who, as a member of the crew, navigates the aircraft when under way.[46] Because under this proposed rule the operator would be a member of the crew and would navigate the small unmanned aircraft when that aircraft is under way, an operator would be an airman as defined in the FAA's statute. Accordingly, the operator would statutorily be required to obtain an airman certificate in order to fly the small unmanned aircraft.

The FAA proposes to codify this statutory requirement in § 107.13(a), which would require a person who wishes to serve as an operator to obtain an unmanned aircraft airman certificate with a small UAS rating. An unmanned aircraft airman certificate would be a new type of airman certificate that would be created by this proposed rule specifically for UAS operators to satisfy the statutory requirement for an airman certificate. The certificate necessary to operate small UAS would have a small UAS rating. The FAA anticipates that certificates used to operate UAS not subject to this proposed rule would have different certification requirements. The specific details of this certificate are discussed further in section III.E of this preamble.

The FAA also proposes to give each operator the power and responsibility typically associated with a pilot-in-command (PIC) under the existing regulations. Under the existing regulations, the PIC ''is directly responsible for, and is the final authority as to the operation of [the] aircraft.'' [47] The PIC position provides additional accountability for the safety of an operation by: (1) Ensuring that a single person on board the aircraft is accountable for that operation; and (2) providing that person with the authority to address issues affecting operational safety.

An accountability system, such as the existing PIC concept, would provide similar benefits for small UAS operations. Accordingly, the FAA proposes, in § 107.19(a), to make each operator: (1) Directly responsible for the

[45] 49 U.S.C. 44711(a)(2)(A).

[46] 49 U.S.C. 40102(a)(8)(A).

[47] 14 CFR 91.3(a).

small UAS operation, and (2) the final authority as to the small UAS operation. To provide further clarity as to the operator's authority over the small UAS operation, proposed § 107.49(b) would require that each person involved in the small UAS operation perform the duties assigned by the operator.

The FAA also considered providing the operator with the emergency powers available to the PIC under 14 CFR 91.3(b). Under § 91.3(b), a PIC can deviate from FAA regulations to respond to an in-flight emergency. However, the FAA does not believe that this power is necessary for the operator because a small unmanned aircraft is highly maneuverable and much easier to land than a manned aircraft. Thus, in an emergency, an operator should be able to promptly land the small unmanned aircraft in compliance with FAA regulations. Accordingly, the FAA proposes not to provide an operator with the emergency powers available to the PIC under § 91.3(b). The FAA invites comments on this issue.

The FAA also does not believe that it is necessary to create a separate ''operator-in-command'' position for small UAS operations. The existing regulations create a separate PIC position because many manned aircraft are operated by multiple pilots. Thus, it is necessary to designate one of those pilots as the accountable authority for the operation. By contrast, only one operator is needed for a small UAS flight operation even though additional non-operator persons could be involved in the operation. Thus, at this time, it is not necessary to create an operator-in-command position. The FAA invites comments on whether a separate operator-in-command position should be created for small UAS operations.

The FAA finally notes that the term ''operate'' is currently a defined term in 14 CFR 1.1 that is used in manned-aircraft operations. While, for purposes of proposed part 107, the proposed definition of ''operator'' would supersede any conflicting definitions in § 1.1, the FAA invites comments as to whether defining a new crewmember position as an ''operator'' would cause confusion with the existing terminology. If so, the FAA invites suggestions as to an alternative title for this crewmember position.

ii. Visual Observer

To assist the operator with the proposed see-and-avoid and visual-line-of-sight requirements discussed in the next section of this preamble, the FAA proposes to create the position of a visual observer. Under this proposed rule, a visual observer would be defined as a person who assists the small unmanned aircraft operator in seeing and avoiding other air traffic or objects aloft or on the ground. The visual observer would do this by augmenting the operator as the person who must satisfy the see-and-avoid and visual-line-of-sight requirements of this proposed rule. As discussed in more detail below, an operator must always be capable of seeing the small unmanned aircraft. However, if the operation is augmented by at least one visual observer, the operator is not required to exercise this capability, as long as the visual observer maintains a constant visual-line-of-sight of the small unmanned aircraft.

The FAA emphasizes that, as proposed, a visual observer is not a required crewmember, as the operator could always satisfy the pertinent requirements him- or herself. Under this proposed rule, an operator could, at his or her discretion, use a visual observer to increase the flexibility of the operation. The FAA notes, however, that as discussed in III.D.3.i of this preamble, even if a visual observer is used to augment the operation, a small unmanned aircraft would still be required by § 107.33(c) to always remain close enough to the control station for the operator to be capable of seeing that aircraft.

To ensure that the visual observer can carry out his or her duties, the FAA proposes, in § 107.33(b), that the operator be required to ensure that the visual observer is positioned in a location where he or she is able to see the small unmanned aircraft in the manner required by the proposed visual-line-of-sight and see-and-avoid provisions of §§ 107.31 and 107.37. The operator can do this by specifying the location of the visual observer. The FAA also proposes to require, in § 107.33(d), that the operator and visual observer coordinate to: (1) Scan the airspace where the small unmanned aircraft is operating for any potential collision hazard; and (2) maintain awareness of the position of the small unmanned aircraft through direct visual observation. This would be accomplished by the visual observer maintaining visual contact with the small unmanned aircraft and the surrounding airspace and then communicating to the operator the flight status of the small unmanned aircraft and any hazards which may enter the area of operation so that the operator can take appropriate action.

To make this communication possible, this proposed rule would require, in § 107.33(a), that the operator and visual observer maintain effective communication with each other at all times. This means that the operator and visual observer must work out a method of communication prior to the operation that allows them to understand each other, and utilize that method in the operation. The FAA notes that this proposed communication requirement would permit the use of communication-assisting devices, such as radios, to facilitate communication between the operator and visual observer from a distance. The FAA considered requiring the visual observer to be stationed next to the operator to allow for unassisted oral communication, but decided that this requirement would be unduly burdensome, as it is possible to have effective oral communication through a communication-assisting device. The FAA invites comments on whether the visual observer should be required to stand close enough to the operator to allow for unassisted verbal communication.

Under this proposed rule, the visual observer would not be permitted to manipulate any controls of the small UAS, share in operational control, or exercise operation-related judgment independent of the operator. Because the visual observer's role in the small UAS operation would be limited to simply communicating what he or she is seeing to the operator, the visual observer would not be an ''airman'' as defined in the FAA's statute.[48] Consequently, as proposed, the visual observer would not statutorily be required to obtain an airman certificate.[49]

While an airman certificate for a visual observer is not statutorily mandated, the FAA considered requiring that the visual observer obtain an airman certificate.[50] However, due to the fact that this proposed rule would not permit the visual observer to

[48] 49 U.S.C. 40102(a)(8). This statute defines an ''airman'' as an individual: ''(A) in command, or as pilot, mechanic, or member of the crew, who navigates aircraft when under way; (B) except to the extent the Administrator of the Federal Aviation Administration may provide otherwise for individuals employed outside the United States, who is directly in charge of inspecting, maintaining, overhauling, or repairing aircraft, aircraft engines, propellers, or appliances; or (C) who serves as an aircraft dispatcher or air traffic control-tower operator.'' The visual observer's limited role in the operation of a small UAS would not meet any of these criteria.

[49] *See* 49 U.S.C. 44711(a)(2)(A) (prohibiting a person without an airman certificate from serving in any capacity as an airman with respect to a civil aircraft used or intended to be used in air commerce).

[50] This requirement would be imposed pursuant to 49 U.S.C. 44701(a)(5), which gives FAA the power to prescribe regulations that it finds necessary for safety in air commerce.

manipulate the small UAS controls or exercise any independent judgment or operational control, the FAA believes that certification of visual observers would not result in significant safety benefits. Accordingly, the FAA is not proposing to require airman certification for visual observers. The FAA invites comments on whether an airman certificate should be required to serve as a visual observer. If so, what requirements should an applicant meet in order to obtain a visual observer airman certificate? The FAA also invites comments regarding the costs and benefits of requiring airman certification for visual observers.

3. See-and-Avoid and Visibility Requirements

Turning to the see-and-avoid and visibility requirements mentioned in the previous section, one of the issues with small UAS operations is that the small UAS operator cannot see and avoid other aircraft in the same manner as a pilot who is inside a manned aircraft. Because at this time there is no technology that can provide an acceptable see-and-avoid replacement for human vision for small UAS operations, this proposed rule would limit small UAS operations to within the visual line of sight of the operator and a visual observer. This proposed rule would also impose requirements to ensure maximum visibility for the operation of the small UAS and ensure that small unmanned aircraft always yield the right-of-way to other users of the NAS.

i. See-and-Avoid

Currently, 14 CFR 91.113(b) imposes a requirement on all aircraft operations that, during flight, ''vigilance shall be maintained by each person operating an aircraft so as to see and avoid other aircraft.'' This see-and-avoid requirement is at the heart of the FAA's regulatory structure mitigating the risk of aircraft colliding in midair. As such, in crafting this proposed rule, the FAA sought a standard under which the small UAS operator would have the ability to see and avoid other aircraft similar to that of a manned-aircraft pilot.

The FAA considered proposing that a UAS operator be permitted to exercise his or her see-and-avoid responsibilities through technological means, such as onboard cameras. We recognize that technology is developing that could provide an acceptable substitute for direct human vision in UAS operations. FAA does not, however, believe this technology has matured to the extent that would allow it to be used safely in small UAS operations in lieu of visual line of sight. The FAA has not identified an acceptable technological substitute for the safety protections provided by direct human vision in small UAS operations at this time. For these reasons and consistent with the statutory direction provided for in section 333, the FAA proposes to require, in §§ 107.31 and 107.37(a)(1), that the operator (and visual observer, if used) must be capable of maintaining a visual line of sight of the small unmanned aircraft throughout that aircraft's entire flight with human vision that is unaided by any device other than spectacles or contact lenses.

If a visual observer is not used, the operator must exercise this capability and maintain watch over the small unmanned aircraft during flight. However, if an operation is augmented by at least one visual observer, then the visual observer can be used to satisfy the visual-line-of-sight requirements, as long as the operator always remains situated such that he or she can exercise visual-line-of-sight capability.

The FAA notes that this proposed requirement does not require the person maintaining visual line of sight to constantly watch the unmanned aircraft for every single second of that aircraft's flight. The FAA understands and accepts that this person may lose sight of the unmanned aircraft for brief moments of the operation. This may be necessary either because the small UAS momentarily travels behind an obstruction or to allow the person maintaining visual line of sight to perform actions such as scanning the airspace or briefly looking down at the small UAS control station. The visual-line-of-sight requirement of this proposed rule would allow the person maintaining visual line of sight brief moments in which he or she cannot directly see the small unmanned aircraft provided that the person is able to see the surrounding operational area sufficiently well to carry out his or her visual-line-of-sight-related responsibilities. Anything more than brief moments during which the person maintaining visual line of sight is unable to see the small unmanned aircraft would be prohibited under this proposed rule.

To ensure that the operator's vision (and that of a visual observer, if used) of the small unmanned aircraft is sufficient to see and avoid other aircraft in the NAS, the proposed rule would require that the operator's or visual observer's vision of the small unmanned aircraft must be sufficient to allow him or her to: (1) Know the small unmanned aircraft's location; (2) determine the small unmanned aircraft's attitude, altitude, and direction; (3) observe the airspace for other air traffic or hazards; and (4) determine that the small unmanned aircraft does not endanger the life or property of another. Because maintaining this type of awareness in real-time is a concentration-intensive activity, proposed § 107.35 would limit an operator or visual observer to operating no more than one small UAS at the same time.[51]

Binoculars, onboard cameras, and other vision-enhancing devices (aside from spectacles or contact lenses) cannot be used to satisfy this proposed requirement because those devices restrict the user's peripheral field of vision. Since a pilot often uses peripheral vision to identify other aircraft in the NAS,[52] a device that restricts peripheral vision hinders the user's ability to see other aircraft. However, the FAA recognizes that there are advantages to using vision-enhancing devices, such as those used when utilizing camera video transmitted to a screen at the operator's station (also known as first person view) when conducting inspections of bridges or towers. This proposed rule is not intended to prohibit the use of those devices. Rather, the proposed visual-line-of-sight requirement requires simply that at least one person involved in the operation, either the operator or a visual observer, must maintain an unenhanced visual line of sight of the small unmanned aircraft. Anyone else involved in the operation may use a vision-enhancing device (including first-person view) so long as that device is not used to meet the proposed requirements of §§ 107.31 and 107.37. The FAA invites comments on this proposed visual-line-of-sight requirement. The FAA also invites suggestions, with supporting documentation, for other ways in which a first-person-view device could be used by the operator without compromising the risk mitigation provided by the proposed visual-line-of-sight requirement. The FAA also invites comments on whether it should permit operations beyond visual line of sight in its final rule, for example through deviation authority, once the pertinent technology matures to the extent that it

[51] The use of a visual observer would not be sufficient to allow an operator to operate more than one small UAS because the operator would still need to maintain sufficient concentration to react to the information provided to him or her by the visual observer.

[52] Pilot Safety brochure: ''Pilot Vision.'' *http://www.faa.gov/pilots/safety/pilotsafetybrochures/media/pilot_vision.pdf.* A copy of this document is also available in the docket for this rulemaking.

can be used to safely operate beyond visual line of sight. If so, what level of validation should the technology be subject to in order to demonstrate reliability? For example, should the FAA use its existing certification or validation methodologies to evaluate UAS technology?

ii. Additional Visibility Requirements

To further ensure that a small UAS operator/visual observer can see and avoid other aircraft, the FAA proposes (1) to limit the operation of small UAS to daylight-only operations, and (2) to impose weather-minimum visibility requirements

First, the FAA proposes, in § 107.29, to prohibit the operation of a small UAS outside the hours of official sunrise and sunset. The Federal Air Almanac provides tables which are used to determine sunrise and sunset at various latitudes. The FAA considered proposing to allow small UAS operations outside the hours of official sunrise and sunset, recognizing that this would integrate a greater quantity of small UAS operations into the NAS. However, the FAA has decided to propose limiting small UAS use to daylight-only operations due to the relatively small size of the small unmanned aircraft and the difficulty in being able to see it in darker environments to avoid other airspace users. The FAA also notes that most small unmanned aircraft flights under this proposed rule would take place at low altitudes, and flying at night would limit the small UAS operator's ability to see people on the ground and take precautions to ensure that the small unmanned aircraft does not pose a hazard to those people. Moreover, allowing small UAS operations outside of daylight hours would require equipage specifications (such as a lighting system emitting a certain minimum amount of light) and airworthiness certification requirements that are contrary to the FAA's goal of a minimally burdensome rule for small unmanned aircraft. The FAA also notes that, for manned aircraft operations, the regulations provide for very specific lighting systems necessary to safely operate in the NAS. Those regulations require, among other things: (1) Lighting system angles; (2) lighting system intensity; (3) lighting system color and position; (4) lighting system installation; and (5) lighting system configuration.[53] This level of regulation and airworthiness certification would be beyond the level of a minimally burdensome rule encompassing low-risk operation that is contemplated by section 333 of Public Law 112–95.

The FAA realizes the proposed daylight-only operations requirement may affect the ability to use small unmanned aircraft in more northern latitudes (specifically Alaska), and is willing to consider any reasonable mitigation which would ensure that an equivalent level of safety is maintained while operating in low-light areas. The FAA welcomes public comments with suggestions on how to effectively mitigate the risk of operations of small unmanned aircraft during low-light or nighttime operations.

In addition, to ensure that small UAS operators and visual observers have the ability to see and avoid other aircraft, the FAA is proposing to require, in § 107.51(c), a minimum flight visibility of 3 statute miles (5 kilometers) from the control station for small UAS operations. A visibility of 3 statute miles currently is required for aircraft operations in controlled airspace.[54] The FAA also requires a 3-mile visibility in the context of other unmanned aircraft operations (moored balloons and kites).[55] The reason for the increased visibility requirement is to provide the small UAS operator with additional time after seeing a manned aircraft to maneuver and avoid an accident or incident with the manned aircraft.

In addition, the FAA is proposing to require, in § 107.51(d), that the small unmanned aircraft must be no less than: (1) 500 feet (150 meters) below clouds; and (2) 2,000 feet (600 meters) horizontal from clouds. This is similar to the requirements imposed by 14 CFR 91.155 on aircraft operating in controlled airspace under visual flight rules. The FAA proposes to impose these cloud-clearance requirements on small UAS operations because, as mentioned previously, small UAS operators do not have the same see-and-avoid capability as manned-aircraft pilots.

iii. Yielding Right of Way

Now that we have discussed how a small UAS operator sees other users of the NAS, we turn to how that operator avoids those users. In aviation, this is accomplished through right-of-way rules, which pilots are required to follow when encountering other aircraft. These rules specify how pilots should respond to other NAS users based on the types of aircraft or the operational scenario.

The operation of small UAS presents challenges to the application of the traditional right-of-way rules. The smaller visual profile of the small unmanned aircraft makes it difficult for manned pilots to see and, therefore, avoid the unmanned aircraft. This risk is further compounded by the difference in speed between manned aircraft and the often slower small unmanned aircraft. Because of these challenges, the FAA proposes to require, in § 107.37(a)(2), that the small UAS operator must always be the one to initiate an avoidance maneuver to avoid collision with any other user of the NAS. Optimally, the small UAS operator should give right-of-way to all manned aircraft in such a manner that the manned aircraft is never presented with a see-and-avoid decision or the impression that it must maneuver to avoid the small UAS.

When a small UAS operator encounters another unmanned aircraft, each operator must exercise his or her discretion to avoid a collision between the aircraft. In extreme situations where collision is imminent, the small UAS operator must always consider the safety of people, first and foremost, over the value of any equipment, even if it means the loss of the unmanned aircraft. To further mitigate the risk of a mid-air collision, the FAA also proposes to codify, in § 107.37(b), the existing requirement in 14 CFR 91.111(a), which prohibits a person from operating an aircraft so close to another aircraft as to create a collision hazard.

4. Containment and Loss of Positive Control

As discussed above, one of the issues unique to UAS operations is the possibility that during flight, the UAS operator may become unable to directly control the unmanned aircraft due to a failure of the control link between the aircraft and the operator's control station. This failure is known as a loss of positive control. Because the UAS operator's direct connection to the aircraft is funneled through the control link, a failure of the control link could have significant adverse results.

To address this issue, the FAA proposes a performance-based operator-responsibility standard built around the concept of a confined area of operation. Confining the flight of a small unmanned aircraft to a limited area would allow the operator to become familiar with the area of operation and to create contingency plans for using the environment in that area to mitigate the risk associated with possible loss of positive control. For example, the operator could mitigate loss-of-control risk to people on the ground by setting up a perimeter and excluding people

[53] *See* 14 CFRs 23.1381 through 23.1401.

[54] *See* 14 CFR 91.115.

[55] 14 CFR 101.13(a)(3).

not involved with the operation from the operational area. The operator could also mitigate risk to other aircraft by notifying the local air traffic control of the small UAS operation and the location of the confined area in which that operation will take place. As a result of risk-mitigation options that are available to the operator in a confined area of operation, the FAA proposes to mitigate the risk associated with loss of aircraft control by confining small unmanned aircraft to a limited area of operation.

As an alternative method of addressing this issue, the FAA considered technological approaches such as requiring a flight termination system that would automatically terminate the flight of the small unmanned aircraft if the operator lost positive control of that aircraft. However, as previously discussed, due to the size and weight of a small UAS, operations subject to this proposed rule would not pose the same level of risk as other operations regulated by the FAA. Since small UAS operations subject to this rule pose a lower level of risk, there are operational alternatives available to mitigate their risk to an acceptable level without imposing an FAA requirement for technological equipage and airworthiness certification requirements. Therefore, this proposed rule would not mandate the use of a flight termination system nor would this proposed rule mandate the equipage of any other navigational aid technology. Instead, the FAA invites comments on whether a flight termination system or other technological equipage should be required and how it would be integrated into the aircraft for small UAS that would be subject to this proposed rule. The FAA also invites comments, with supporting documentation, as to the costs and benefits of requiring a flight termination system or other technological equipage.

i. Confined Area of Operation Boundaries

The FAA notes that the proposed visual-line-of-sight requirement in § 107.31 would create a natural horizontal boundary on the area of operation. Due to the distance limitations of human vision, the operator or visual observer would be unable to maintain visual line of sight of the small unmanned aircraft sufficient to satisfy proposed § 107.31 if the aircraft travels too far away from them. Accordingly, the proposed visual-line-of-sight requirement in proposed § 107.31 would effectively confine the horizontal area of operation to a circle around the person maintaining visual contact with the aircraft with the radius of that circle being limited to the farthest distance at which the person can see the aircraft sufficiently to maintain compliance with proposed § 107.31.

The FAA notes that there are two issues with defining the horizontal boundary of the area of operation in this manner. First, a small UAS operation could use multiple visual observers to expand the outer bounds of the horizontal circle created by the visual-line-of-sight requirement. To address this issue, the FAA proposes to require, in § 107.33(c), that if an operation uses a visual observer, the small unmanned aircraft must remain close enough to the operator at all times during flight for the operator to be capable of seeing the aircraft with vision unaided by any device other than corrective lenses. This approach would prevent the use of visual observers to expand the horizontal outer bounds of the confined area of operation. This approach would also create a safety-beneficial redundancy in that, while the operator is not required to look at the small unmanned aircraft in an operation that uses a visual observer, should something go wrong, the operator would be able to look up and see for him- or herself what is happening with the aircraft.

As an alternative method of addressing this issue, the FAA considered imposing a numerical limit on how far away a small unmanned aircraft can be from the operator. The FAA ultimately decided not to propose this approach, as it currently lacks sufficient data to designate a specific numerical limit. However, the FAA invites comments on whether the horizontal boundary of the contained area of operation should be defined through a numerical limit. If the boundary is defined through a numerical limit, what should that limit be?

The second way that the horizontal boundary of the confined operational area could be expanded is by stationing the operator on a moving vehicle or aircraft. If the operator is stationed on a moving vehicle, then the horizontal area-of-operation boundary tied to the operator's line of sight would move with the operator, thus increasing the size of the small unmanned aircraft's area of operation. To prevent this scenario, the FAA proposes, in § 107.25, consistent with the ARC recommendations,[56] to prohibit the operation of a small UAS from a moving aircraft or land-borne vehicle. However, proposed § 107.25 would make an exception for water-borne vehicles. This is because there are far less people and property located over water than on land. Consequently, a loss of positive control that occurs over water would have a significantly smaller chance of injuring a person or damaging property than a loss of positive control that occurs over land. Allowing use of a small UAS from a water-borne vehicle would also increase the societal benefits of this proposed rule without sacrificing safety by incorporating small UAS operations such as bridge inspections and wildlife nesting area evaluations into the NAS.

The FAA is considering alternatives for regulation of the operation of small UAS from moving land vehicles, while protecting safety. It invites comments, with supporting documentation, on whether small UAS operations should be permitted from moving land-based vehicles, and invites comment on a regulatory framework for such operations. The FAA specifically invites comments as to whether distinctions could be drawn between different types of land-based vehicles or operating environments such that certain operations from moving land-based vehicles could be conducted safely. The FAA also invites comments on whether deviation authority should be included in the final rule to accommodate these types of operations.

Next, we turn to the vertical boundary of the confined area of operation. With regard to the vertical boundary, the FAA proposes, in § 107.51(b), to set an altitude ceiling of 500 feet above ground level (AGL) for small UAS operations that would be subject to this proposed rule. The FAA chose to propose 500 feet as the vertical area-of-operation boundary because most manned aircraft operations take place above 500 feet. Specifically, most manned aircraft operations conducted over uncongested areas must be flown at an altitude above 500 feet AGL, while most manned aircraft operations conducted over congested areas must be flown at an even higher altitude.[57] Thus, a 500-foot altitude ceiling for small UAS operations would create a buffer between a small unmanned aircraft and most manned aircraft flying in the NAS.

The FAA notes that while most manned aircraft operations fly above the 500-foot ceiling proposed in this rule, there are some manned-aircraft operations that could fly below this altitude. For example, aerial applicators, helicopter air ambulance services, and military operations conducted on military training routes often fly at an

[56] ARC report and recommendations, Sec. 6.11

[57] *See* 14 CFR 91.119(b) and (c).

altitude below 500 feet. However, even though some manned aircraft operations take place at an altitude below 500 feet, there is significantly less air traffic at or below 500 feet than there is above 500 feet altitude. As a result of this difference in air-traffic density, the FAA has determined that small UAS operations would not pose a significant risk to manned aircraft operations taking place below 500 feet altitude if proper precautions are taken by the small UAS operator.

The FAA also considered whether the vertical boundary should be set at a higher level. However, because most manned-aircraft operations transit the airspace above the 500-foot level, UAS operations at that altitude would likely require greater levels of operator training, aircraft equipage, and some type of aircraft certification in order to avoid endangering other users of the NAS. Since these provisions would be contrary to the goal of this rulemaking, which is to regulate the lowest-risk small UAS operations while imposing a minimal regulatory burden on those operations, this proposed rule would not allow small UAS to travel higher than 500 feet AGL. The FAA invites comments, with supporting documentation, on whether this proposed 500-foot ceiling should be raised or lowered.

ii. Mitigating Loss-of-Positive-Control Risk

Now that we have defined the confined area of operation, we turn to the question of how loss-of-positive-control risk can be mitigated within that area of operation. The FAA notes that there is significant diversity in both the types of small UAS that are available and the types of operations that those small UAS can be used in. Accordingly, small UAS operators need significant flexibility to mitigate hazards posed by their individual small UAS operation, as a mitigation method that works well for one type of small UAS used in one type of operation may not work as well in another operation that uses another type of small UAS. For example, in a loss-of-positive-control situation, a rotorcraft that loses operator inputs or power to its control systems would tend to descend straight down or at a slight angle while a fixed wing aircraft would glide for a greater distance before landing. Since the loss-of-positive-control risk posed by different types of small unmanned aircraft in various operations is different, the FAA proposes to create a performance-based standard under which, subject to certain broadly-applicable constraints, small UAS operators would have the flexibility to create operational and aircraft-specific loss-of-control mitigation measures.

The broadly applicable constraints that the FAA proposes to impose on a small UAS operator's risk-mitigation decisions are as follows. First, the FAA proposes to require, in § 107.49(a)(3), that prior to flight, the operator must ensure that all links between the control station and the small unmanned aircraft are working properly. The operator can do this by verifying control inputs from the control station to the servo actuators [58] in the small unmanned aircraft. If the operator finds, during this preflight check, that a control link is not functioning properly, the operator would not commence flight until the problem with the control link is resolved. This proposed constraint would significantly mitigate the risk of a loss-of-positive-control scenario by reducing the possibility that small unmanned aircraft flight commences with a malfunctioning control link.

Second, the FAA proposes to impose a speed limit of 87 knots (100 miles per hour) on small unmanned aircraft calibrated airspeed at full power in level flight. This is because, if there is a loss of positive control, an aircraft traveling at a high speed poses a higher risk to persons, property, and other aircraft than an aircraft traveling at a lower speed. A speed limit would also have safety benefits outside of a loss-of-positive-control scenario because a small unmanned aircraft traveling at a lower speed is generally easier to control than a higher-speed aircraft.

In determining the specific speed limit, the FAA decided to propose 87 knots (100 mph) as the limit. This proposed speed limit is based on the ARC recommendation of a 100 mph speed limit for small UAS operations. The ARC determined that ''aircraft flying faster than 100 mph are considered a high performance aircraft'' that ''are perceived as having greater risks.'' [59] Accordingly, the FAA proposes to limit the speed of small unmanned aircraft to 87 knots (100 mph). The FAA invites comments on whether this speed limit should be raised or lowered or whether a speed limit is necessary.

Third, the FAA proposes, in § 107.39, to prohibit the operation of a small unmanned aircraft over a person who is not directly participating in the operation of that small unmanned aircraft. One of the possible consequences of loss-of-positive-control is that the aircraft will immediately crash into the ground upon loss of control inputs from the operator. Because a loss of positive control can happen at any moment, the FAA's proposed prohibition on operating small unmanned aircraft over most persons will minimize the risk that a person is standing under a small unmanned aircraft if that aircraft terminates flight and returns to the surface. This prohibition would not apply to persons inside or underneath a covered structure that would protect the person from a falling small unmanned aircraft.

The FAA's proposed prohibition on operating over people would provide an exception for persons directly participating in the operation of the small unmanned aircraft. The FAA considered prohibiting the operation of a small unmanned aircraft over any person, but rejected this approach as unduly burdensome because the operator or visual observer may, at some points of the operation, need to stand under the small unmanned aircraft in order to maintain visual line of sight and/or comply with other provisions of this proposed rule. As an alternative to prohibiting these persons from standing under the small unmanned aircraft, the FAA proposes, in § 107.49(a)(2), that prior to flight, the operator must ensure that all persons directly involved in the small unmanned aircraft operation receive a briefing that includes operating conditions, emergency procedures, contingency procedures, roles and responsibilities, and potential hazards. A person is directly involved in the operation when his or her involvement is necessary for the safe operation of the small unmanned aircraft. By receiving a pre-flight briefing on the details of the operation and the hazards involved, the persons involved in the operation would be made aware of the small unmanned aircraft's location at all times and would be able to avoid the flight path of the small unmanned aircraft if the operator were to lose control or the aircraft were to experience a mechanical failure.

Within these constraints, the FAA proposes the following performance-based standards for mitigating loss-of-positive-control risk. First, the FAA proposes, in § 107.49(a)(1), that, prior to flight, the operator must become familiar with the confined area of operation by assessing the operating environment and assessing risks to persons and property in the immediate vicinity both on the surface and in the air. As part of this preflight assessment, the operator would need to consider conditions that could pose a hazard to

[58] A ''servo actuator'' is generally defined as a device used to provide a wide range of remote movement based on signals from the system on which it is used.

[59] ARC Report, p. 20, section 6.12.

the operation of the small UAS as well as conditions in which the operation of the small UAS could pose a hazard to other aircraft or persons or property on the ground. Accordingly, the FAA proposes to require that the preflight assessment include the consideration of: (1) Local weather conditions; (2) local airspace and any flight restrictions; (3) the location of persons and property on the ground; and (4) any other ground hazards.

Second, the FAA proposes that, after becoming familiar with the confined area of operation and conducting a preflight assessment, the operator be required, by § 107.19(b), to ensure that the small unmanned aircraft will pose no undue hazard to other aircraft, people, or property in the event of a loss of control of the aircraft for any reason. This proposed requirement would provide the operator with significant flexibility to choose how to mitigate the hazards associated with loss of aircraft control. For example, in addition to the examples mentioned previously, if the operation takes place in a residential area, the operator could ask everyone in the area of operation to remain inside their homes while the operation is conducted.[60] If the operation takes place in an area where other air traffic could pose a hazard, the operator would advise local air traffic control as to the location of his or her area of operation and add extra visual observers to the operation so that they can notify the operator if other aircraft are approaching the area of operation.

The above are just some examples of mitigation strategies that could be employed by the operator to ensure that the small unmanned aircraft will pose no hazard to other aircraft, people or property in the event of lost positive control. These examples are not intended to provide an exhaustive list, as there are different ways to mitigate loss of positive control. The proposed requirement in § 107.19(b) would provide the operator with the flexibility to choose which mitigation method is appropriate for his/her specific operation to ensure any hazards posed by loss of positive aircraft control are sufficiently mitigated. The FAA also anticipates creating guidance that provides additional examples of how operators can mitigate loss of positive control in small UAS operations. However, the FAA emphasizes that no matter what mitigation option(s) the operator employs under this proposed rule, the operator must strive to always maintain positive control of the small unmanned aircraft. The operator would be in violation of proposed § 107.19(b) if he or she intentionally operates the small unmanned aircraft in a location where he or she will not have positive control over that aircraft.

5. Limitations on Operations in Certain Airspace

This proposed rule would place limitations small UAS operations in three areas related to airspace: (1) Controlled airspace (airspace other than Class G); (2) prohibited or restricted airspace; and (3) airspace where aviation activity is limited by a Notice to Airmen (NOTAM). The FAA is proposing these requirements to reduce the threat to other users of the NAS in busy airspace or where most or all aviation activities would otherwise be limited.

i. Controlled Airspace

The FAA is seeking to limit the exposure of the small unmanned aircraft to other users of the NAS to minimize the risk of collision, which can occur both during controlled flight of the UAS or if the operator loses positive control of the small unmanned aircraft. This proposed rule would prohibit small unmanned aircraft operations in Class A airspace. Class A airspace starts at 18,000 feet mean sea level and extends up to 60,000 feet (Flight Level 600). As discussed above, this rule would prohibit small UAS operations above 500 feet AGL and outside of visual line of sight. Operations in Class A airspace would be inconsistent with that requirement, and therefore this proposed rule would prohibit operations in Class A airspace.

Small UAS operations would also be prohibited in Class B, Class C, Class D, and within the lateral boundaries of the surface area of Class E airspace designated for an airport without prior authorization from the ATC facility having jurisdiction over the airspace. The FAA factors information such as traffic density, the nature of operations, and the level of safety required when determining whether to designate controlled airspace.[61] Pilots must have an ATC clearance to enter certain controlled airspace. In other words, the FAA requires ATC to have knowledge of aviation operations in the airspace due to the greater amount of activity in that area compared to uncontrolled airspace.

The FAA believes that restricting use of controlled airspace to approved operations would reduce the risk of interference with other aircraft activities. Interference could occur for many reasons, including the location of the proposed small UAS operation in the airspace, or how the small unmanned aircraft would behave if there is a loss of positive control. These limitations would also be consistent with the general requirement for aircraft operating in controlled airspace to have ATC approval prior to entering the airspace. Therefore, the FAA proposes that small UAS receive approval from the ATC facility with jurisdiction over the airspace in which the operator would like to conduct operations. That ATC facility would have the best understanding of local airspace, its usage, and traffic patterns and would be in the best position to ascertain whether the proposed small UAS operation would pose a hazard to other users or the efficiency of the airspace, and procedures to implement to mitigate hazards. This proposed rule would not establish equipment requirements for small UAS operating in controlled airspace as the FAA does for other users of controlled airspace. Rather, the FAA believes that local ATC approval would provide a safer and more efficient operating environment at less cost to the operator.

The FAA notes that normal aircraft operations inside controlled airspace in the vicinity of an airport require prior authorization from ATC. Per part 91, ATC currently requires two-way radio communication for departures, through flights, arrivals, and operations inside the airspace. The FAA understands that not all small UAS will be able to comply with the provisions of part 91, and that is why this proposed rule would not require strict compliance with part 91. However, because the air-traffic provisions of part 91 are intended to ensure safe operation in the NAS, a small UAS operator that intends to operate in controlled airspace must ensure that the proposed operations are planned and conducted in the safest manner possible. The small UAS operator can do this by working closely with the ATC facility that controls the airspace.

The ATC facility has the authority to approve or deny aircraft operations based on traffic density, controller workload, communication issues, or any other type of operations that could potentially impact the safe and expeditious flow of air traffic in that airspace. The more that a small UAS is able to show that it would satisfy the provisions of part 91 and comply with

[60] The FAA notes that this proposed requirement would not require people not involved with the operation to comply with the operator's warnings. The operator would simply be unable to commence the operation until the pertinent area has been made safe for operation.

[61] *See* FAA Aeronautical Information Manual, Para. 3–1–1.

the local operating procedures, the easier the access to the airspace would be. These items should be outlined in a prior agreement with the ATC facility to identify shortfalls and establish operating procedures for small UAS to integrate into the existing air traffic operation. This agreement would ensure all parties involved are aware of limitations and special interest items and would enable the safe flow of aircraft operations in that airspace. The FAA seeks comments related to part 91 compliance issues small UAS operators may encounter.

ii. Prohibited or Restricted Areas

The proposed rule would prohibit small UAS operations in prohibited and restricted areas without permission from the using or controlling agency as applicable. Prohibited and restricted areas are designated in 14 CFR part 73. Prohibited areas are established when necessary to prohibit flight over an area on the surface in the interest of national security or welfare. No person may operate an aircraft without permission of the using agency in a prohibited area.[62] Restricted areas are areas established when determined necessary to confine or segregate activities considered hazardous to non-participating aircraft. Although aircraft flight is not wholly prohibited in these areas, it is subject to restriction.[63] The proposed provision concerning prohibited and restricted areas would be similar to the part 91 restriction on operations in these areas.[64]

iii. Areas Designated by Notice to Airmen

This proposed rule would also prohibit operation of small UAS in airspace restricted by NOTAMs unless authorized by ATC or a certificate of waiver or authorization. This would include NOTAMs issued to designate a temporary flight restriction (TFR). NOTAMs contain time-critical aeronautical information that is either temporary in nature, or not sufficiently known in advance to permit publication on aeronautical charts or other publications.[65] For example, NOTAMs may be used to limit or restrict aircraft operations during emergency situations or presidential or VIP movements. They may also be used to limit aircraft operations in the vicinity of aerial demonstrations or sporting events. NOTAMs are available to the public on the FAA's Web site.[66]

Like other users of the airspace, small UAS operators would be required to review and comply with NOTAMs. As with other airspace restrictions in this rule, an operator could seek authorization from ATC or through a certificate of waiver or authorization to conduct operations in otherwise restricted airspace. The FAA believes that this process would permit an assessment of the operation in relation to the airspace restriction to determine whether the operation can be safely conducted.

6. Airworthiness, Inspection, Maintenance, and Airworthiness Directives

i. Inspections and Maintenance

As discussed in section III.J.3 of this preamble, pursuant to section 333(b)(2) of Public Law 112–95, we have determined that a small UAS should not be required to obtain airworthiness certification if satisfying the provisions of this proposal. However, without an airworthiness certification process, the FAA still needs to ensure that a small UAS is in a condition for safe operation. In considering how to address this issue, the FAA notes that the current regulations applicable to manned civil aircraft generally require an annual aircraft inspection every 12 months.[67] The inspection and any maintenance that might be necessary as a result of the inspection currently are governed by the provisions of 14 CFR part 43. Part 43 requires that the inspection examine every component of the aircraft in detail to determine whether any hazardous characteristics are present that would render the aircraft unairworthy.[68] If the inspection reveals any hazardous characteristics that would render the aircraft unairworthy, then maintenance, conducted pursuant to the regulations of part 43, must be performed in order to return the aircraft to an airworthy condition.

In addressing the issue of airworthiness for small UAS, the FAA considered several approaches, including requiring small UAS operators to comply with the existing inspection and maintenance requirements of this chapter. The FAA also considered requiring a separate permit to operate (PTO) in addition to aircraft registration and airman certification. A PTO would have included airworthiness certification requirements that would have required an applicant to:

- Describe the entire small UAS, including airframe, control station, and communications link;
- Comply with a set of unvalidated consensus standards;
- Test the design features required by the unvalidated consensus standards and determine that the UAS satisfies those standards;
- Inspect the aircraft for compliance with the manufacturer's requirements;
- Determine whether the aircraft has been manufactured in compliance with unvalidated production acceptance and quality assurance consensus standards acceptable to the FAA;
- Complete ground and flight testing of required UAS components and determine whether they demonstrated acceptable performance and safe operation.
- Create a process for addressing unsafe conditions in the aircraft; and
- Create a monitoring program to identify and correct safety-of-flight issues.

After further consideration, the FAA decided that neither of these approaches is proportionate to the risk posed by small UAS. FAA noted that, as mentioned previously, due to their light weight, small unmanned aircraft generally pose a significantly lower risk to people and property on the ground than manned aircraft. This relatively low risk is mitigated even further by the see-and-avoid and loss-of-positive-control provisions of this proposed rule, which are discussed above. Accordingly, based on existing information, the FAA believes that requiring small UAS operators to conduct inspection and maintenance of the small UAS pursuant to the existing regulations of part 43, or to obtain a PTO, would not result in significant safety benefits. As a result, this proposed rule would not require small UAS compliance with part 43 or the application for, or issuance of, a PTO.

Instead, this proposed rule would require, in § 107.21(b), that prior to each flight, the operator must inspect the small UAS to ensure that it is in a condition for safe operation. The operator could do this by, for example, performing a manufacturer-

[62] *See* 14 CFR 1.1.

[63] *See id.*

[64] *See* 14 CFR 91.133.

[65] *See* FAA Aeronautical Information Manual, para. 5–1–3.

[66] See, *e.g., https://www.notams.faa.gov/dinsQueryWeb/* and *http://www.faa.gov/pilots/flt_plan/notams/.*

[67] *See* 14 CFR 91.609. Different components of the aircraft are also currently subject to additional component-specific inspection schedules. For example, in addition to the above general inspection requirements, altimeter instruments on airplanes and helicopters operating in controlled airspace under instrument flight rules must be inspected every 24 months. *See* 14 CFR 91.411(a)(1).

[68] *See* 14 CFR part 43, Appendix D (listing aircraft components that must be inspected and the hazardous characteristics that the inspection should look for).

recommended preflight inspection or performing an on-the-ground test of the small UAS to determine whether safety-critical systems and components are working properly.

If, as a result of the inspection, the operator determines that the small UAS is no longer in a condition for safe operation, then proposed §§ 107.21(a) and 107.15(a) would prohibit the operation of the small UAS until the necessary maintenance has been made and the small UAS is once again in a condition for safe operation. First, proposed § 107.21(a) would require that the operator must maintain the small UAS in a condition for safe operation. An example of how the operator could satisfy this proposed requirement would be performing the manufacturer's recommended maintenance at manufacturer-recommended regular intervals. Second, § 107.15(a) would prohibit a person from operating a small UAS unless that UAS is in a condition for safe operation. Thus, if an operator notices during inspection, maintenance, or preflight action, that the small UAS is not in a condition for safe operation, then the operator would be in violation of § 107.15(a) if he or she flies the small unmanned aircraft while the UAS is not in a condition safe for operation.

The FAA also notes that a small UAS that appears to be in a condition for safe operation prior to flight may become unsafe for operation during flight. For example, the small unmanned aircraft could sustain damage during flight rendering that aircraft unsafe for continuing the flight. As such, this proposed rule would require, in § 107.15(b), that the operator must discontinue the flight of the small unmanned aircraft when he or she knows or has reason to know that continuing the flight would pose a hazard to other aircraft, people, or property. This proposed requirement is similar to a requirement that currently exists in § 91.7(b), which requires the PIC to ''discontinue the flight [of an aircraft] when unairworthy mechanical, electrical, or structural conditions occur.''

The FAA invites comments on the issues discussed in this section. The FAA also invites comments as to the costs and benefits of requiring small UAS operators to perform maintenance and inspections pursuant to existing regulations.

ii. Airworthiness Directives

The FAA typically issues airworthiness directives to correct an existing unsafe condition in a product when the condition is likely to exist or develop in other products of the same type design. Airworthiness directives currently are issued for engines, propellers, and other products that are either: (1) Approved under a type certificate or a supplemental type certificate; or (2) that are manufactured under a production certificate, a parts manufacturer approval (PMA), or technical standard order (TSO) authorization.

As discussed in section III.J of this preamble, the FAA does not propose to require a type certificate, a production certificate, a PMA or TSO authorization for small UAS or any part installed on the small UAS. However, to provide manufacturers with flexibility, manufacturers would not be prohibited from installing parts that are FAA-certificated, have received PMA, or are TSO-authorized for manned-aircraft use on the small UAS, provided the small unmanned aircraft remains under 55 pounds after the installation of the part. The FAA anticipates that some manufacturers may choose to use these parts on the small UAS in order to obtain a higher level of reliability associated with a certificate, approval, or authorization.

However, because parts that are FAA-certificated, have received PMA, or are TSO-authorized may have airworthiness directives that are applicable to those parts, the FAA proposes to require, in § 107.13(d), that the owner or operator of the small UAS must comply with all applicable airworthiness directives. The FAA notes that it used a similar approach in its 2004 light-sport aircraft rulemaking. In that rulemaking, the FAA did not require a type or production certificate for light-sport aircraft but allowed the installation on the aircraft of parts that are FAA-certificated, have received PMA, or are TSO-authorized as long as the owner or operator complied with all applicable airworthiness directives.[69]

7. Miscellaneous Operating Provisions

i. Careless or Reckless Operation

The existing FAA regulations prohibit a person from operating an aircraft in a careless or reckless manner so as to endanger the life or property of another.[70] These regulations also prohibit the PIC from allowing any object to be dropped from an aircraft in flight if doing so would create a hazard to persons or property.[71] The FAA proposes to apply similar regulations to small UAS operations, in § 107.23 to ensure that a small UAS is not operated in a hazardous manner.

ii. Drug and Alcohol Prohibition

Proposed § 107.27 would require small UAS operators and visual observers to comply with the alcohol and drug use prohibitions that are currently in place in part 91 of the FAA's regulations. Small UAS operators and visual observers would also be subject to the existing regulations of § 91.19, which prohibit knowingly carrying narcotic drugs, marijuana, and depressant or stimulant drugs or substances.

The purpose of these regulations is to ensure that the safety of small UAS operations are not impeded by alcohol or drug use and to prohibit the use of aircraft for drug trafficking. Section 91.17 specifically prohibits use of alcohol or drugs during or for a time period prior to an operation. Moreover, operators and visual observers would need to submit to testing to determine alcohol concentration in the blood due to a suspected violation of law or § 91.17. Operators or visual observers would be required to submit these tests to the FAA if the FAA has a reasonable basis to believe that the person has violated § 91.17.

This section would also subject persons operating small UAS who knowingly carry illegal substances to FAA enforcement action, which could include certificate revocation. An exception exists for substances authorized by or under any Federal or State statute or by any Federal or State Agency.

iii. Medical Conditions

As discussed in section III.E of this preamble, this proposed rule would not require a small UAS operator or visual observer to hold an airman medical certificate. However, the FAA recognizes the possibility that a person acting as an operator or visual observer may have a medical condition that could interfere with the safe operation of the small UAS. Accordingly, the FAA proposes, in § 107.17, to prohibit a person from acting as an operator or visual observer if he or she knows or has reason to know of any physical or mental condition that would interfere with the safe operation of a small UAS. This proposed provision is similar to the regulatory provision of 14 CFR 61.53(b), which currently applies to operations that do not require a medical certificate.

iv. Sufficient Power for the Small UAS

Proposed § 107.49(a)(4) would require a small UAS operator to ensure that, if

[69] *Certification of Aircraft and Airmen for the Operation of Light-Sport Aircraft Final Rule,* 69 FR 44772, 44855 (July 27, 2004).

[70] 14 CFR 91.13(a).

[71] 14 CFR 91.15.

powered, the small UAS has enough power to operate for its intended operational time and an additional five minutes. The 5-minute buffer would ensure that the small UAS has sufficient power to return to the operator, or another location, and be able to make a controlled landing. Additionally, control inputs to a small UAS may degrade as batteries lose charge because power to the flight control system(s) may be lost. Accordingly this proposed rule would help to ensure that the small UAS remains controllable throughout its intended operational time. The FAA notes that a small UAS travelling at 10 miles per hour would be able to cover nearly one mile in 5 minutes.

v. Registration and Marking

As mentioned earlier, the FAA's statute prohibits a person from operating a civil aircraft that is not registered.[72] The FAA proposes to codify this statutory requirement in § 107.13(b). In addition, all aircraft currently are required to display their registration number on the aircraft.[73] The FAA proposes to impose a similar requirement, in § 107.13(c), on small unmanned aircraft subject to this proposed rule. The specific manner in which the small unmanned aircraft would register and display its registration number is discussed in section III.G of this preamble.

E. Operator Certificate

As discussed earlier in this preamble, the FAA proposes to satisfy the statutory requirement for an airman to possess an airman certificate [74] by requiring small UAS operators to obtain and hold an unmanned aircraft operator certificate with a small UAS rating in order to operate a small UAS. An unmanned aircraft operator certificate would be a new type of airman certificate created by this proposed rule, and this section explains the FAA's proposal concerning this certificate.

1. Applicability

The FAA is proposing to require that individuals obtain an unmanned aircraft operator certificate with a small UAS rating as a prerequisite to operating a small UAS. As with airman certificates that the FAA requires for operating other aircraft, an operator certificate would ensure that the operator is able to safely operate the small UAS. The FAA notes that airman certificates are currently issued to pilots who engage in commercial and non-commercial activities. The FAA is proposing to issue a new type of certificate for UAS operators, rather than require a private or commercial pilot certificate with UAS type rating, because many of the requirements for private and commercial pilots are not necessary for the types of operations that would be permitted under this rule.

Moreover, the FAA wants to maintain a distinction between an unmanned aircraft operator certificate and the airman certificates issued under parts 61, 63 and 65.[75] As such, proposed § 61.8 would prohibit activities under this rule from being used to meet part 61 requirements. Activities would include any training, certification, or flights associated with small UAS under proposed part 107. This proposal is consistent with the FAA's statement in the 2013 Pilot Certification and Qualification Requirements for Air Carrier Operations Final Rule that ''regulations do not currently permit the time acquired while operating [a UAS] to be logged to meet aeronautical experience requirements for FAA [manned-aircraft] certification.'' [76] Additionally, that rule did not extend an exception from a flight time standard to graduates of training programs designed to qualify a military pilot solely for operation of UAS to qualify for a reduced flight time.[77]

The FAA considered proposing to require an individual to obtain a commercial pilot certificate with a UAS type endorsement before operating a small UAS. Issuance of such a certificate would require that the applicant obtain a Class II airman medical certificate, pass an aeronautical knowledge test, and demonstrate flight proficiency and aeronautical experience with a certificated flight instructor. However, given the lower level of public risk posed by small UAS operations, the FAA decided that imposing such requirements would be unduly burdensome to small UAS operators. Moreover, as explained in further detail in preamble section III.E.2.iii.a below, the FAA believes that the training, testing, proficiency and experience requirements for obtaining a commercial pilot license have limited relevance to the nature of small UAS operations. The FAA invites public comment on its proposal to create a new category of airman certificate for small UAS operators.

2. Unmanned Aircraft Operator Certificate—Eligibility & Issuance

This rule would establish the eligibility requirements to apply for an unmanned aircraft operator certificate with a small UAS rating and specify when a certificate would be issued. Military and former military pilots would be able to apply based on experience operating unmanned aircraft in the United States Armed Forces.

i. Minimum Age

Proposed § 107.61 would establish the eligibility requirements for an unmanned aircraft operator certificate with a small UAS rating. First, an applicant would need to be at least 17 years of age. This minimum age is consistent with existing FAA minimum age requirements for the Sport Pilot, Recreational Pilot, and Private Pilot airman certificates—the base-level certificates authorizing pilots to operate aircraft while not under the supervision of an instructor. Because this rule would permit commercial small UAS operations, the FAA considered setting the minimum age at 18 years, consistent with the Commercial Pilot Certificate requirements which permit carrying persons or property for compensation or hire. However, the FAA determined that the higher age limit was not necessary because the proposed operational limitations will create an environment that minimizes risk to persons and property.

The FAA notes that the minimum age necessary to apply for an airman certificate to operate a glider or a balloon category aircraft is 16 years old. The FAA invites comments on whether the minimum age necessary to apply for an unmanned aircraft operator certificate should similarly be reduced to 16 years old in the final rule. The FAA also invites comments as to whether reducing the minimum applicant age to 16 years old would further enable academic use of small UAS.

ii. English Language Proficiency

A person would need to be able to read, speak, write and understand the English language to be eligible for an unmanned aircraft operator certificate with a small UAS rating. This requirement is consistent with all other airman certificates issued by the FAA.[78] The English language has generally been

[72] 49 U.S.C. 44101(a).

[73] *See* 14 CFR part 45.

[74] 49 U.S.C. 44711(a)(2)(A).

[75] Parts 61, 63, and 65 currently apply to all airman certificates, which include small UAS airmen. However, under this proposed rule, these parts would no longer apply to small UAS airmen. Thus, the distinction discussed in this paragraph would segregate experience acquired while operating a small UAS from experience acquired while operating a manned aircraft.

[76] 78 FR 42324 (July 15, 2013).

[77] *Id.*

[78] *See, e.g.,* 14 CFR 61.83(c).

accepted as the international standard for aircraft operations by ICAO.

However, this proposed rule would create an exception for people who are unable to meet one of the English language requirements due to medical reasons, as is the case for other airman certificates. Such a person would still be eligible for a certificate; however, the FAA would be able to specify limitations on that person's small UAS operator certificate to account for the medical condition. For example, if an applicant is unable to communicate using speech then the FAA may impose a limitation that the operator may not conduct a small UAS operation requiring more than one person.

iii. Pilot Qualification

The third proposed requirement to obtain an unmanned aircraft operator certificate with a small UAS rating would be to pass an initial aeronautical knowledge test. To ensure that a pilot is qualified to control an aircraft, the FAA generally requires that the applicant for a pilot certificate demonstrate the following three things: (1) Aeronautical knowledge; (2) flight proficiency (*i.e.* that the applicant has the requisite piloting skills); and (3) aeronautical experience.[79] For the reasons stated below, the FAA has determined that a flight proficiency demonstration and aeronautical experience should not be required for issuance of an unmanned aircraft operator certificate with a small UAS rating. Instead, the FAA proposes to require that applicants for this certificate simply demonstrate their aeronautical knowledge by passing an initial knowledge test and then passing a recurrent knowledge test every 24 months thereafter.

a. Flight Proficiency and Aeronautical Experience

As mentioned in the previous paragraph, the FAA currently requires applicants for a pilot certificate to demonstrate that they have the requisite flight proficiency and aeronautical experience to properly control the flight of an aircraft. These existing regulations are intended to ensure that an aircraft can take off safely and arrive back on the ground: (1) With everyone on board the aircraft unharmed; (2) without harming people on the ground; and (3) without interfering with other users of the NAS.

The first consideration for requiring a flight-proficiency demonstration and aeronautical experience (to prevent possible harm to people on board the aircraft) does not apply to small UAS operations because if a small unmanned aircraft was to crash, there would be no one on board the aircraft to be harmed by that crash. The second consideration for these requirements (to prevent harm to people on the ground) is addressed by the operating requirements of this rule, which limit the operation of the small unmanned aircraft to a confined area and require the operator to ensure that the aircraft will pose no hazard to people on the ground if there is a loss of positive control. An operator does not necessarily need special operating skills or aeronautical experience to ensure that the aircraft will not pose a hazard to people on the ground. For example, if an operator plans to fly the small unmanned aircraft in a residential area, the operator could approach the people who live in that area prior to the operation, inform them of the details of the operation, and ask them to either stay out of the area or stay indoors during the operation. Doing this would ensure the safety of people on the ground but would not require the use of special operating skills or aeronautical experience.

The third consideration for requiring a flight-proficiency demonstration and aeronautical experience (to avoid interference with other users of the NAS) is mitigated by the fact that a small unmanned aircraft is generally: (1) Relatively easy to control; (2) highly maneuverable; and (3) much easier to terminate flight than a manned aircraft. Specifically, the control station for a small UAS is typically less complex than the interface used to control the flight of a manned aircraft. Many small UAS control stations currently consist of a basic two-joystick interface where one joystick controls the aircraft's altitude and the other joystick controls the aircraft's speed and direction. Other control stations utilize basic programs, such as smart-phone or tablet applications, to control the small unmanned aircraft. These programs are generally easy to learn and utilize. By contrast, the flight deck interface used to control a manned aircraft requires coordinated use of flight control inputs, interpretation of aircraft instrumentation, and onboard equipment operation. Some of this equipment includes communication and sophisticated navigation equipment. A manned-aircraft pilot must learn to properly use all of these flight-deck-interface components in order to control the flight of the manned aircraft.

In addition, because a small unmanned aircraft is highly maneuverable and easy to land, an operator who finds the small unmanned aircraft to be difficult to control would still be able to easily land the aircraft. For instance, in the two-joystick control station example provided above, the operator could land a small unmanned rotorcraft simply by pressing the altitude joystick down until the rotorcraft descends to the ground. By contrast, a manned aircraft pilot would need to go through a significantly more complex process that includes adjusting aircraft attitude with flight controls, reducing engine power, and scanning for other traffic, in order to land the aircraft on the ground after takeoff.

There are two additional considerations for not requiring a flight proficiency demonstration or aeronautical experience for small UAS operators. First, unlike the pilot of a manned aircraft, the small UAS operator has the option to sacrifice the small unmanned aircraft in response to an emergency. Second, as discussed previously, proposed §§ 107.19(b) and 107.39 would require the operator to control the confined area of operation in order to ensure that the small unmanned aircraft will not pose a hazard to people on the ground in an emergency situation. Other operating rules proposed in this NPRM, such as the prohibition on operating within restricted areas without permission, the requirement to give way to manned aircraft, and the 500 feet AGL height limitation, would also mitigate the risk that a small unmanned aircraft interferes with other users of the NAS or poses a hazard to people on the ground.

Because the considerations underlying the current flight proficiency demonstration and aeronautical experience requirements have, at best, a limited applicability to small UAS operations that would be subject to this proposed rule, the FAA proposes not to require that applicants for an unmanned aircraft operator certificate with a small UAS rating demonstrate flight proficiency or aeronautical experience. The FAA invites comments on whether these applicants should be required to demonstrate flight proficiency and/or aeronautical experience. If so, what flight proficiency and/or aeronautical experience requirements should the FAA impose? The FAA also invites comments as to the costs and benefits of imposing these requirements.

b. Initial Aeronautical Knowledge Test

Turning to the remaining component of airman certification (aeronautical knowledge), the FAA proposes to require that applicants for an unmanned aircraft operator certificate with a small UAS rating pass an initial knowledge test to demonstrate that they have

[79] *See, e.g.,* 14 CFR 61.105–61.109.

sufficient aeronautical knowledge to safely operate a small UAS. The FAA proposes a knowledge test rather than a required training course in order to provide applicants with flexibility as to the method that they use to acquire aeronautical knowledge. For example, some individuals who wish to become small UAS operators may also hold a pilot certificate, and those individuals would already have acquired extensive aeronautical knowledge in order to obtain a pilot certificate. Other individuals may be able to acquire the necessary knowledge through self-study. Still other individuals may choose to use a commercial training course designed to provide them with the knowledge necessary to pass the initial knowledge test. In any case, passage of a knowledge test would ensure that the applicant has demonstrated the aeronautical knowledge necessary to safely operate a small UAS regardless of how the applicant happened to acquire that knowledge. The FAA invites comments as to whether other requirements, such as passage of an FAA-approved training course, should be imposed either instead of or in addition to the proposed knowledge test.

c. Areas of Knowledge Tested on the Initial Knowledge Test

This proposed initial knowledge test would test the following areas of knowledge. First, the knowledge test would test whether the applicant knows the regulations applicable to small UAS operations. By testing the applicant's knowledge of the applicable regulations, the proposed initial knowledge test would ensure that the applicant understands what those regulations require and does not violate them through ignorance.

Second, the initial knowledge test would test whether the applicant understands how to determine the classification of specific airspace and what the requirements are for operating in that airspace. To comply with the proposed airspace operating requirements, a small UAS operator would need to know how to determine the classification of the airspace in which he or she would like to operate.

Third, the initial knowledge test would test whether the applicant understands flight restrictions affecting small unmanned aircraft operations. The proposed initial knowledge test would test whether the applicant knows how to determine which areas are prohibited, restricted, or subject to a TFR in order to comply with the proposed flight restrictions in §§ 107.45 and 107.47.

Fourth, the initial knowledge test would test whether the applicant understands how to clear an obstacle during flight. As discussed previously, proposed § 107.37(b) prohibits a person from creating a collision hazard with, among other things, a ground structure. The proposed initial knowledge test would test whether the applicant understands what types of small unmanned aircraft maneuvers would create a collision hazard with a ground structure.

Fifth, the initial knowledge test would test whether the applicant understands the effects of weather and micrometeorology (weather on a localized and small scale) on small unmanned aircraft operation. Knowledge of weather is necessary for safe operation of a small unmanned aircraft because, due to the light weight of the small unmanned aircraft, weather could have a significant impact on the flight of that aircraft. For example, space around buildings, smokestacks and trees, which is safe during clear weather, could easily become hazardous in a windy situation. Accordingly, the proposed initial knowledge test would test whether an applicant understands the effect that different types of weather have on small unmanned aircraft performance and how to react to that weather. The proposed knowledge test would also test whether an applicant has knowledge of official sources that he or she can use to obtain weather information and predictions in order to plan the operation of the small UAS.

Sixth, the proposed knowledge test would test whether an applicant understands how to calculate the weight and balance of the small unmanned aircraft to determine impacts on performance. In order to operate safely, operators need knowledge and understanding of some fundamental aircraft performance issues, which include load balancing and weight distribution as well as available power for the operation.

Seventh, the operator of a small UAS may be presented with an emergency situation during an operation. Accordingly, the proposed initial knowledge test would test whether the applicant understands how to properly respond to an emergency.

Eighth, the proposed initial knowledge test would test the applicant's understanding of aeronautical decision-making/judgment and crew resource management. Even though this proposed rule would limit the flight of a small unmanned aircraft to operations at or below 500 feet AGL, some manned aircraft will still operate in the same airspace as the small unmanned aircraft. Accordingly, the small UAS operator would need to understand the aeronautical decision-making and judgment that manned-aircraft pilots engage in so that he or she can anticipate how the manned aircraft will react to the small unmanned aircraft. The small UAS operator would also need to understand how to function in a team environment (this is known as crew resource management) because this proposed rule would permit the use of visual observers to assist the small UAS operator and would place the operator in charge of those observers.

Ninth, the proposed initial knowledge test would test the applicant's understanding of airport operations and radio communication procedures, which would include standard terminology. While this proposed rule would limit small UAS operations in the vicinity of an airport, there are some instances where these operations would be permitted. For example, this proposed rule would allow a small unmanned aircraft to operate in Class B, C, or D airspace if the operator obtains prior ATC authorization. In order to operate safely near an airport, the operator would need to have knowledge of airport operations so that the small unmanned aircraft does not interfere with those operations. The operator would also need to have knowledge of radio communication procedures so that the operator can communicate with ATC.

Lastly, the proposed initial knowledge test would test whether the applicant understands the physiological effects of drugs and alcohol. Many prescription and over-the-counter medications can significantly reduce an individual's cognitive ability to process and determine what is happening around him or her. Accordingly, an operator needs to understand how drugs and alcohol can impact his or her ability to safely operate the small UAS.

The FAA invites comments on the proposed areas of knowledge to be tested on the initial knowledge test. The FAA also invites comments as to whether the initial knowledge test should test any other areas of knowledge. If so, what additional areas of knowledge should be tested? What would be the costs and benefits of testing these other areas of knowledge?

d. Administration of the Initial Knowledge Test

Knowledge tests currently administered to prospective pilots under 14 CFR part 61 are created by the FAA and administered by FAA-approved knowledge testing centers. A knowledge testing center is a private

entity that has received FAA approval to administer airman knowledge tests. These centers are all certificated and regularly evaluated to ensure that the testing center meets FAA certification requirements. There are currently about 650 knowledge testing center spread throughout the country. The FAA proposes to apply its existing knowledge development and administration framework to knowledge tests that would be administered to prospective small UAS operators. Under this framework, the initial knowledge test would be created by the FAA and administered by an FAA-approved knowledge testing center. Just as it does now, the FAA will specify the minimum grade necessary to pass the knowledge test,[80] and applicants who take the test will be issued an airman knowledge test report showing the results of the knowledge test.

To ensure that the knowledge test is properly administered, this proposed rule would also impose the following requirements. First, proposed § 107.69 would prohibit an applicant from cheating or engaging in unauthorized conduct during a knowledge test. This would include: (1) Copying or intentionally removing a knowledge test; (2) giving a copy of a knowledge test to another applicant or receiving a copy of the knowledge test from another applicant; (3) giving or receiving unauthorized assistance while the knowledge test is being administered; (4) taking any part of a knowledge test on behalf of another person; (5) being represented by or representing another person for a knowledge test; and (6) using any material not specifically authorized by the FAA while taking a knowledge test. Cheating or engaging in unauthorized conduct during a knowledge test in violation of proposed § 107.69 would be grounds for suspending or revoking the certificate or denying an application for a certificate. In addition, a person who engages in unauthorized conduct would be prohibited from applying for a certificate or taking a knowledge test for a period of one year after the date of the unauthorized conduct.

Second, to ensure that the person taking the knowledge test is correctly identified, proposed § 107.67 would require an applicant for a knowledge test to have proper identification at the time of the application. To ensure correct identification, the applicant for an unmanned aircraft operator certificate would have to have his or her identification verified in person just like any other applicant for an FAA-issued airman certificate. The proposed requirements for proper identification would be the same as the identification requirements currently imposed on applicants who wish to take a knowledge test.[81] Specifically, an applicant's identification would need to include the applicant's: (1) Photograph; (2) signature; (3) date of birth, which shows the applicant meets or will meet the proposed age requirements for an operator certificate; and (4) the applicant's current residential address if the permanent mailing address is a post office box number.

Finally, proposed § 107.71 would address circumstances in which an applicant wishes to retake a knowledge test after failure. To ensure that an applicant receives additional training after failing a knowledge test, the FAA currently requires an applicant who fails a knowledge test to receive additional training from a flight instructor and an endorsement from that instructor indicating that the instructor has determined that the applicant is now proficient to pass the test.[82] However, as discussed previously, this proposed rule would not require any specific form of training or studying in order to pass a knowledge test. Accordingly, the FAA proposes to require that a person who fails a knowledge test wait 14 calendar days before retaking the knowledge test. This 14-day waiting period would provide sufficient time for an applicant who fails a knowledge test to obtain additional training of his or her choice.

The FAA also considered whether to offer an option for the knowledge test to be administered online. However, in examining this approach the FAA ultimately determined that there would be significant risk in the integrity of a knowledge test becoming compromised if that test was to be administered outside of a controlled environment. This could be accomplished through someone copying and circulating the test questions, using unauthorized materials to take the test, or even taking the test for another person. Using the identity of another person to take the knowledge test may also allow an applicant to manipulate the security vetting procedures that take place once the applicant's identity is verified.

In addition, the FAA determined that it would be more difficult to safeguard the personally identifiable information (PII) of a test-taker that would be collected online rather than in-person at a knowledge testing center. Accordingly, the FAA has decided against proceeding with an online test-taking option. The FAA invites comments on whether the small UAS aeronautical knowledge test should have an option for online test-taking and, if so, what safeguards should be implemented to protect the integrity of the small UAS knowledge test, assure the FAA of the identity of the test taker, and protect the test-taker's PII that would be provided online. The FAA also invites comment on different UAS testing location options that might provide the lowest cost option for individuals, while protecting the integrity of the test and the information provided as part of the test-taking process.

e. Recurrent Aeronautical Knowledge Test

i. General Requirement and Administration of the Recurrent Knowledge Test

The FAA also proposes to require small UAS operators to pass a recurrent aeronautical knowledge test after they receive their operator certificate. The FAA proposes this requirement because this proposed rule would not require small UAS operators to regularly conduct small UAS operations, and consequently, some operators may conduct small UAS operations infrequently and may not fully retain some of the knowledge that they acquired in order to pass the initial knowledge test. The FAA also notes that even operators who regularly conduct small UAS operations may not fully retain pieces of knowledge that they do not use during their regular operations. For example, a small UAS operator who conducts operations only in Class G airspace may not retain the knowledge that he or she needs ATC authorization in order to conduct operations in Class B, C, or D airspace. Some aeronautical knowledge that the small UAS operator learned for the initial knowledge test may also become outdated over time.

Accordingly, the FAA proposes to require that the operator pass a recurrent knowledge test every 24 months. The FAA proposes 24 months as the appropriate recurrent testing frequency because that is the frequency of the recurrent flight review that pilots currently complete under 14 CFR 61.56. This requirement has been in place for approximately 40 years. Based on the FAA's experience with the existing 24-month flight review cycle, a recurrent knowledge test that is given every 24 months would ensure that the small UAS operator properly maintains the pertinent aeronautical knowledge. The

[80] *See* 14 CFR 61.35(b).

[81] The current knowledge-test identification requirements can be found at 14 CFR 61.35(a)(2).

[82] 14 CFR 61.49(a).

FAA invites comments on this proposed requirement.

The FAA also proposes that the recurrent aeronautical knowledge test be administered using the same framework as the initial aeronautical knowledge test. Specifically, under this proposed rule, the recurrent knowledge test would be created by the FAA and administered by FAA-approved knowledge testing centers. An applicant would be required to have proper identification in order to take the test, and he or she would be required to wait 14 days after failure before retaking the knowledge test. A certificate holder or applicant [83] would also be prohibited from cheating or engaging in unauthorized conduct during the recurrent knowledge test.

Just as with the initial knowledge test, the FAA invites comments on whether the small UAS recurrent aeronautical knowledge test should have an option for online test-taking and, if so, what safeguards should be implemented to protect the integrity of the small UAS knowledge test, assure the FAA of the identity of the test taker, and protect the test-taker's PII that would be provided online.

ii. Recurrent Test Areas of Knowledge

Under this proposed rule, the recurrent knowledge test would test the following areas of knowledge. First, the knowledge test would test the operator's knowledge of the regulations that govern small UAS operation to ensure that his or her knowledge is up to date regarding all aspects of small UAS operations permitted under the certificate, as the operator may not encounter all of these aspects in his or her regular operation. In the example provided earlier, an operator who regularly conducts small UAS operations in Class G airspace may not retain the knowledge concerning regulations governing operation in other classes of airspace.

Second, the recurrent knowledge test would test the operator's knowledge of airspace classification and operating requirements, obstacle clearance requirements, and flight restrictions. This is because: (1) Airspace that the operator is familiar with could become reclassified over time; (2) the location of existing flight restrictions could change over time; (3) new ground-based obstacles could be created as a result of new construction; and (4) some operators may not regularly encounter these issues in their regular operations.

Third, the recurrent knowledge test would ensure that the operator has the latest knowledge concerning sources of weather and airport operations. This is because the official sources of weather could change over time. Market turnover could also affect a change in airport operations as new airports are built and old airports are demolished or repurposed. The FAA notes that airports can also change their operations in response to changes in operating environment by, for example, changing the approaches that manned aircraft use to line up for a landing. The recurrent knowledge test would ensure that the small UAS operator is familiar with the latest sources of weather and the latest information concerning airport operations.

Fourth, the recurrent knowledge test would test the operator's knowledge of emergency procedures, crew resource management, and aeronautical decision-making/judgment. A small UAS operator may not encounter any of these situations over a 24-month operating period because: (1) An emergency situation may not present itself; (2) the operator may be involved in operations that do not use visual observers; and (3) the operator may be involved in operations that do not take place in the vicinity of any manned aircraft. Accordingly, including these areas of knowledge on the recurrent knowledge test would ensure that the operator retains knowledge on these areas even if he or she does not regularly encounter them in his or her small UAS operations.

iv. Issuance of an Unmanned Aircraft Operator Certificate with Small UAS Rating

Proposed § 107.63 specifies that the FAA will issue the certificate to an airman eligible under § 107.61 if the airman submits an application including an airman knowledge test report showing that he or she passed the initial aeronautical knowledge test required for the certificate. The certificate will not have an expiration date, and once issued, it will remain valid until surrendered, suspended, or revoked. The FAA invites comments as to whether this certificate should expire after a certain period of time. If so, when should the certificate expire?

The method of submission of the application is discussed further in section III.E.5.i of this preamble. The FAA notes that, as discussed in that section, all applicants for an airman certificate will be vetted by the Transportation Security Administration (TSA) pursuant to 49 U.S.C. 46111 to determine whether they pose a security threat. An applicant will not be issued an unmanned aircraft operator certificate until the TSA determines that the applicant will not pose a security threat.

v. Not Requiring an Airman Medical Certificate

The FAA also considered whether to require an applicant seeking an unmanned aircraft operator certificate with a small UAS rating to obtain an airman medical certificate as part of the application process. With certain exceptions, under 14 CFR part 61, the FAA currently requires an airman medical certificate for a student pilot certificate, a recreational pilot certificate, a private pilot certificate, a commercial pilot certificate, and an airline transport pilot certificate.[84] Flight instructors are also required to have a valid medical certificate when required to act as pilot in command.

The primary reason for medical certification is to determine if the airman has a medical condition that is likely to manifest as subtle or sudden incapacitation that could cause a pilot to lose positive control of the aircraft, or impair the pilots ability to ''see and avoid.''

The FAA has determined that traditional FAA medical certification may not be warranted for small UAS operators subject to this proposed rule mainly because small UAS operators and visual observers are operating within a ''confined area of operation,'' and subject to other operational limitations, discussed previously in this preamble. This is because the proposed visual-line-of-sight requirement for the operator and/or visual observer to be able to see the aircraft's direction and attitude of flight in the proposed rule is preferable to a vision standard. Even with normal vision it is foreseeable that a small unmanned aircraft may be so small that the operational space must be reduced to meet the operational requirements proposed in this rule. As such, prescriptive medical standards may not be as critical as they are for individuals exercising pilot privileges and therefore are not proposed under this action.

Rather, the FAA is proposing that operators self-certify, at the time of their airman application, that they do not have a medical condition that could interfere with the safe operation of a small UAS. As proposed in § 107.61(d), an applicant for an unmanned aircraft operator certificate with a small UAS

[83] As discussed in more detail further in the preamble, proposed § 107.75 would allow military or former military UAS operator applicants to take the recurrent test instead of the initial test in order to obtain an FAA-issued unmanned aircraft operator certificate.

[84] 14 CFR 61.23(a).

rating would be ineligible for the certificate if he or she knows or has reason to know of any physical or mental condition that would interfere with the safe operation of a small UAS. The FAA also proposes, in § 107.63(a), that the applicant be required to make a certification to that effect. Both of these proposed requirements are similar to the regulatory provision of § 61.53(b), which prohibits operations during medical deficiency for individuals conducting operations that do not require a medical certificate. FAA also considered proposing to require a medical certificate for a visual observer, but decided not to propose this requirement for the same reason a medical certificate for an operator is not being proposed. The FAA, however, does invite public comment as to whether an FAA medical certificate should be required. The FAA also invites comments as to the costs and benefits of requiring an airman medical certificate for an operator or visual observer.

4. Military Equivalency

This proposed rule would allow pilots with military experience operating unmanned aircraft to take the recurrent knowledge test in lieu of the initial knowledge test in order to be eligible for an unmanned aircraft operator certificate with a small UAS rating. The U.S. Armed Forces use many types and sizes of UAS in combat and non-combat operations, both in the United States and abroad, and have done so for many years. During that time, many servicemen and women have been trained to operate UAS. The FAA has established special rules for current or former military pilots allowing them to be issued FAA pilot certificates based on their military flight experience and passing a military knowledge check.[85]

Accordingly, the FAA is proposing to allow current or former military operators of unmanned aircraft to take a more limited recurrent aeronautical knowledge test rather than the initial aeronautical knowledge test to obtain an unmanned aircraft operator certificate with a small UAS rating. They may not rely on that experience if they were subject to certain disciplinary action described in § 107.75(a).

The FAA also considered whether to allow individuals who have been conducting UAS operations under a COA as a non-military UAS operator to take a recurrent test instead of an initial test in order to obtain an unmanned aircraft operator certificate with a small UAS rating. However, the FAA decided not to include this provision in the proposed rule because: (1) There is no formally recognized recordation system for non-military COA pilots as there is for military pilots; and (2) non-military COA pilots are currently subject to different requirements than military COA pilots for operations above 400 feet AGL. The FAA invites comments on whether non-military COA pilots should be permitted to take the recurrent knowledge test instead of the initial knowledge test in order to obtain an unmanned aircraft operator certificate.

5. Unmanned Aircraft Operator Certificate: Denial, Revocation, Suspension, Amendment, and Surrender

This rule would establish specific instances for when an unmanned aircraft operator certificate with a small UAS rating can be denied, revoked, suspended, amended, or surrendered. This rule would allow the FAA to deny, suspend, or revoke the certificate for reasons including security risk posed by the applicant, drug or alcohol offenses, refusal to submit to an alcohol test or furnish the results. Certificate holders would also be able to voluntarily surrender certificates.

i. Transportation Security Administration Vetting and Positive Identification

The FAA will deny an application for a certificate or take certificate action if the TSA determines that a person poses a security threat. Specifically, under 49 U.S.C. 46111, once an unmanned aircraft operator certificate application is received, the FAA will verify compliance and the accuracy of the application and provide the applicant's information to TSA for security vetting prior to certificate issuance. Under this proposed rule, the FAA would transmit a student pilot's biographic information for security vetting to TSA and issue an unmanned aircraft operator certificate only after receiving a successful response from TSA. However, if the TSA determines that an airman certificate applicant poses a security risk, section 46111 requires the FAA to deny the application for a certificate or amend, modify, suspend, or revoke (as appropriate) any part of an airman certificate based on the TSA's security findings.

The FAA may issue certificates to individuals who have first successfully completed a security threat assessment (STA) conducted by the TSA.[86] TSA would conduct STAs of applicants for a UAS certificate and notify the applicant and/or the FAA when the STA is complete. The STA would consist of a check of intelligence-related databases, including Interpol and international databases, terrorist watch lists, and other sources relevant to determining whether an individual poses or may pose a threat to transportation security, and that confirm the individual's identity. A successful STA is generally valid for five years, but may be revoked during that time if TSA's recurrent vetting reveals that the individual poses or may pose a security threat.

Congress requires TSA to recover the costs of vetting and credentialing services through user fees.[87] The fees for vetting UAS certificate applicants would cover TSA's costs for enrolling, processing, and replying to the application, as well as the costs of conducting the intelligence-related checks themselves. TSA is developing a process, through rulemaking, by which TSA's vetting fees can be collected from applicants during the application process, as TSA currently does in other vetting and credentialing programs, and used to cover the cost of the security screening. Thus, while this rulemaking projects that these costs are currently governmental costs, these costs would be passed on to individuals in the future.

As a result of the processes that go into the issuance of an airman certificate, the FAA estimates that it could take about 6 to 8 weeks after receipt of an application for the FAA to issue an applicant an unmanned aircraft operator certificate with a small UAS rating. The FAA invites comments with suggestions for how this period could be reduced. The FAA also notes that the TSA will continue to examine certificate holders after FAA issuance of a certificate.

In addition, in order for the TSA to be able to make the security assessments specified in 49 U.S.C. 46111, the agency must be sure of the identity of the person that it is assessing. Otherwise, a person who poses a security threat could evade TSA scrutiny simply by using someone else's identity. To address this issue, the FAA currently requires all applicants for a pilot certificate to apply in person and present positive identification at the time of application.[88] The identification must include an official photograph of the applicant, the applicant's signature, and the applicant's residential address,

[85] *See* 14 CFR 61.73.

[86] See 49 U.S.C. 44903(j)(2)(D).

[87] See 6 U.S.C. 469.

[88] FAA Order 8900.1, vol. 5, ch. 1, sec. 3, para. 5–54; FAA Order 8900.2, ch. 7, sec. 2, para. 25, pg. 7–36.

if different from the mailing address.[89] Acceptable methods of identification currently include, but are not limited to, U.S. driver's licenses, government identification cards, and passports.[90]

Because positive identification of the applicant is necessary for TSA to be able to determine whether the applicant poses a security threat, this proposed rule would require an applicant for a small unmanned aircraft operator certificate with a small UAS rating to submit the application to a Flight Standards District Office (FSDO), a designated pilot examiner (DPE), an airman certification representative (ACR) for a pilot school, a certificated flight instructor (CFI), or other persons authorized by the Administrator. The person accepting the application submission would be required to verify that the identity of the applicant matches the identity that is provided on the application.

This proposed rule would allow a DPE, an ACR for a pilot school, or a CFI to accept an application and verify the identity of the applicant because to do otherwise would severely limit the number of locations where an applicant for a certificate could submit his or her application. This is because of the limited number of FSDOs and qualified personnel in each FSDO needed to accept the anticipated number of application submissions each year. There are only 81 FDSOs in the United States, which are only open 5 days per week (excluding Federal holidays). However, there are an approximate combined total of 100,000 DPEs, ACRs, and CFIs potentially available to accept an application 7 days per week. Though there is no fee required to submit an application to a FSDO, there may be a nominal processing fee charged by the authorized FAA representative, none of which goes to the FAA. The FAA believes that this nominal fee (estimated average of $50), if charged by the FAA representative, would offset the average cost of travelling to a FSDO as well as the delay in submitting the application (measured possibly in weeks) due to having to make an appointment with the FSDO during the work week.

DPEs represent the FAA, and are already required to positively identify an applicant for certification when the applicant takes the practical test for the certificate. ACRs are also currently required to positively identify the student/applicant for airman certification as part of the responsibility of the part 141 flight school with which the ACR is affiliated.

CFIs are currently required to verify a pilot-certificate applicant's identity pursuant to TSA regulations codified at 49 CFR 1552.3(h)(1). That section requires a flight school [91] to endorse a pilot logbook verifying that a student is a U.S. citizen and presented identification prior to flight training, which likely would be at the same time that a person would apply for a student pilot certificate.

Because DPEs, ACRs, and CFIs already have experience verifying an applicant's identity, this proposed rule would allow these persons to accept an application for an unmanned aircraft operator certificate with a small UAS rating and verify the identity of the applicant. Sections 61.193, 61.413, and 183.23 would be revised accordingly.

The FAA has also considered allowing knowledge testing centers to verify an applicant's identity and accept an application for an unmanned aircraft operator certificate. However, the FAA is proposing to limit positive identification and acceptance of an application to those persons who are either: (1) Already authorized to accept and sign airman applications (FAA personnel, DPEs, and ACRs); or (2) are already required to verify identity under the TSA's regulations (CFIs). Knowledge testing centers do not fit into either of these categories, and thus, this proposed rule would not allow them to accept airman applications. The FAA invites comments on whether knowledge testing centers should be allowed to accept airman applications.

ii. Drugs and Alcohol Violations

Proposed § 107.57 would authorize the FAA to deny a certificate application or take other certificate action for violations of Federal or State drug laws. Certificates could also be denied, suspended or revoked for committing an act prohibited by § 91.17 or § 91.19—which are discussed in section III.D.6 of this document. Specifically, proposed § 107.59 specifies that certificate action could be taken for: (1) Failure to submit for a blood alcohol test or to release test results to the FAA as required by § 91.17; or (2) carriage of illegal drugs in violation of § 91.19. This proposal mirrors current regulations that apply to all airman certificates.[92]

iii. Change of Name

The FAA recognizes that individuals who hold airman certificates may change their names. Accordingly, the regulations governing pilot certificates currently issued under part 61 allow the holder of a pilot certificate to change the name on a certificate by submitting appropriate paperwork to the FAA.[93] This proposed rule would provide operators with the same opportunity in § 107.77(a). Specifically, proposed § 107.77(a) would allow a person holding an unmanned aircraft operator certificate with a small UAS rating to change the name on the certificate by submitting a name-change application to the FAA accompanied by the applicant's: (1) Operator certificate; and (2) a copy of the marriage license, court order, or other document verifying the name change. After reviewing these documents, the FAA would return them to the applicant.

iv. Change of Address

To ensure that the FAA has an airman certificate holder's proper contact information, part 61 currently requires the holder of a pilot, flight instructor, or ground instructor airman certificate who has made a change in permanent mailing address to notify the FAA within 30 days of making the address change.[94] Failure to do so prohibits the certificate holder from exercising the privileges of the airman certificate until he or she has notified the FAA of the changed address.[95] Because this regulatory provision helps ensure that the FAA is able to contact airman certificate holders, proposed § 107.77(c) would extend the existing change-of-mailing-address requirement to holders of an unmanned aircraft operator certificate with a small UAS rating.

v. Voluntary Surrender of Certificate

The FAA also recognizes that some individuals who obtain an unmanned aircraft operator certificate with a small UAS rating may decide to stop serving as a small UAS operator. Accordingly, proposed § 107.79 would allow a holder of an unmanned aircraft operator certificate to voluntarily surrender it to the FAA for cancellation. However, the FAA emphasizes that cancelling the operator certificate pursuant to § 107.79 would mean that the certificate no longer exists, and the individual who surrendered the certificate would need to again go through the entire certification process (including passing the initial aeronautical knowledge test) if he/she subsequently changes his/her mind. Accordingly, proposed § 107.79(b) would require the individual surrendering the certificate to include

[89] *Id.*

[90] *Id.*

[91] TSA defines a flight school as any pilot school, flight training center, air carrier training facility, or flight instructor certificated under 14 CFR parts 61, 121, 135, 141, or 142.49 CFR 1552.1(b).

[92] *See* 14 CFR 61.15(a) and (b), 63.12, and 65.12.

[93] 14 CFR 61.25.

[94] 14 CFR 61.60.

[95] *Id.*

the following signed statement (or an equivalent) in his or her cancellation request:

> I voluntarily surrender my unmanned aircraft operator certificate with a small UAS rating for cancellation. This request is made for my own reasons with full knowledge that my certificate will not be reissued to me unless I again complete the requirements specified in §§ 107.61 and 107.63.

F. Registration

As mentioned earlier, the FAA's statute prohibits a person from operating a civil aircraft that is not registered,[96] and this proposed rule would codify this statutory requirement. The registration of aircraft and the assignment of an identifying registration number to be displayed on the aircraft are primary foundation blocks in the regulatory structures that provide for safe and orderly aircraft activity within the NAS. The registration number provides a quick call-sign for communications between air traffic control and aircraft in flight. It also provides a link to information about the aircraft and the owner responsible for its operations. This information may assist the FAA and law enforcement agencies to respond to inappropriate behavior, to share safety information, respond to emergency situations, and populate data fields for studies that track trends and help shape future management decisions.

Part 47 of 14 CFR currently governs the registration process applicable to aircraft that are not registered under the laws of a foreign country and that meet one of the following ownership criteria:

- The aircraft is owned by a citizen of the United States;
- The aircraft is owned by a permanent resident of the United States;
- The aircraft is owned by a corporation that is not a citizen of the United States, but that is organized and doing business under U.S. Federal or State law and the aircraft is based and primarily used in the United States; or
- The aircraft is owned by the United States government or a state or local governmental entity.[97]

This proposed rule would not apply to UAS operations that have certain international ownership components. This would exclude any aircraft whose ownership fails to meet the criteria for registration under part 47. Because this proposed rule would apply only to aircraft that are eligible for registration under part 47, the FAA proposes to satisfy the statutory aircraft-registration requirement by requiring all small unmanned aircraft subject to this proposed rule to be registered pursuant to the existing registration process of part 47.

The FAA also proposes to make a single change to part 47 to accommodate small unmanned aircraft registration. Specifically, small unmanned aircraft, which can easily be obtained for as low as several hundred dollars, are significantly smaller assets than manned aircraft, which can cost hundreds of thousands or millions of dollars. Because small unmanned aircraft are small assets, the FAA proposes to exempt small unmanned aircraft which have not previously been registered anywhere from the regulatory requirements of § 47.15, which were designed to apply to large-asset manned aircraft.

Thus, under this proposed rule, a small unmanned aircraft would generally be registered as follows. The aircraft's owner would send the following items to the FAA: (1) An Aircraft Registration Application providing information about the aircraft and contact information for the aircraft owner; (2) evidence of ownership (such as a bill of sale); and (3) the $5.00 registration fee. If the application and supporting materials satisfy the criteria of part 47, the FAA would then assign a registration number (''N'' number) to the aircraft and issue a Certificate of Aircraft Registration to the applicant. If the aircraft was last previously registered in the U.S., once the new application has been sent to the Registry, its second copy (pink copy) may be used to operate the aircraft for a reasonable time while the application is being processed and the new certificate issued.

The FAA also notes that a Certificate of Aircraft Registration issued under part 47 currently expires every three years.[98] This is because ownership of the aircraft may change hands or the aircraft owner could move after registering. A requirement to periodically reregister the aircraft increases the likelihood that the FAA's registration database contains the latest information concerning each registered aircraft. The aircraft owner can easily reregister the aircraft by submitting to the FAA: (1) An application for registration renewal containing updated information about the aircraft and its owner; and (2) a $5.00 reregistration fee.[99] Because the current three-year registration expiration provision in part 47 would increase the likelihood that the FAA's registration database contains the latest information on small unmanned aircraft and their owners, the FAA proposes to retain this requirement for small unmanned aircraft registration.

In addition, the FAA notes that because most manned aircraft are type-certificated, the FAA currently possesses a significant amount of information about each aircraft type (as a result of the type-certification process) that it can use to supplement information in an individual registration application. This results in the current registration requirements of part 47 asking for a minimal amount of information for most manned aircraft.

However, small unmanned aircraft, which would not be type-certificated under this proposed rule, come in a variety of forms, many of which are not currently standardized. This situation is likely to continue as the small UAS market will continue broad innovation until designs emerge that are well balanced against the tasks found to be best served by this segment of aviation. To enable the FAA to both identify particular aircraft against a stated description as well as to identify and share safety related information as it develops, the FAA invites comments as to whether small unmanned aircraft owners should be required to provide additional information during the registration process. The FAA anticipates that the additional information requirement imposed on small unmanned aircraft could be similar to the requirements imposed on amateur-built aircraft under 14 CFR 47.33(c), as amateur aircraft pose the same lack-of-standardization issues as a small UAS.

G. Marking

1. Display of Registration Number

Subpart C of 14 CFR part 45 currently requires an aircraft to display its registration number on the aircraft. This requirement is intended to allow aircraft identification for oversight purposes. The number must generally be: (1) Painted on the aircraft or affixed to the aircraft by some other permanent means; (2) have no ornamentation; (3) contrast in color with the background; and (4) be legible.[100]

To increase the likelihood of aircraft identification during flight, part 45, Subpart C specifies highly visible surfaces on the aircraft where the aircraft registration number must be displayed. Those surfaces differ based on the type of aircraft that is used. For

[96] 49 U.S.C. 44101(a).

[97] 14 CFR 47.3. This limitation on the applicability of part 47 stems from a statute (49 U.S.C. 44103), which allows the FAA to only register aircraft that meet the above criteria.

[98] *See* 14 CFR 47.40.

[99] *Id.*

[100] 14 CFR 45.21(c).

example, a rotorcraft is required to display its registration number horizontally on the fuselage, boom or tail.[101] Conversely, a fixed wing unmanned aircraft is generally required to display its registration number on either the vertical tail surfaces or the sides of its fuselage.[102]

To ensure maximum visibility, Subpart C also specifies a minimum size for the registration number display.[103] For fixed-wing aircraft and rotorcraft, the registration number display must generally be at least 12 inches high.[104] Characters in the display must also be: (1) Generally two thirds as wide as they are high; (2) formed by solid lines that are one-sixth as thick as the character is high; and (3) spaced out so that the space between the characters is at least one-fourth of the character width.[105] Because some aircraft subject to part 45 may be small, § 45.29(f) allows aircraft that are too small to comply with the size requirements to display the registration number on the aircraft in as large a manner as practicable.[106]

This proposed rule would require a small unmanned aircraft to display its registration number in the manner specified in Subpart C of part 45. For unmanned aircraft that are not too small to comply with the display-size requirements discussed above, this proposed rule would require compliance with all of those requirements. This is because small unmanned aircraft present the same identification and oversight concerns as manned aircraft. For example, if a bystander was to observe a small unmanned aircraft being flown in a dangerous manner, the FAA would be able to determine the aircraft's owner if the bystander is able to see the aircraft's registration number. Because the current requirements in Subpart C of part 45 are intended to provide for the maximum visibility of an aircraft's registration number, compliance with those requirements would greatly increase the probability of a small unmanned aircraft being identified during a small UAS operation.

The FAA acknowledges that some small unmanned aircraft may be too small to comply with the minimum-display-size requirements of part 45. However, as mentioned previously, part 45 already contains a provision, § 45.29(f), that would address this issue by allowing the too-small aircraft to simply display its registration number in as large a manner as practicable. Accordingly, the size of the small unmanned aircraft would not be a barrier to compliance with the provisions of Subpart C of part 45.

The FAA also notes that, as discussed above, the registration-display-location requirements of part 45, Subpart C are specific to different types of aircraft.[107] Under this proposed rule, the FAA would expect small unmanned aircraft to comply with the display-location provisions that apply to the specific type of small unmanned aircraft being used. For example, rotorcraft small unmanned aircraft would be expected to comply with the display-location provisions that are applicable to rotorcraft. Conversely, fixed-wing small unmanned aircraft would be expected to comply with the provisions that are applicable to fixed-wing aircraft.

The FAA invites comments on whether a small unmanned aircraft should be required to display its registration number in accordance with Subpart C of part 45. If compliance with Subpart C should not be required, what standard should the FAA impose for how a small unmanned aircraft displays its registration number in order to fulfill its safety oversight obligation regarding small unmanned aircraft operations? The FAA invites comments with supporting documentation on this issue.

2. Marking of Products and Articles

The FAA also considered requiring small unmanned aircraft to comply with the marking of products and articles requirement of Subpart B of part 45. This subpart requires the manufacturer of an aircraft or aircraft component to attach a fireproof identification plate to the aircraft and/or component containing the manufacturer's name, model designation, serial number, and, if applicable, the type certificate. The purpose of these requirements is to allow the FAA to trace the pertinent aircraft and/or aircraft parts back to the manufacturer if an issue arises with the aircraft and/or aircraft parts.

The FAA does not believe that requiring small unmanned aircraft manufacturers to comply with the requirements of Subpart B of part 45 would be cost-justified. Under Executive Orders 12866 and 13563, the FAA may ''propose or adopt a regulation only upon a reasoned determination that [the regulation's] benefits justify its costs.'' [108] As discussed elsewhere in this preamble, the FAA's primary safety concerns with regard to small UAS operations are: (1) The ability to ''see and avoid'' other aircraft with no pilot on board; and (2) the operator losing positive control of the small unmanned aircraft. Here, both of these safety concerns would be mitigated by the other provisions of this proposed rule. Accordingly, the FAA does not believe that the safety benefits of requiring small UAS manufacturers to install fireproof plating with their identification information would be sufficient to justify the costs of doing so.

The FAA invites comments, with supporting documentation, as to the costs and benefits of mandating compliance with Subpart B of part 45. The FAA also invites comments, with supporting documentation, on whether alternative methods of small-UAS manufacturer marking should be required.

H. Fraud and False Statements

Currently, the U.S. criminal code prohibits fraud and falsification in matters within the jurisdiction of the executive branch.[109] The FAA too may impose civil sanctions in instances of fraud and falsification in matters within its jurisdiction.[110]

Similarly, in § 107.5(a), this proposed rule would prohibit a person from making a fraudulent or intentionally false record or report that is required for compliance with the provisions of this proposed rule. Proposed § 107.5(a) would also prohibit a person from making any reproduction or alteration, for a fraudulent purpose, of any certificate, rating, authorization, record, or report that is made pursuant to proposed part 107. Finally, proposed § 107.5(b) would specify that the commission of a fraudulent or intentionally false act in violation of § 107.5(a) could result in the suspension or revocation of a certificate or waiver issued by the FAA pursuant to this proposed rule. This proposed civil sanction would be similar to the sanctions that the FAA currently imposes on fraudulent and false statements pursuant to §§ 61.59(b), 67.403(c), and 121.9(b).

[101] 14 CFR 45.27(a). Section 45.27(a) also allows the number to be displayed on both surfaces of the cabin, but an unmanned aircraft will not have a cabin.

[102] 14 CFR 45.25(a).

[103] 14 CFR 45.29(f).

[104] 14 CFR 45.29(b)(1) and (3).

[105] 14 CFR 45.29(c)–(e).

[106] *See* 14 CFR 45.29(f).

[107] *See, e.g.,* 14 CFR 45.25(a) and 45.27(a).

[108] Executive Order 13563, section 1(b) (summarizing and reaffirming Executive Order 12866).

[109] 18 U.S.C. 1001

[110] The FAA has exercised this power in 14 CFR 61.59, 67.403, 121.9, and 139.115, which currently impose civil prohibitions on fraud and false statements made in matters within the FAA's jurisdiction.

I. Oversight

1. Inspection, Testing, and Demonstration of Compliance

The FAA's oversight statutes, codified at 49 U.S.C. 44709 and 46104, provide the FAA with broad investigatory and inspection authority for matters within the FAA's jurisdiction. Under section 46104, the FAA may subpoena witnesses and records, administer oaths, examine witnesses, and receive evidence at a place in the United States that the FAA designates. Under section 44709, the FAA may ''reinspect at any time a civil aircraft, aircraft engine, propeller, appliance, design organization, production certificate holder, air navigation facility, or agency, or reexamine an airman holding a certificate issued [by the FAA].''

This rule would codify the FAA's oversight authority in proposed § 107.7. Proposed § 107.7(b) would require the operator, visual observer, or owner of a small UAS to, upon FAA request, allow the FAA to make any test or inspection of the small unmanned aircraft system, the operator, and, if applicable, the visual observer to determine compliance with the provisions of proposed part 107.

Section 107.7(a) would require an operator or owner of a small UAS to, upon FAA request, make available to the FAA any document, record, or report required to be kept by the provisions of proposed part 107. This would include the operator's unmanned aircraft operator certificate with a small UAS rating and the certificate of aircraft registration for the small UAS being operated.

2. Accident Reporting

The FAA notes that UAS is a relatively new industry and that operators of small UAS may not have prior experience with aviation regulations or FAA oversight. In addition, because of the newness of the small UAS industry, the FAA currently does not have the oversight experience with small UAS that it has with manned aircraft operations. Accordingly, to ensure proper oversight of small UAS operations, this proposed rule, in § 107.9, would require a small UAS operator to report to the FAA any small UAS operation that results in: (1) Any injury to a person; or (2) damage to property other than the small unmanned aircraft. The report would have to be made within 10 days of the operation that resulted in injury or damage to property.[111] After receiving this report, the FAA may conduct further investigation to determine whether any FAA regulations were violated.

The FAA emphasizes that this proposed reporting requirement would be triggered only during operations that result in injury to a person or property damage. The FAA invites comments as to whether this type of accident-reporting should be required. The FAA also invites suggestions for alternative methods of ensuring compliance with the regulations governing small UAS operations. The FAA specifically invites comments as to whether small UAS accidents that result in minimal amounts of property damage should be exempted from the reporting requirement. If so, what is the threshold of property damage that should trigger the accident reporting requirement?

J. Section 333 Statutory Findings

As mentioned previously, in order to determine whether certain UAS may operate safely in the NAS pursuant to section 333 of Public Law 112–95, the Secretary must find that the operation of the UAS would not: (1) Create a hazard to users of the NAS or the public; or (2) pose a threat to national security. The Secretary must also determine whether small UAS operations subject to this proposed rule pose a safety risk sufficient to require airworthiness certification.

1. Hazard to Users of the NAS or the Public

Section 333 of Public Law 112–95 requires the Secretary to determine whether the operation of the UAS subject to this proposed rule would create a hazard to users of the NAS or the public. As discussed in the Background section of this preamble, due to their extremely light weight, small UAS could pose a significantly smaller public risk than do manned aircraft.

Two primary safety concerns associated with small UAS operations are: (1) The ability to ''see and avoid'' other aircraft with no pilot on board; and (2) the operator losing positive control of the small unmanned aircraft. Here, both of these safety concerns would be mitigated by the other provisions of this proposed rule. Specifically by requiring operations to be conducted within visual line of sight; limiting maximum gross weight of the small unmanned aircraft to be below 55 pounds; limiting the operating altitude to below 500 feet AGL; requiring operators to be certificated; defining the area of operation; and prohibiting operations over any person not directly participating in the operation, the risk associated with this group of aircraft would be significantly reduced when compared with other categories of aircraft that weigh more, fly higher, and faster.

Accordingly, the Secretary proposes to find that small UAS operations subject to this proposed rule would not create a hazard to users of the NAS or the public. We invite comments on this proposed finding.

2. National Security

Section 333 of Public Law 112–95 also requires the Secretary to determine whether the operation of UAS subject to this proposed rule would pose a threat to national security. Proposed part 107 would expand small UAS operations in the NAS to include commercial operations. Under proposed part 107, these operations would be subject to specific requirements, such as being able to operate only during daylight and only within visual line of sight of the operator and, if applicable, a visual observer. The small unmanned aircraft would also have to be registered with the FAA and display its FAA-issued registration marking prominently on the aircraft.

In addition, the operator of the small unmanned aircraft would be required to obtain an FAA-issued unmanned aircraft operator certificate with a small UAS rating. The process for obtaining this certificate would include the same TSA-review procedures that are currently used under 49 U.S.C. 46111 in order to screen out airman-certificate applicants who pose a security risk.

Because the above provisions would limit the security risk that could be posed by small UAS operations subject to this proposed rule, the Secretary proposes to find that these small UAS operations would not pose a threat to national security. We invite comments on this proposed finding.

3. Airworthiness Certification

Finally, section 333(b)(2) of Public Law 112–95 requires the Secretary to determine whether small UAS operations subject to this proposed rule pose a safety risk sufficient to require airworthiness certification. The Secretary has determined that airworthiness certification should not be required for small UAS subject to this proposed rule due to their low-risk operational characteristics. Specifically, as mentioned previously, because of the other provisions in this proposed rule, the risk associated with small UAS

[111] The proposed 10-day timeframe to submit a report is similar to the 10-day timeframe that is currently required by the NTSB for accident reporting. *See* 49 CFR 830.15(a).

subject to this proposed rule is significantly reduced.

The FAA emphasizes that, under this proposed rule, the operator would not need to determine design conformity or reliability probabilities when evaluating the airworthiness of small UAS. Instead, the operator would need to make a determination of whether the small UAS is in a safe condition during flight operations and ground operations conducted for the purpose of flight. During preflight and post flight inspections, a small UAS operator should look for simple inspection items such as dents, corrosion, mis-alignment, loose wires, binding controls, loose fasteners, and excessive wear. This simple but not all-inclusive list will identify most problems that could impact the airworthiness and reliability of the aircraft.

Another inspection method unique to small UAS that would be governed by this proposed rule would be a check of the control link. This check can be accomplished by using the control station to verify proper flight control deflection prior to flight. The check can also be used to ensure the flight controls deflect freely, without binding. Like the aforementioned inspection items, this too is a simple visual inspection that should not require any specialized training.

Because the proposed airworthiness provisions discussed above would sufficiently ensure that the small UAS is in a condition for safe operation and because the other provisions of this rule would ensure that the risk posed by small unmanned aircraft is significantly smaller than public risk posed by other groups of aircraft, the Secretary finds, pursuant to section 333(b)(2) of Public Law 112–95, that airworthiness certification would be unnecessary for small UAS subject to this proposed rule. We invite comments on this finding.

IV. Regulatory Notices and Analyses

A. Regulatory Evaluation

Changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 and Executive Order 13563 direct that each Federal agency shall propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 (Pub. L. 96–354) requires agencies to analyze the economic impact of regulatory changes on small entities. Third, the Trade Agreements Act (Public Law 96–39) prohibits agencies from setting standards that create unnecessary obstacles to the foreign commerce of the United States. In developing U.S. standards, this Trade Act requires agencies to consider international standards and, where appropriate, that they be the basis of U.S. standards. Fourth, the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4) requires agencies to prepare a written assessment of the costs, benefits, and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local, or tribal governments, in the aggregate, or by the private sector, of $100 million or more annually (adjusted for inflation with base year of 1995). This portion of the preamble summarizes the FAA's analysis of the economic impacts of this proposed rule. Readers seeking greater detail can read the full regulatory evaluation, a copy of which has been placed in the docket for this rulemaking.

In conducting these analyses, FAA has determined that this proposed rule: (1) Has benefits that justify its costs; (2) is an economically ''significant regulatory action'' as defined in section 3(f) of Executive Order 12866; (3) is ''significant'' as defined in DOT's Regulatory Policies and Procedures; (4) would have a significant positive economic impact on a substantial number of small entities; (5) would not create unnecessary obstacles to the foreign commerce of the United States; and (6) would not impose an unfunded mandate on state, local, or tribal governments, or on the private sector by exceeding the threshold identified above. These analyses are summarized below.

1. Total Benefits and Costs of This Rule

This proposed rule reflects the fact that technological advances in small unmanned aircraft systems (small UAS) have led to a developing commercial market for their uses by providing a safe operating environment for them and for other aircraft in the NAS. In time, the FAA anticipates that the proposed rule would provide an opportunity to substitute small UAS operations for some risky manned flights, such as photographing houses, towers, bridges, or parks, thereby averting potential fatalities and injuries. It would also lead to more efficient methods of performing certain commercial tasks that are currently performed by other methods.

For any commercial operation occurring because this rule is enacted, the operator/owner of that small UAS will have determined the expected revenue stream of the flights exceeds the cost of the flights' operation. In each such case this rule helps enable new markets to develop. The FAA identified how the proposed rule would improve the safety of the NAS when small UAS are operated in place of a hazardous manned operation or a laborer working at heights.

The estimated out-of-pocket cost for a small UAS operator to be FAA-certified is less than $300. As this proposal enables new businesses to be established, the private sector benefits would exceed private sector costs when new entrepreneurs earn a profit. As more profitable opportunities increase, so will the social benefits. Therefore, each new small UAS operator will have determined that their expected benefits exceed their costs. In addition, if the use of a small UAS replaces a dangerous non-UAS operation and saves one human life, that alone would result in benefits outweighing the costs of this proposed rule. The costs are shown in the table in the ''Cost Summary'' section below.

2. Who is potentially affected by this rule?

Manufacturers and operators of small unmanned aircraft systems.

3. Assumptions

- Because the commercial small UAS industry is not yet established and may evolve differently from current expectations, the FAA determined that a five-year time frame of analysis would be appropriate.
- The base year is 2014.
- The FAA uses a seven percent discount rate for the benefits as prescribed by OMB in Circular A–4.[112]
- Since the year that the proposed rule is published is unknown, the FAA uses Year 1 as the current year so that the first discounting occurs in Year 2.
- In the small UAS future fleet forecast, the FAA assumes that 20 percent of the fleet would retire or leave the fleet every year.[113]
- Because only one operator is required to operate a small UAS, the FAA assumes that there would be one qualified FAA-approved operator per

[112] *http://www.whitehouse.gov/omb/circulars_a004_a-4*

[113] A copy of the forecast can be found in the rulemaking docket. The FAA notes that a small UAS could incur a cost for registration and then retire or leave the fleet during the analysis interval. The FAA also notes that our small UAS forecast may be understated if operators choose to own more than one FAA-registered aircraft (for example, as a backup in case one aircraft is disabled). To account for this possibility, as a sensitivity analysis, if there were an additional 20 percent increase in our small UAS forecast, then the costs in Table 7 and Table 10, found in the regulatory evaluation accompanying this NPRM, would increase by 20 percent. The FAA requests comments, with supporting documentation, on this sensitivity analysis.

registered and operating small UAS. Even though 20 percent of the small UAS equipment leaves the fleet each year, the FAA expects that small UAS operators, once tested and certificated, would remain employable and some would take jobs as small UAS operators in the following years of the analysis interval. Also, operators would incur a cost for recurrent knowledge testing every 24 months. This will be explained in detail in the ''Costs'' section below.

- The FAA assumes that the failure rate of applicants [114] taking the small UAS initial and recurrent knowledge based test would be 10 percent.[115] However, applicants and operators who fail are assumed to pass the knowledge test on the second attempt.
- Since this proposed rule allows knowledge test centers (KTC) to administer small UAS operator initial or recurrent knowledge tests, the FAA assumes that the KTC would collocate themselves with a Designated Pilot Examiner (DPE), Certificated Flight Instructor (CFI) or Other Designated Authority to validate an applicant's identity, accept the knowledge test results and the small UAS operator application for review and submission to the FAA AFS–760 Airman Certification Branch for processing.
- The cost to administer an FAA approved small UAS knowledge test, including compliance fees, to a small UAS applicant or operator is $150.[116]
- The FAA estimates that a small UAS operator applicant would need to travel 19 miles one way to reach their closest KTC location.[117]
- The 2014 published IRS variable cost mileage rate of $0.235 per mile is used to estimate the cost of Vehicle usage.[118]
- The FAA assigns the hourly value for personal time to equal $25.09 for Year 1.[119]
- The FAA assigns the hourly value for travel time to equal $24.68 for Year 1.[120]
- The FAA assigns the hourly value of FAA or KTC clerical time to $20.06 by calculating the mean for a Level 2 (FG 5/6) Clerical Support person from the Core Compensation Plan Pay Bands, effective January 12, 2014 working in the Washington DC locality.[121] The FAA then divides the mean of the annual salaries by 2,080 for an hourly rate.
- The FAA assigns the value of $28.00 as the estimate for the FAA's cost to register an aircraft. This estimate is based on an internal cost model developed in September 2014 by the FAA civil aviation registry to use for managerial estimates.
- The FAA uses a $50 fee to validate the identity of an applicant.

The FAA requests comments, with supporting documentation, on each of these assumptions and data values.

4. Benefit Summary

The potential benefits from this proposed rule would arise from improved safety and from opening up new commercial aviation activities. The FAA currently does not permit commercial activity involving small UAS due to the potential hazards they could pose to other aircraft and to the civilian population. This proposed rule would allow certain types of unmanned aerial observational operations to replace manned aerial observational operations that are currently being conducted under potentially hazardous conditions. The proposed rule would also allow small UAS to replace laborers inspecting high towers or in certain other hazardous locations. This proposed rule would allow the creation and development of new industries able to operate with minimal potential risks to operators and the public.

Specifically, with respect to the potential safety benefits from substituting small unmanned aircraft for aerial photography, the FAA reviewed 17 aerial aviation photography accidents and incidents that occurred between 2005 and 2009. Of these accidents, the FAA determined that a small UAS could have substituted for the manned operation in two cases. If the use of a small UAS replaces a dangerous non-UAS operation and saves one human life, that alone would result in benefits outweighing the costs of this proposed rule.

The potential benefits would be driven by the market and small UAS airspace availability. In the Regulatory Evaluation, the FAA explores only four of the many potential small UAS markets this proposal could enable. The four potential small UAS markets are:

1. Aerial photography,
2. Precision agriculture,
3. Search and rescue/law enforcement, and
4. Bridge inspection.

The FAA estimates that the proposed rule could not only enable numerous new industries, but also provide safety benefits and create a safe operating environment. The FAA has not quantified the specific benefits due to a lack of data. The FAA invites commenters to provide data that could be used to quantify benefits of this proposed rule.

5. Cost Summary

Several provisions in the proposed rule would impose compliance costs on potential commercial small UAS operators. However, the FAA assumes that commercial small UAS operators would incur these costs only if they anticipated revenues that would more than offset these costs. The business decision to enter a previously non-existent market is borne by each operator who knowingly chooses to operate a small UAS within the regulated environment of this proposal. In the Regulatory Evaluation, the FAA estimates these costs by provision. As summarized in the following table, the FAA estimates the total cost of the proposed rule for the 5 year period of analysis.

[114] The FAA notes that a person first must apply to become a small UAS operator. During the application process, this analysis will refer to a person applying to become a small UAS operator as an applicant. After the applicant has successfully passed the application process, this analysis will refer to the person as a small UAS operator.

[115] The FAA has not yet created or administered the knowledge test proposed in the NPRM. However, the weighted average failure rate for all categories of airman taking knowledge tests in 2013 was 10%. See Appendix 3 of the regulatory evaluation accompanying this NPRM for details.

[116] *http://www.catstest.com/airman-testing-exams/recreational-private-pilot.php*

[117] See ''Travel Expense'' section for methodology and source information.

[118] *http://www.irs.gov/2014-Standard-Mileage-Rates-for-Business,-Medical-and-Moving-Announced*

[119] Source: Revised Departmental Guidance on The Valuation of Travel time in Economic Analysis (published June 9, 2014). Per this guidance, median Household income divided by 2,080 hours is used to establish a wage rate (see Table 3). This wage rate, as noted in this guidance, serves as an approximate value for leisure time. Consistent with this guidance wage rates are augmented by 1.2 percent per year to reflect projected annual growth of real median household income. Year 1 (2012$) wage rates estimates are calculated as $24.50 * 1.012^2 = $25.09; Year 2 as $24.50 * 1.012^3 = $25.39; Year 3 as $24.50 * 1.012^4 = $25.70; Year 4 as $24.50 * 1.012^5 = $26.01; and Year 5 as $24.50 * 1.012^6 = $26.32.

[120] Source: Revised Departmental Guidance on The Valuation of Travel time in Economic Analysis (published June 9, 2014)-Local Travel (Business). Per this guidance future Travel Time Saving estimates are also augmented by 1.2 percent per year to reflect projected annual growth of real median household income. Year 1 (2012$) travel time savings estimates are calculated as $24.10 * 1.012^2 = $24.68; Year 2 as $24.10 * 1.012^3 = $24.98; Year 3 as $24.10 * 1.012^4 =$25.28; Year 4 as $24.10 * 1.012^5 = $25.58; and Year 5 as $24.10 * 1.012^6 = $25.89. See table 4.

[121] *https://my.faa.gov/content/dam/myfaa/org/staffoffices/ahr/program_policies/policy_guidance/hr_policies/hrpm/comp/comp_ref/media/core_salary_with_conversion.xls.*

TOTAL AND PRESENT VALUE COST SUMMARY BY PROVISION

[Thousands of current year dollars]

Type of cost	Total costs (000)	7% P.V. (000)
Applicant/small UAS operator:		
Travel Expense	$151.7	$125.9
Knowledge Test Fees	$2,548.6	2,114.2
Positive Identification of the Applicant Fee	$434.3	383.7
Owner:		
Small UAS Registration Fee	$85.7	70.0
Time Resource Opportunity Costs:		
Applicants Travel Time	$296.1	245.3
Knowledge Test Application	$108.9	90.2
Physical Capability Certification	$20.0	17.7
Knowledge Test Time	$1,307.1	1,082.9
Small UAS Registration Form	$220.5	179.7
Change of Name or Address Form	$14.9	12.3
Knowledge Test Report	$154.9	128.5
Pre-flight Inspection	Not quantified	
Accident Reporting	Minimal cost	
Government Costs:		
TSA Security Vetting	$1,026.5	906.9
FAA—sUAS Operating Certificate	$39.6	35.0
FAA—Registration	$394.3	321.8
Total Costs	$6,803.1	5,714.0

* Details may not add to row or column totals due to rounding.

B. Initial Regulatory Flexibility Determination (IRFA)

The Regulatory Flexibility Act of 1980 (Pub. L. 96–354) (RFA) establishes ''as a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure that such proposals are given serious consideration.'' The RFA covers a wide-range of small entities, including small businesses, not-for-profit organizations, and small governmental jurisdictions.

Agencies must perform a review to determine whether a rule will have a significant economic impact on a substantial number of small entities. If the agency determines that it will, the agency must prepare a regulatory flexibility analysis as described in the RFA.

The FAA believes that this proposed rule would have a significant impact on a substantial number of entities. Therefore, under section 603(b) of the RFA, the initial analysis must address:

- Description of reasons the agency is considering the action.
- Statement of the legal basis and objectives for the proposed rule.
- Description of the record keeping and other compliance requirements of the proposed rule.
- All federal rules that may duplicate, overlap, or conflict with the proposed rule.
- Description and an estimated number of small entities to which the proposed rule will apply.
- Describe alternatives considered.

1. Description of Reasons the Agency Is Considering the Action

The FAA is proposing to amend its regulations to adopt specific rules to allow the operation of small unmanned aircraft system (small UAS) operations in the National Airspace System (NAS). These changes would address the operation of small UAS, certification of their operators, registration, and display of registration markings. The proposed requirements would allow small UAS to operate in the NAS while minimizing the risk they may pose to manned aviation operations and the general public.

If the proposed rule were adopted, operators would be permitted to participate in certain commercial activities from which they are currently prohibited. The proposed requirements are intended to enable the opportunity for the private sector to develop commercial small UAS businesses and facilitate legal and safe operations. Currently commercial activity using a small UAS is prohibited by federal regulation unless the civil aircraft has an airworthiness certificate in effect and operations are approved by the FAA on a case by case basis via an exemption from the pertinent regulations.

2. Statement of the Legal Basis and Objectives for the Proposed Rule

This rulemaking is promulgated under the authority described in the FAA Modernization and Reform Act of 2012 (Pub. L. 112–95). Section 333 of Public Law 112–95 directs the Secretary of Transportation to determine whether ''certain unmanned aircraft systems may operate safely in the national airspace system.'' If the FAA determines, pursuant to section 333, that certain unmanned aircraft systems may operate safely in the NAS, then the FAA must ''establish requirements for the safe operation of such aircraft systems in the national airspace system.'' [122]

This rulemaking is also promulgated pursuant to 49 U.S.C. 40103(b)(1) and (2), which charge the FAA with issuing regulations: (1) To ensure the safety of aircraft and the efficient use of airspace; and (2) to govern the flight of aircraft for purposes of navigating, protecting and identifying aircraft, and protecting individuals and property on the ground. In addition, 49 U.S.C. 44701(a)(5)

[122] Public Law 112–95, section 333(c). In addition, Public Law 112–95, section 332(b)(1) requires the FAA to issue ''a final rule on small unmanned aircraft systems that will allow for civil operation of such systems in the national airspace system, to the extent the systems do not meet the requirements for expedited operational authorization under section 333 of [Pub. L. 112–95].''

charges the FAA with prescribing regulations that the FAA finds necessary for safety in air commerce and national security.

Finally, the model-aircraft component of this rulemaking is promulgated pursuant to Public Law 112–95, section 336(b), which clarifies that the FAA's existing authority, under 49 U.S.C. 40103(b) and 44701(a)(5), provides the FAA with the power to pursue enforcement ''against persons operating model aircraft who endanger the safety of the national airspace system.''

3. Description of the Record Keeping and Other Compliance Requirements of the Proposed Rule

The FAA's statute [123] prohibits a person from serving as an airman without an airman certificate. This proposed rule would create a new airman certificate for small UAS operators to satisfy the statutory requirement. The airman certificate would be called an unmanned aircraft operator certificate with a small UAS rating, and in order to obtain it, a person would have to: (1) Take and pass an aeronautical knowledge test; and (2) submit an application for the certificate.

To take and pass an aeronautical knowledge test, a person would have to: (1) Apply to take the test at an FAA-approved Knowledge Testing Center; (2) spend time taking the test; and (3) obtain an airman knowledge test report showing that he or she passed the test. After passing a knowledge test, the person would then apply for the certificate by: (1) Filling out and submitting an application for the certificate, which would include a certification stating that the applicant is physically capable of safely operating a small UAS; and (2) attaching a copy of the airman knowledge test report to the application. This proposed rule would also require a small UAS operator to report to the FAA any accident that results in: (1) Any injury to a person; or (2) damage to property other than the small unmanned aircraft.

The FAA's statute also prohibits the operation of an aircraft that is not registered.[124] Consequently this proposed rule would require owners of a small unmanned aircraft to register that aircraft with the FAA. The owner of a small unmanned aircraft can do this simply by sending the following items to the FAA: (1) An Aircraft Registration Application providing information about the aircraft and contact information for the aircraft owner; (2) evidence of ownership (such as a bill of sale); and (3) the $5.00 registration fee.

4. All Federal Rules That May Duplicate, Overlap, or Conflict With the Proposed Rule

The FAA is unaware that the proposed rule will overlap, duplicate or conflict with existing federal rules.

5. Description and an Estimated Number of Small Entities To Which the Proposed Rule Will Apply

The FAA believes that the proposed rule would enable numerous new industries, while maintaining a safe operating environment in the NAS.

Because the commercial small UAS industry is not yet established and legal operation of commercial small UAS in the NAS constitutes a new market, available data for these operations is sparse. Accordingly, the FAA has not quantified number of small entities to which the proposed rule would apply because the FAA cannot reasonably predict how the market will develop for individual commercial uses of small UAS.

With respect to the potential operator costs, the FAA assumes that each operator would be a new entrant into the commercial market and that each operator would have one small UAS. The following table shows the proposed rule's estimated out-of-pocket startup and recurrent direct compliance costs for a new small UAS operator or owner.

SMALL UAS OPERATOR STARTUP AND RECURRENT COSTS

[Current dollars]

Type of cost	Cost	
	Initial	Recurrent
Applicant/small UAS operator:	.....	.....
Travel Expense	$9	$9
Knowledge Test Fees	150	150
Positive Identification of the Applicant Fee	50	.....
Total applicant/small UAS operator	209	159
Owner:	.....	.....
Small UAS Registration Fee	5	5
Total Owner	5	5
Total	214	164

* Details may not add to row or column totals due to rounding.

The FAA does not believe that $214 per operator would be a significant negative economic impact to small entity operators because $214 is relatively inexpensive to be licensed for operation of a commercial vehicle.

The FAA expects this proposed rule would be a significant positive economic impact because it enables new businesses to operate small UAS for hire and would stimulate a manufacturing support industry. The FAA believes that most, if not all, of these new commercial activities would be conducted by operators of small UAS who are small business entities. Therefore, the FAA believes that this proposed rule would have a positive significant impact on a substantial number of entities.

6. Alternatives Considered

The FAA considered both more costly and less costly alternatives as part of its NPRM. The FAA rejected the more costly alternatives due to policy considerations and undue burden that would be imposed on small UAS operators. The less costly alternatives and the FAA's reasons for rejecting

[123] 49 U.S.C. 44711(a)(2)(A).

[124] 49 U.S.C. 44101.

those alternatives in the NPRM are discussed below.

• Allowing knowledge testing centers to verify ID and accept airman applications. The FAA decided, as part of its proposal, to limit positive identification and acceptance of an application to those persons who are either: (1) Already authorized to accept and sign airman applications (FAA personnel, DPEs, and ACRs); or (2) are already required to verify identity under the TSA's regulations (CFIs). Knowledge testing centers do not fit into either of these categories, and thus, after considering the alternative of allowing them to accept airman applications, the FAA decided not to include this alternative in the NPRM.

• Allowing individuals who have been conducting UAS operations under a COA as a non-military UAS operator to take a recurrent test instead of an initial test in order to obtain an unmanned aircraft operator certificate with a small UAS rating. However, the FAA decided not to include this provision in the proposed rule because: (1) There is no formally recognized recordation system for non-military COA pilots as there is for military pilots; and (2) non-military COA pilots are currently subject to different requirements than military COA pilots for operations above 400 feet AGL.

Therefore this proposed rule would have a significant positive economic impact on a substantial number of small entities. The FAA solicits comments regarding this determination.

C. International Trade Impact Assessment

The Trade Agreements Act of 1979 (Pub. L. 96–39), as amended by the Uruguay Round Agreements Act (Pub. L. 103–465), prohibits Federal agencies from establishing standards or engaging in related activities that create unnecessary obstacles to the foreign commerce of the United States. Pursuant to these Acts, the establishment of standards is not considered an unnecessary obstacle to the foreign commerce of the United States, so long as the standard has a legitimate domestic objective, such as the protection of safety, and does not operate in a manner that excludes imports that meet this objective. The statute also requires consideration of international standards and, where appropriate, that they be the basis for U.S. standards.

The FAA invites comments on the inclusion of foreign-registered small unmanned aircraft in this new framework. In particular, FAA invites comments on foreign experiences with differing levels of stringency in their UAS regulation. The FAA recognizes that several other countries have adopted different standards with regard to the commercial operation of UAS in their respective airspaces. Data from their experiences regarding safety outcomes and economic activity could form the basis for studying the effect of these different regulatory approaches.

D. Unfunded Mandates Assessment

Title II of the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4) requires each Federal agency to prepare a written statement assessing the effects of any Federal mandate in a proposed or final agency rule that may result in an expenditure of $100 million or more (in 1995 dollars) in any one year by State, local, and tribal governments, in the aggregate, or by the private sector; such a mandate is deemed to be a ''significant regulatory action.'' The FAA currently uses an inflation-adjusted value of $151.0 million in lieu of $100 million. This proposed rule does not contain such a mandate; therefore, the requirements of Title II of the Act do not apply.

E. Paperwork Reduction Act

The Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)) requires that the FAA consider the impact of paperwork and other information collection burdens imposed on the public. According to the 1995 amendments to the Paperwork Reduction Act (5 CFR 1320.8(b)(2)(vi)), an agency may not collect or sponsor the collection of information, nor may it impose an information collection requirement unless it displays a currently valid Office of Management and Budget (OMB) control number.

This action contains the following proposed information collection requirements:

• Submission of an application for an unmanned aircraft operator certificate with a small UAS rating;

• submission of an application to register a small unmanned aircraft; and

• reporting any accident that results in injury to a person or damage to property other than the small unmanned aircraft.

Below, we discuss each of these information-collection requirements in more detail. As required by the Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)), the FAA has submitted these proposed information collection amendments to OMB for its review.

1. Obtaining an Unmanned Aircraft Operator Certificate With a Small UAS Rating

Summary: The FAA's statute [125] prohibits a person from serving as an airman without an airman certificate. This proposed rule would create a new airman certificate for small UAS operators to satisfy the statutory requirement. The airman certificate would be called an unmanned aircraft operator certificate with a small UAS rating, and in order to obtain it, a person would have to: (1) Take and pass an aeronautical knowledge test; and (2) submit an application for the certificate.

To take and pass an aeronautical knowledge test, a person would have to: (1) Apply to take the test at an FAA-approved Knowledge Testing Center; (2) spend time taking the test; and (3) obtain an airman knowledge test report showing that he or she passed the test. After passing a knowledge test, the person would then apply for the certificate by: (1) Filling out and submitting an application for the certificate, which would include a certification stating that the applicant is physically capable of safely operating a small UAS; and (2) attaching a copy of the airman knowledge test report to the application.

The above requirements would not result in a new collection of information, but would instead expand an existing OMB-approved collection of information that is approved under OMB control number 2120–0021. This collection of information governs information that the FAA collects to certificate pilots and flight instructors. The above requirements would increase the burden of this already-existing collection of information.

Use: The above requirements would be used by the FAA to issue airman certificates to UAS operators in order to satisfy the statutory requirement that an airman must possess an airman certificate.

Estimate of Increase in Annualized Burden (there are 7,896 unique applicants):

[125] 49 U.S.C. 44711(a)(2)(A).

			Total			Annual		
Final Rule Requirement	Pages Per Application	Applicant Time (Hours)	Total Time (Hours)	Total Number of Pages	Total Cost	Annual Time (Hours)	Annual Number of Pages	Annual Cost
Application for an Operator Certificate	1	0.25	3,862	7,896	$39,598	772	1579	$7,920
Knowledge Test Application	3	0.25	4,248	46,338	$108,928	850	9268	$21,786
Physical Capability Certification	1	0.10	1,545	7,896	$20,016	309	1579	$4,003
Knowledge Test Time	70	3.00	50,972	1,081,220	$1,307,131	10194	216244	$261,426
Airman Knowledge Test Report	1	0.50	3,948	15,446	$154,923	790	3089	$30,985

* Details may not add to row or column totals due to rounding.

2. Registering a Small Unmanned Aircraft

Summary: The FAA's statute [126] prohibits the operation of an aircraft unless the aircraft is registered. Pursuant to this statutory prohibition, this proposed rule would require small unmanned aircraft to be registered with the FAA using the current registration process found in 14 CFR part 47. In order to register a small unmanned aircraft with the FAA, the aircraft's owner would have to submit to the FAA an Aircraft Registration Application providing information about the aircraft and contact information for the aircraft owner. This registration would need to be renewed every three years.

The above requirements would not result in a new collection of information, but would instead expand an existing OMB-approved collection of information that is approved under OMB control number 2120–0042. This collection of information governs information that the FAA collects in order to register an aircraft. The above requirements would increase the burden of this already-existing collection of information.

Use: The above requirements would be used by the FAA to register small unmanned aircraft in order to satisfy the statutory requirement that an aircraft must be registered in order to operate.

Estimate of Increase in Annualized Burden:

			Total			Annual		
Final Rule Requirement	Pages Per Application	Applicant Time (Hours)	Total Time (Hours)	Total Number of Pages	Total Cost	Annual Time (Hours)	Annual Number of Pages	Annual Cost
Aircraft Registration Application	1	0.5	8,571	17,142	$220,464	1,714	3,428	$44,093

* Details may not add to row or column totals due to rounding.

3. Accident Reporting

Summary: To ensure proper oversight of small UAS operations, this proposed rule would require a small UAS operator to report to the FAA any small UAS operation that results in: (1) Any injury to a person; or (2) damage to property other than the small unmanned aircraft. After receiving this report, the FAA may conduct further investigation to determine whether any FAA regulations were violated. This proposed requirement would constitute a new collection of information. However, the FAA emphasizes that this proposed reporting requirement would be triggered only during operations that result in injury to a person or property damage.

Use: The above requirements would be used by the FAA to ensure proper oversight of small UAS operations. A report of an accident that resulted in an injury to a person or property damage may serve to initiate an FAA investigation into whether FAA regulations were violated.

Annualized Burden Estimate:

There is one page of paperwork associated with reporting an accident. The FAA calculated the probability of an accident by dividing the accident rate for general aviation pilots by the total number of hours and estimated that an accident would occur .001% of the time. Applying .001% to the small UAS in the analysis interval shows that the probability of an accident where property damage, injury, or death occurs is negligible; therefore the FAA estimates that there are no costs for this provision.

4. Total Annualized Burden Estimate

The total annualized burden estimate of the information-collection requirements associated with this proposed rule is as follows:

[126] 49 U.S.C. 44101.

Final Rule Requirement	Total Number of Pages	Total Cost	Annual Cost
Operator Certificate	1,158,796	$1,630,596	$326,119
Aircraft Registration	17,142	$220,464	$44,093
Accident Reporting	Negligible	Negligible	Negligible

* Details may not add to row or column totals due to rounding.

The agency is soliciting comments to—

- Evaluate whether the proposed information requirement is necessary for the proper performance of the functions of the agency, including whether the information will have practical utility;
- Evaluate the accuracy of the agency's estimate of the burden;
- Enhance the quality, utility, and clarity of the information to be collected; and
- Minimize the burden of collecting information on those who are to respond, including by using appropriate automated, electronic, mechanical, or other technological collection techniques or other forms of information technology.

Individuals and organizations may send comments on the information collection requirement to the address listed in the **ADDRESSES** section at the beginning of this preamble by April 24, 2015. Comments also should be submitted to the Office of Management and Budget, Office of Information and Regulatory Affairs, Attention: Desk Officer for FAA, New Executive Office Building, Room 10202, 725 17th Street NW., Washington, DC 20053.

F. International Compatibility and Cooperation

In keeping with U.S. obligations under the Convention on International Civil Aviation, it is FAA policy to conform to International Civil Aviation Organization (ICAO) Standards and Recommended Practices to the maximum extent practicable. The FAA has determined that there are no ICAO Standards and Recommended Practices that correspond to these proposed regulations.

Additionally, Executive Order 13609, Promoting International Regulatory Cooperation, promotes international regulatory cooperation to meet shared challenges involving health, safety, labor, security, environmental, and other issues and to reduce, eliminate, or prevent unnecessary differences in regulatory requirements. The FAA has analyzed this action under the policies and agency responsibilities of Executive Order 13609, and has determined that this action would have no effect on international regulatory cooperation.

G. Environmental Analysis

FAA Order 1050.1E identifies FAA actions that are categorically excluded from preparation of an environmental assessment or environmental impact statement under the National Environmental Policy Act in the absence of extraordinary circumstances. The FAA has determined this rulemaking action qualifies for the categorical exclusion identified in paragraph 312f and involves no extraordinary circumstances.

H. Regulations Affecting Intrastate Aviation in Alaska

Section 1205 of the FAA Reauthorization Act of 1996 (110 Stat. 3213) requires the Administrator, when modifying 14 CFR regulations in a manner affecting intrastate aviation in Alaska, to consider the extent to which Alaska is not served by transportation modes other than aviation, and to establish appropriate regulatory distinctions. Because this proposed rule would limit small unmanned aircraft operations to daylight hours only, it could, if adopted, affect intrastate aviation in Alaska. The FAA, therefore, specifically requests comments on whether there is justification for applying the proposed rule differently in intrastate operations in Alaska.

V. Executive Order Determinations

A. Executive Order 13132, Federalism

The FAA has analyzed this proposed rule under the principles and criteria of Executive Order 13132, Federalism. The agency has determined that this action would not have a substantial direct effect on the States, or the relationship between the Federal Government and the States, or on the distribution of power and responsibilities among the various levels of government, and, therefore, would not have Federalism implications.

B. Executive Order 13211, Regulations That Significantly Affect Energy Supply, Distribution, or Use

The FAA analyzed this proposed rule under Executive Order 13211, Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use (May 18, 2001). The agency has determined that it would not be a ''significant energy action'' under the executive order and would not be likely to have a significant adverse effect on the supply, distribution, or use of energy.

VI. Additional Information

A. Comments Invited

The FAA invites interested persons to participate in this rulemaking by submitting written comments, data, or views. The agency also invites comments relating to the economic, environmental, energy, or federalism impacts that might result from adopting the proposals in this document. The most helpful comments reference a specific portion of the proposal, explain the reason for any recommended change, and include supporting data. To ensure the docket does not contain duplicate comments, commenters should send only one copy of written comments, or if comments are filed electronically, commenters should submit only one time.

The FAA will file in the docket all comments it receives, as well as a report summarizing each substantive public contact with FAA personnel concerning this proposed rulemaking. Before acting on this proposal, the FAA will consider all comments it receives on or before the closing date for comments. The FAA will consider comments filed after the comment period has closed if it is possible to do so without incurring expense or delay. The agency may change this proposal in light of the comments it receives.

B. Availability of Rulemaking Documents

An electronic copy of rulemaking documents may be obtained from the Internet by—

1. Searching the Federal eRulemaking Portal (*http://www.regulations.gov*);

2. Visiting the FAA's Regulations and Policies Web page at *http://www.faa.gov/regulations_policies* or

3. Accessing the Government Printing Office's Web page at *http://www.gpo.gov/fdsys/*.

Copies may also be obtained by sending a request to the Federal Aviation Administration, Office of Rulemaking, ARM–1, 800 Independence Avenue SW., Washington, DC 20591, or by calling (202) 267–9680. Commenters must identify the docket or notice number of this rulemaking.

All documents the FAA considered in developing this proposed rule, including economic analyses and technical reports, may be accessed from the Internet through the Federal eRulemaking Portal referenced in item (1) above.

List of Subjects

14 CFR Part 21

Aircraft, Aviation safety, Recording and recordkeeping requirements.

14 CFR Part 43

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

14 CFR Part 45

Aircraft, Signs and symbols.

14 CFR Part 47

Aircraft, Reporting and recordkeeping requirements.

14 CFR Part 61

Aircraft, Airmen, Alcohol abuse, Aviation safety, Drug abuse, Recreation and recreation areas, Reporting and recordkeeping requirements, Security measures, Teachers.

14 CFR Part 91

Air traffic control, Aircraft, Airmen, Airports, Aviation safety, Reporting and recordkeeping requirements.

14 CFR Part 101

Aircraft, Aviation Safety.

14 CFR Part 107

Aircraft, Airmen, Aviation safety, Reporting and recordkeeping requirements, Security measures, Signs and symbols, Small unmanned aircraft, Unmanned aircraft.

14 CFR Part 183

Airmen, Authority delegations (Government agencies).

The Proposed Amendment

In consideration of the foregoing, the Federal Aviation Administration proposes to amend chapter I of title 14, Code of Federal Regulations as follows:

PART 21—CERTIFICATION PROCEDURES FOR PRODUCTS AND PARTS

■ 1. The authority citation for part 21 is revised to read as follows:

Authority: 42 U.S.C. 7572; 49 U.S.C. 106(f), 106(g), 40101 note, 40105, 40113, 44701–44702, 44704, 44707, 44709, 44711, 44713, 44715, 45303; Sec. 333 of Pub. L. 112–95.

■ 2. Amend § 21.1 by revising paragraph (a) introductory text to read as follows:

§ 21.1 Applicability and definitions.

(a) Except for aircraft subject to the provisions of part 107 of this chapter, this part prescribes—

* * * * *

PART 43—MAINTENANCE, PREVENTIVE MAINTENANCE, REBUILDING, AND ALTERATION

■ 3. The authority citation for part 43 is revised to read as follows:

Authority: 49 U.S.C. 106(f), 106(g), 40113, 44701, 44703, 44705, 44707, 44711, 44713, 44717, 44725.

■ 4. Amend § 43.1 by revising paragraph (b) to read as follows:

§ 43.1 Applicability.

* * * * *

(b) This part does not apply to—

(1) Any aircraft for which the FAA has issued an experimental certificate, unless the FAA has previously issued a different kind of airworthiness certificate for that aircraft;

(2) Any aircraft for which the FAA has issued an experimental certificate under the provisions of § 21.191(i)(3) of this chapter, and the aircraft was previously issued a special airworthiness certificate in the light-sport category under the provisions of § 21.190 of this chapter; or

(3) Any aircraft subject to the provisions of part 107 of this chapter.

* * * * *

PART 45—IDENTIFICATION AND REGISTRATION MARKING

■ 5. The authority citation for part 45 is revised to read as follows:

Authority: 49 U.S.C. 106(f), 106(g), 40103, 40113–40114, 44101–44105, 44107–44111, 44504, 44701, 44708–44709, 44711–44713, 44725, 45302–45303, 46104, 46304, 46306, 47122.

■ 6. Add § 45.9 to subpart B to read as follows:

§ 45.9 Small unmanned aircraft systems.

Notwithstanding any other provision of this part, this subpart does not apply to aircraft subject to part 107 of this chapter.

PART 47—AIRCRAFT REGISTRATION

■ 7. The authority citation for part 47 is revised to read as follows:

Authority: 4 U.S.T. 1830; Pub. L. 108–297, 118 Stat. 1095 (49 U.S.C. 40101 note, 49 U.S.C. 44101 note); 49 U.S.C. 106(f), 106(g), 40113–40114, 44101–44108, 44110–44113, 44703–44704, 44713, 45302, 46104, 46301.

■ 8. Amend § 47.15 by revising paragraph (a) introductory text to read as follows:

§ 47.15 Registration number.

(a) *Number required.* An applicant for aircraft registration must place a U.S. registration number (registration mark) on the Aircraft Registration Application, AC Form 8050–1, and on any evidence submitted with the application. There is no charge for the assignment of numbers provided in this paragraph. This paragraph does not apply to an aircraft manufacturer who applies for a group of U.S. registration numbers under paragraph (c) of this section; a person who applies for a special registration number under paragraphs (d) through (f) of this section; a holder of a Dealer's Aircraft Registration Certificate, AC Form 8050–6, who applies for a temporary registration number under § 47.16; or an owner of a small unmanned aircraft weighing less than 55 pounds that has not previously been registered anywhere.

* * * * *

PART 61—CERTIFICATION: PILOTS, FLIGHT INSTRUCTORS, AND GROUND INSTRUCTORS

■ 9. The authority citation for part 61 continues to read as follows:

Authority: 49 U.S.C. 106(f), 106(g), 40113, 44701–44703, 44707, 44709–44711, 45102–45103, 45301–45302.

■ 10. Amend § 61.1 by revising paragraph (a) introductory text to read as follows:

§ 61.1 Applicability and definitions.

(a) Except as provided in part 107 of this chapter, this part prescribes:

* * * * *

■ 11. Add § 61.8 to read as follows:

§ 61.8 Inapplicability of unmanned aircraft operations.

Any action conducted pursuant to part 107 of this chapter or Subpart E of part 101 of this chapter cannot be used to meet the requirements of this part.

■ 12. Revise § 61.193 to read as follows:

§ 61.193 Flight instructor privileges.

(a) A person who holds a flight instructor certificate is authorized within the limitations of that person's flight instructor certificate and ratings to train and issue endorsements that are required for:

(1) A student pilot certificate;

(2) A pilot certificate;

(3) A flight instructor certificate;

(4) A ground instructor certificate;

(5) An aircraft rating;

(6) An instrument rating;

(7) A flight review, operating privilege, or recency of experience requirement of this part;

(8) A practical test; and

(9) A knowledge test.

(b) A person who holds a flight instructor certificate is authorized to accept an application for an unmanned aircraft operator certificate with a small UAS rating and verify the identity of the applicant in a form and manner acceptable to the Administrator.

■ 13. Revise § 61.413 to read as follows:

§ 61.413 What are the privileges of my flight instructor certificate with a sport pilot rating?

(a) If you hold a flight instructor certificate with a sport pilot rating, you are authorized, within the limits of your certificate and rating, to provide training and endorsements that are required for, and relate to—

(1) A student pilot seeking a sport pilot certificate;

(2) A sport pilot certificate;

(3) A flight instructor certificate with a sport pilot rating;

(4) A powered parachute or weight-shift-control aircraft rating;

(5) Sport pilot privileges;

(6) A flight review or operating privilege for a sport pilot;

(7) A practical test for a sport pilot certificate, a private pilot certificate with a powered parachute or weight-shift-control aircraft rating or a flight instructor certificate with a sport pilot rating;

(8) A knowledge test for a sport pilot certificate, a private pilot certificate with a powered parachute or weight-shift-control aircraft rating or a flight instructor certificate with a sport pilot rating; and

(9) A proficiency check for an additional category or class privilege for a sport pilot certificate or a flight instructor certificate with a sport pilot rating.

(b) A person who holds a flight instructor certificate with a sport pilot rating is authorized to accept an application for an unmanned aircraft operator certificate with a small UAS rating and verify the identity of the applicant in a form and manner acceptable to the Administrator.

PART 91—GENERAL OPERATING AND FLIGHT RULES

■ 14. The authority citation for part 91 continues to read as follows:

Authority: 49 U.S.C. 106(f), 106(g), 1155, 40101, 40103, 40105, 40113, 40120, 44101, 44111, 44701, 44704, 44709, 44711, 44712, 44715, 44716, 44717, 44722, 46306, 46315, 46316, 46504, 46506–46507, 47122, 47508, 47528–47531, 47534, articles 12 and 29 of the Convention on International Civil Aviation (61 Stat. 1180), (126 Stat. 11).

■ 15. Amend § 91.1 by revising paragraph (a) introductory text and adding paragraph (e) to read as follows:

§ 91.1 Applicability.

(a) Except as provided in paragraphs (b), (c), and (e) of this section and §§ 91.701 and 91.703, this part prescribes rules governing the operation of aircraft within the United States, including the waters within 3 nautical miles of the U.S. coast.

* * * * *

(e) Except as provided in §§ 107.27, 107.47, 107.57, and 107.59 of this chapter, this part does not apply to any aircraft or vehicle governed by part 103 of this chapter, part 107 of this chapter, or subparts B, C, or D of part 101 of this chapter.

PART 101—MOORED BALLOONS, KITES, AMATEUR ROCKETS AND UNMANNED FREE BALLOONS

■ 16. The authority citation for part 101 is revised to read as follows:

Authority: 49 U.S.C. 106(f), 106(g), 40101 note, 40103, 40113–40114, 45302, 44502, 44514, 44701–44702, 44721, 46308, Sec. 336(b), Pub. L. 112–95.

■ 17. Amend § 101.1 by adding paragraph (a)(5) to read as follows:

§ 101.1 Applicability.

(a) * * *

(5) Any model aircraft that meets the conditions specified in § 101.41. For purposes of this part, a model aircraft is an unmanned aircraft that is:

(i) Capable of sustained flight in the atmosphere;

(ii) Flown within visual line of sight of the person operating the aircraft; and

(iii) Flown for hobby or recreational purposes.

* * * * *

■ 18. Add subpart E, consisting of §§ 101.41 and 101.43, to read as follows:

Subpart E—Special Rule for Model Aircraft

§ 101.41 Applicability.

This subpart prescribes the rules governing the operation of a model aircraft that meets all of the following conditions as set forth in section 336 of Public Law 112–95:

(a) The aircraft is flown strictly for hobby or recreational use;

(b) The aircraft is operated in accordance with a community-based set of safety guidelines and within the programming of a nationwide community-based organization;

(c) The aircraft is limited to not more than 55 pounds unless otherwise certified through a design, construction, inspection, flight test, and operational safety program administered by a community-based organization;

(d) The aircraft is operated in a manner that does not interfere with and gives way to any manned aircraft; and

(e) When flown within 5 miles of an airport, the operator of the aircraft provides the airport operator and the airport air traffic control tower (when an air traffic facility is located at the airport) with prior notice of the operation.

§ 101.43 Endangering the safety of the National Airspace System.

No person may operate model aircraft so as to endanger the safety of the national airspace system.

■ 19. Add part 107 to read as follows:

PART 107—SMALL UNMANNED AIRCRAFT SYSTEMS

Subpart A—General

Sec.

Subpart B—Operating Rules

Authority: 49 U.S.C. 106(f), 40101 note, 40103(b), 44701(a)(5); Sec. 333 of Pub. L. 112–95.

Subpart A—General

§ 107.1 Applicability.

(a) Except as provided in paragraph (b) of this section, this part applies to the registration, airman certification, and operation of civil small unmanned aircraft systems within the United States.

(b) This part does not apply to the following:

(1) Air carrier operations;

(2) Any aircraft subject to the provisions of part 101 of this chapter;

(3) Any aircraft conducting an external load operation;

(4) Any aircraft towing another aircraft or object; or

(5) Any aircraft that does not meet the criteria specified in § 47.3 of this chapter.

§ 107.3 Definitions.

The following definitions apply to this part. If there is a conflict between the definitions of this part and definitions specified in § 1.1 of this chapter, the definitions in this part control for purposes of this part:

Control station means an interface used by the operator to control the flight path of the small unmanned aircraft.

Corrective lenses means spectacles or contact lenses.

Operator means a person who manipulates the flight controls of a small unmanned aircraft system.

Small unmanned aircraft means an unmanned aircraft weighing less than 55 pounds including everything that is on board the aircraft.

Small unmanned aircraft system (small UAS) means a small unmanned aircraft and its associated elements (including communication links and the components that control the small unmanned aircraft) that are required for the safe and efficient operation of the small unmanned aircraft in the national airspace system.

Unmanned aircraft means an aircraft operated without the possibility of direct human intervention from within or on the aircraft.

Visual observer means a person who assists the small unmanned aircraft operator to see and avoid other air traffic or objects aloft or on the ground.

§ 107.5 Falsification, reproduction or alteration.

(a) No person may make or cause to be made—

(1) Any fraudulent or intentionally false record or report that is required to be made, kept, or used to show compliance with any requirement under this part.

(2) Any reproduction or alteration, for fraudulent purpose, of any certificate, rating, authorization, record or report under this part.

(b) The commission by any person of an act prohibited under paragraph (a) of this section is a basis for denying an application for certificate, or suspending or revoking the applicable certificate or waiver issued by the Administrator under this part and held by that person.

§ 107.7 Inspection, testing, and demonstration of compliance.

(a) An operator or owner of a small unmanned aircraft system must, upon request, make available to the Administrator:

(1) The operator's unmanned aircraft operator certificate with a small UAS rating;

(2) The certificate of aircraft registration for the small unmanned aircraft system being operated; and

(3) Any other document, record, or report required to be kept by an operator or owner of a small unmanned aircraft system under the regulations of this chapter.

(b) The operator, visual observer, or owner of a small unmanned aircraft system must, upon request, allow the Administrator to make any test or inspection of the small unmanned aircraft system, the operator, and, if applicable, the visual observer to determine compliance with this part.

§ 107.9 Accident reporting.

No later than 10 days after an operation that meets the criteria of either paragraph (a) or (b) of this section, an operator must report to the nearest Federal Aviation Administration Flight Standards District Office any operation of the small unmanned aircraft that involves the following:

(a) Any injury to any person; or

(b) Damage to any property, other than the small unmanned aircraft.

Subpart B—Operating Rules

§ 107.11 Applicability.

This subpart applies to the operation of all civil small unmanned aircraft systems to which this part applies.

§ 107.13 Registration, certification, and airworthiness directives.

No person may operate a civil small unmanned aircraft system for purposes of flight unless:

(a) That person has an unmanned aircraft operator certificate with a small UAS rating issued pursuant to subpart C of this part and satisfies the requirements of § 107.65;

(b) The small unmanned aircraft being operated has been registered with the FAA pursuant to subpart D of this part;

(c) The small unmanned aircraft being operated displays its registration number in the manner specified in subpart D of this part; and

(d) The owner or operator of the small unmanned aircraft system complies with all applicable airworthiness directives.

§ 107.15 Civil small unmanned aircraft system airworthiness.

(a) No person may operate a civil small unmanned aircraft system unless it is in a condition for safe operation. This condition must be determined during the preflight check required under § 107.49 of this part.

(b) The operator must discontinue the flight when he or she knows or has reason to know that continuing the flight would pose a hazard to other aircraft, people, or property.

§ 107.17 Medical condition.

No person may act as an operator or visual observer if he or she knows or has reason to know that he or she has a physical or mental condition that would interfere with the safe operation of a small unmanned aircraft system.

§ 107.19 Responsibility of the operator.

(a) The operator is directly responsible for, and is the final authority as to the operation of the small unmanned aircraft system.

(b) The operator must ensure that the small unmanned aircraft will pose no undue hazard to other aircraft, people, or property in the event of a loss of control of the aircraft for any reason.

§ 107.21 Maintenance and inspection.

An operator must:

(a) Maintain the system in a condition for safe operation; and

(b) Inspect the small unmanned aircraft system prior to flight to determine that the system it is in a condition for safe operation.

§ 107.23 Hazardous operation.

No person may:

(a) Operate a small unmanned aircraft system in a careless or reckless manner so as to endanger the life or property of another; or

(b) Allow an object to be dropped from a small unmanned aircraft if such action endangers the life or property of another.

§ 107.25 Operation from a moving vehicle or aircraft.

No person may operate a small unmanned aircraft system—

(a) From a moving aircraft; or

(b) From a moving vehicle unless that vehicle is moving on water.

§ 107.27 Alcohol or drugs.

A person acting as an operator or as a visual observer must comply with the provisions of §§ 91.17 and 91.19 of this chapter.

§ 107.29 Daylight operation.

No person may operate a small unmanned aircraft system except between the hours of official sunrise and sunset.

§ 107.31 Visual line of sight aircraft operation.

With vision that is unaided by any device other than corrective lenses, the operator or visual observer must be able to see the unmanned aircraft throughout the entire flight in order to:

(a) Know the unmanned aircraft's location;

(b) Determine the unmanned aircraft's attitude, altitude, and direction;

(c) Observe the airspace for other air traffic or hazards; and

(d) Determine that the unmanned aircraft does not endanger the life or property of another.

§ 107.33 Visual observer.

If a visual observer is used during the aircraft operation, all of the following requirements must be met:

(a) The operator and the visual observer must maintain effective communication with each other at all times.

(b) The operator must ensure that the visual observer is able to see the unmanned aircraft in the manner specified in §§ 107.31 and 107.37.

(c) At all times during flight, the small unmanned aircraft must remain close enough to the operator for the operator to be capable of seeing the aircraft with vision unaided by any device other than corrective lenses.

(d) The operator and the visual observer must coordinate to do the following:

(1) Scan the airspace where the small unmanned aircraft is operating for any potential collision hazard; and

(2) Maintain awareness of the position of the small unmanned aircraft through direct visual observation.

§ 107.35 Operation of multiple small unmanned aircraft systems.

A person may not act as an operator or visual observer in the operation of more than one unmanned aircraft system at the same time.

§ 107.37 Operation near aircraft; right-of-way rules.

(a) Each operator must maintain awareness so as to see and avoid other aircraft and vehicles and must yield the right-of-way to all aircraft, airborne vehicles, and launch and reentry vehicles.

(1) In order to maintain awareness so as to see other aircraft and vehicles, either the operator or a visual observer must, at each point of the small unmanned aircraft's flight, satisfy the criteria specified in § 107.31.

(2) Yielding the right-of-way means that the small unmanned aircraft must give way to the aircraft or vehicle and may not pass over, under, or ahead of it unless well clear.

(b) No person may operate a small unmanned aircraft so close to another aircraft as to create a collision hazard.

§ 107.39 Operation over people.

No person may operate a small unmanned aircraft over a human being who is:

(a) Not directly participating in the operation of the small unmanned aircraft; or

(b) Not located under a covered structure that can provide reasonable protection from a falling small unmanned aircraft.

§ 107.41 Operation in certain airspace.

(a) A small unmanned aircraft may not operate in Class A airspace.

(b) A small unmanned aircraft may not operate in Class B, Class C, or Class D airspace or within the lateral boundaries of the surface area of Class E airspace designated for an airport unless the operator has prior authorization from the Air Traffic Control (ATC) facility having jurisdiction over that airspace.

§ 107.45 Operation in prohibited or restricted areas.

No person may operate a small unmanned aircraft in prohibited or restricted areas unless that person has permission from the using or controlling agency, as appropriate.

§ 107.47 Flight restrictions in the proximity of certain areas designated by notice to airmen.

No person may operate a small unmanned aircraft in areas designated in a Notice to Airmen under §§ 91.137 through 91.145, or § 99.7 of this chapter, unless authorized by:

(a) Air Traffic Control (ATC); or

(b) A Certificate of Waiver or Authorization issued by the FAA.

§ 107.49 Preflight familiarization, inspection, and actions for aircraft operation.

(a) Prior to flight, the operator must:

(1) Assess the operating environment, considering risks to persons and property in the immediate vicinity both on the surface and in the air. This assessment must include:

(i) Local weather conditions;

(ii) Local airspace and any flight restrictions;

(iii) The location of persons and property on the surface; and

(iv) Other ground hazards.

(2) Ensure that all persons involved in the small unmanned aircraft operation receive a briefing that includes operating conditions, emergency procedures, contingency procedures, roles and responsibilities, and potential hazards;

(3) Ensure that all links between ground station and the small unmanned aircraft are working properly; and

(4) If the small unmanned aircraft is powered, ensure that there is enough available power for the small unmanned aircraft system to operate for the intended operational time and to operate after that for at least five minutes.

(b) Each person involved in the operation must perform the duties assigned by the operator.

§ 107.51 Operating limitations for small unmanned aircraft.

An operator must comply with all of the following operating limitations when operating a small unmanned aircraft system:

(a) The airspeed of the small unmanned aircraft may not exceed 87 knots (100 miles per hour) calibrated airspeed at full power in level flight;

(b) The altitude of the small unmanned aircraft cannot be higher than 500 feet (150 meters) above ground level;

(c) The minimum flight visibility, as observed from the location of the ground control station must be no less than 3 statute miles (5 kilometers); and

(d) The minimum distance of the small unmanned aircraft from clouds must be no less than:

(1) 500 feet (150 meters) below the cloud; and

(2) 2,000 feet (600 meters) horizontally away from the cloud.

Subpart C—Operator Certification

§ 107.53 Applicability.

This subpart prescribes the requirements for issuing an unmanned aircraft operator certificate with a small UAS rating.

§ 107.57 Offenses involving alcohol or drugs.

(a) A conviction for the violation of any Federal or State statute relating to the growing, processing, manufacture, sale, disposition, possession, transportation, or importation of narcotic drugs, marijuana, or depressant or stimulant drugs or substances is grounds for:

(1) Denial of an application for an unmanned aircraft operator certificate with a small UAS rating for a period of up to 1 year after the date of final conviction; or

(2) Suspension or revocation of an unmanned aircraft operator certificate with a small UAS rating.

(b) Committing an act prohibited by § 91.17(a) or § 91.19(a) of this chapter is grounds for:

(1) Denial of an application for an unmanned aircraft operator certificate with a small UAS rating for a period of up to 1 year after the date of that act; or

(2) Suspension or revocation of an unmanned aircraft operator certificate with a small UAS rating.

§ 107.59 Refusal to submit to an alcohol test or to furnish test results.

A refusal to submit to a test to indicate the percentage by weight of alcohol in the blood, when requested by a law enforcement officer in accordance with § 91.17(c) of this chapter, or a refusal to furnish or authorize the release of the test results requested by the Administrator in accordance with § 91.17(c) or (d) of this chapter, is grounds for:

(a) Denial of an application for an unmanned aircraft operator certificate with a small UAS rating for a period of up to 1 year after the date of that refusal; or

(b) Suspension or revocation of an unmanned aircraft operator certificate with a small UAS rating.

§ 107.61 Eligibility.

Subject to the provisions of §§ 107.57 and 107.59, in order to be eligible for an unmanned aircraft operator certificate with a small UAS rating under this subpart, a person must:

(a) Be at least 17 years of age;

(b) Be able to read, speak, write, and understand the English language. If the applicant is unable to meet one of these requirements due to medical reasons, the FAA may place such operating limitations on that applicant's certificate as are necessary for the safe operation of the small unmanned aircraft;

(c) Pass an initial aeronautical knowledge test covering the areas of knowledge specified in § 107.73(a); and

(d) Not know or have reason to know that he or she has a physical or mental condition that would interfere with the safe operation of a small unmanned aircraft system.

§ 107.63 Issuance of an unmanned aircraft operator certificate with a small UAS rating.

An applicant for an unmanned aircraft operator certificate with a small UAS rating under this subpart must make the application in a form and manner acceptable to the Administrator.

(a) The application must include:

(1) An airman knowledge test report showing that the applicant passed an initial aeronautical knowledge test, or recurrent aeronautical knowledge test for those individuals that satisfy the requirements of § 107.75; and

(2) A certification signed by the applicant stating that the applicant does not know or have reason to know that he or she has a physical or mental condition that would interfere with the safe operation of a small unmanned aircraft system.

(b) The application must be submitted to a Flight Standards District Office, a designated pilot examiner, an airman certification representative for a pilot school, a certified flight instructor, or other person authorized by the Administrator. The person accepting the application submission must verify the identity of the applicant in a manner acceptable to the Administrator.

§ 107.65 Aeronautical knowledge recency.

A person may not operate a small unmanned aircraft system unless that person has completed one of the following, within the previous 24 calendar months:

(a) Passed an initial aeronautical knowledge test covering the areas of knowledge specified in § 107.73(a); or

(b) Passed a recurrent aeronautical knowledge test covering the areas of knowledge specified in § 107.73(b).

§ 107.67 Knowledge tests: General procedures and passing grades.

(a) Knowledge tests prescribed by or under this part are given at times and places, and by persons designated by the Administrator.

(b) An applicant for a knowledge test must have proper identification at the time of application that contains the applicant's:

(1) Photograph;

(2) Signature;

(3) Date of birth, which shows the applicant meets or will meet the age requirements of this part for the certificate sought before the expiration date of the airman knowledge test report; and

(4) If the permanent mailing address is a post office box number, then the applicant must provide a current residential address.

(c) The minimum passing grade for the knowledge test will be specified by the Administrator.

§ 107.69 Knowledge tests: Cheating or other unauthorized conduct.

(a) An applicant for a knowledge test may not:

(1) Copy or intentionally remove any knowledge test;

(2) Give to another applicant or receive from another applicant any part or copy of a knowledge test;

(3) Give assistance on, or receive assistance on, a knowledge test during the period that test is being given;

(4) Take any part of a knowledge test on behalf of another person;

(5) Be represented by, or represent, another person for a knowledge test;

(6) Use any material or aid during the period that the test is being given, unless specifically authorized to do so by the Administrator; and

(7) Intentionally cause, assist, or participate in any act prohibited by this paragraph.

(b) An applicant who the Administrator finds has committed an act prohibited by paragraph (a) of this section is prohibited, for 1 year after the date of committing that act, from:

(1) Applying for any certificate, rating, or authorization issued under this chapter; and

(2) Applying for and taking any test under this chapter.

(c) Any certificate or rating held by an applicant may be suspended or revoked if the Administrator finds that person has committed an act prohibited by paragraph (a) of this section.

§ 107.71 Retesting after failure.

An applicant for a knowledge test who fails that test may not reapply for the test for 14 calendar days after failing the test.

§ 107.73 Initial and recurrent knowledge tests.

(a) An initial aeronautical knowledge test covers the following areas of knowledge:

(1) Applicable regulations relating to small unmanned aircraft system rating privileges, limitations, and flight operation;

(2) Airspace classification and operating requirements, obstacle clearance requirements, and flight restrictions affecting small unmanned aircraft operation;

(3) Official sources of weather and effects of weather on small unmanned aircraft performance;

(4) Small unmanned aircraft system loading and performance;

(5) Emergency procedures;

(6) Crew resource management;

(7) Radio communication procedures;

(8) Determining the performance of small unmanned aircraft;

(9) Physiological effects of drugs and alcohol;

(10) Aeronautical decision-making and judgment; and

(11) Airport operations.

(b) A recurrent aeronautical knowledge test covers the following areas of knowledge:

(1) Applicable regulations relating to small unmanned aircraft system rating privileges, limitations, and flight operation;

(2) Airspace classification and operating requirements, obstacle clearance requirements, and flight restrictions affecting small unmanned aircraft operation;

(3) Official sources of weather;

(4) Emergency procedures;

(5) Crew resource management;

(6) Aeronautical decision-making and judgment; and

(7) Airport operations.

§ 107.75 Military pilots or former military pilots.

(a) *General.* Except for a person who has been removed from unmanned aircraft flying status for lack of proficiency or because of a disciplinary action involving any aircraft operation, a U.S. military unmanned aircraft pilot or operator or former U.S. military unmanned aircraft pilot or operator who meets the requirements of this section may apply, on the basis of his or her U.S. military unmanned aircraft pilot or operator qualifications, for an unmanned aircraft operator certificate with small UAS rating issued under this part.

(b) *Military unmanned aircraft pilots or operators and former military unmanned aircraft pilots or operators in the U.S. Armed Forces.* A person who qualifies as a U.S. military unmanned aircraft pilot or operator or former U.S. military unmanned aircraft pilot or operator may apply for an unmanned aircraft operator certificate with a small UAS rating if that person—

(1) Passes a recurrent aeronautical knowledge test covering the areas of knowledge specified in § 107.73(b); and

(2) Presents evidentiary documents that show:

(i) The person's status in the U.S. Armed Forces;

(ii) That the person is or was a U.S. military unmanned aircraft pilot or operator.

§ 107.77 Change of name or address.

(a) *Change of Name.* An application to change the name on a certificate issued under this subpart must be accompanied by the applicant's:

(1) Operator certificate; and

(2) A copy of the marriage license, court order, or other document verifying the name change.

(b) The documents in paragraph (a) of this section will be returned to the applicant after inspection.

(c) *Change of address.* The holder of an unmanned aircraft operator certificate issued under this subpart who has made a change in permanent mailing address may not, after 30 days from that date, exercise the privileges of the certificate unless the holder has notified the FAA of the change in address using one of the following methods:

(1) By letter to the FAA Airman Certification Branch, P.O. Box 25082, Oklahoma City, OK 73125 providing the new permanent mailing address, or if the permanent mailing address includes a post office box number, then the holder's current residential address; or

(2) By using the FAA Web site portal at *www.faa.gov* providing the new permanent mailing address, or if the permanent mailing address includes a post office box number, then the holder's current residential address.

§ 107.79 Voluntary surrender of certificate.

(a) The holder of a certificate issued under this subpart may voluntarily surrender it for cancellation.

(b) Any request made under paragraph (a) of this section must include the following signed statement or its equivalent: ''I voluntarily surrender my unmanned aircraft operator certificate with a small UAS rating for cancellation. This request is made for my own reasons, with full knowledge that my certificate will not be reissued to me unless I again complete the requirements specified in §§ 107.61 and 107.63.''

Subpart D—Small Unmanned Aircraft Registration and Identification

§ 107.87 Applicability.

This subpart prescribes the rules governing the registration and identification of all civil small unmanned aircraft to which this part applies.

§ 107.89 Registration and identification.

(a) All small unmanned aircraft must be registered in accordance with part 47 of this chapter.

(b) All small unmanned aircraft must display their nationality and registration marks in accordance with the requirements of subpart C of part 45 of this chapter.

PART 183—REPRESENTATIVES OF THE ADMINISTRATOR

■ 20. The authority citation for part 183 is revised to read as follows:

Authority: 31 U.S.C. 9701; 49 U.S.C. 106(f), 106(g), 40113, 44702, 45303.

■ 21. Amend § 183.23 by revising paragraphs (b) and (c) and adding paragraph (d) to read as follows:

§ 183.23 Pilot examiners.

* * * * *

(b) Under the general supervision of the appropriate local Flight Standards Inspector, conduct those tests;

(c) In the discretion of the appropriate local Flight Standards Inspector, issue temporary pilot certificates and ratings to qualified applicants; and

(d) Accept an application for an unmanned aircraft operator certificate with a small UAS rating and verify the identity of the applicant in a form and manner acceptable to the Administrator.

Issued under the authority provided by 49 U.S.C. 106(f), 40101 note; and Sec. 333 of

Public Law 112–95, in Washington, DC, on February 15, 2015.

Anthony R. Foxx,

Secretary of Transportation.

Michael P. Huerta,

Administrator.

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