



Department
of Transportation

Aviation Safety

800 Independence Ave
Washington, DC 20591

In the matter of the petition of

ZIPLINE INTERNATIONAL INC.

For an exemption from §§ 61.3(a); 61.133; 91.7(a); 91.119(b) through (c); 91.121; 91.151(a); 135.25(a); 135.63(c) through (d); 135.65(d); 135.149(a); 135.161(a); 135.203(a); 135.209(a); 135.243(b)(1) through (b)(3); 135.267; 135.337(b)(1); 135.338(b)(1); 135.339(e)(3) through (e)(4); 135.340(e)(3) through (e)(4) of Title 14, Code of Federal Regulations.

Exemption No. **19111**
Regulatory Docket No. **FAA-2020-0499**

PARTIAL GRANT OF EXEMPTION

By letter dated May 8, 2020, Mr. Joseph Marshall, Director of Operations, UAS, Zipline International Inc. (“Zipline” or “the petitioner”), 333 Corey Way, South San Francisco, CA, 94080, petitioned the Federal Aviation Administration (FAA) for an exemption from §§ 61.3(a); 61.133; 91.7(a); 91.119(b) through (c); 91.121; 91.151(a); 135.25(a) 135.63(c) through (d); 135.149(a); 135.161(a); 135.203(a); 135.209(a); 135.243(b)(1) through (b)(3); 135.267; 135.337(b)(1); 135.338(b)(1); 135.339(e)(3) through (e)(4); 135.340(e)(3) through (e)(4) of Title 14, Code of Federal Regulations.

The proposed exemption, if granted, would allow the petitioner to conduct part 135 air carrier operations for commercial package delivery using an unmanned aircraft (UA) with a maximum gross takeoff weight of 49.3 pounds (including payload).

In addition to the information in the petition, the petitioner provided the FAA with further clarification of its request for relief by responding to the FAA's request for information (RFI). The petitioner also provided the FAA with information marked as proprietary that included: a Concept of Operations (CONOPS), part 135 company manuals, and other documents supporting the exemption. This additional information aided the FAA in its analysis and disposition of the requested relief.¹

Summary of the Petition and Supporting Information

In the petitioner's request for an exemption and supporting documents, it describes that its operation is designed to transport medical packages using their Sparrow² unmanned aircraft system (UAS) between a "Nest" (launch and recovery site) and one or more delivery sites. The Sparrow is a fixed-wing UA with a maximum takeoff weight of 49.3 pounds including payload that is electrically powered and capable of flight along a pre-planned route without human intervention. The petitioner describes a typical operation as follows: a trained Fulfillment Operator, who is not part of the petitioner's flight personnel, confirms, processes, and packages each order. The order is then loaded into the cargo compartment of the aircraft by a trained employee of the company called a Flight Operator (FO) and the FO places the UA on a mechanically-controlled, electrically-powered launcher. The launcher rapidly accelerates the Sparrow UA to flight speed and it ascends to a cruise height between 160 and 400 ft. above ground level (AGL) with a nominal cruise height of approximately 320 ft. AGL during transit, primarily remaining in class G airspace. The Sparrow then follows a pre-planned route to the delivery site and descends to approximately 70 ft. AGL for delivery. While still in flight, the UA opens its payload doors and releases the package containing cargo, which descends via parachute to a designated delivery location. The petitioner asserts that the Sparrow is capable of accounting for variables such as wind, before it releases its payload, which maximizes the probability that the package lands within the designated delivery zone. After delivery, the aircraft returns to cruise height and follows the pre-planned route back to the Nest for recovery using an automated arresting system, which raises up a wire as the aircraft approaches the recovery area and captures the aircraft via a tailhook. Most flights are completed within 30 minutes.

The petitioner state that its maximum planned operating altitude provides separation from manned aircraft normally operating at or above 500 ft. AGL or 1,000 ft. AGL over congested areas. Zipline is required to operate its UA at or below 400 ft. AGL, an altitude below which the petitioner states the presence of manned aircraft will be extremely infrequent, other than approach and departure landing paths at airports and known general aviation corridors that the petitioner intends to avoid. The petitioner places trained VOs as crewmembers where necessary

¹ Zipline has marked the information in these documents as proprietary. Accordingly, while these materials have not been released in their entirety, the FAA has listed the documents it relied on in its analysis of the petition in appendix A "Zipline Exemption No. 19111: Supplemental Documents Considered" and posted this list to the docket. If information summarized in this document is not contained in the petition, then it was part of the supporting materials.

² Zipline's UA undergoing type certification is called the Model Zip UAS Sparrow. The FAA shortens it in this document to the "Sparrow"

along the route, who are in constant communication with the pilot in command (PIC). The VOs immediately notify PICs that safety of flight may be compromised due to ground or flight hazards. If needed, the PIC can then issue a command appropriate for the situation, which the petitioner describes as: return to the Nest, hold in place, or even execute the parachute landing safety system known as the Paraland, which will deploy in the event a forced landing is necessary. In addition, the aircraft is constructed in a frangible design to dissipate energy and mitigate the chance of injury or damage to property on the ground.

The petitioner states that operations will occur over both private and public land. The petitioner plans to avoid areas where people typically congregate (i.e., open-air concert venues, schoolyards, etc.), using company proprietary route planning software called “Path Planner.” The petitioner describes that its Path Planner software designs routes to minimize ground risk by avoiding areas such as: airspace restrictions, keep-out zones, schools, busy highways, and places of social gathering, while considering the location of the delivery site. The Sparrow is designed to fly a pre-programmed route and is supported by a command link that allows for continual contact with the aircraft throughout the flight. The controller (i.e., PIC)³ monitors the position and health of the UA in real-time, via the petitioner’s iPad application called the “Control Mini App.” The communication and control system includes three modes: line-of-sight radio (LOS), cellular radio (cell), and satellite radio (SATCOM). This system simultaneously transmits on the LOS radio, cell, and SATCOM, during all times while in flight. The Sparrow will act upon the most recent command, based on the time the command is sent. The UA will disregard commands with identical or older time stamps. Commands initiated by the Control Mini App are always queued to be sent across all three modes, regardless of existing communication status, thus maximizing the chance of reception.

The petitioner states that since January 2016, the company has logged over 120,000 flights, with 110,000 hours of flight time, traversing a total of 7,250,000 miles. Approximately two-thirds of this flight time has been commercial delivery flights overseas, above populated areas, and beyond visual line of sight (BVLOS). Approximately one-third of the flight time is within visual line of sight (VLOS), over private property in the United States, at Zipline’s test facilities. As of March 1, 2020, the petitioner has completed over 31,000 commercial flights BVLOS over the public in Rwanda and Ghana, delivering blood and medical products. These flights have accumulated over 27,000 flight hours and 1.8 million miles traveled. In these commercial operations, the petitioner’s operations have no record of causing an injury nor significant damage to property. This experience is exclusive from the petitioner’s testing programs on private property here in the United States, which is ongoing.

The petitioner states that they established a UAS training academy in Rwanda in late 2017, which has expanded to also offer training and certification programs in Ghana. Having qualified over 150 pilots and other crewmembers in their overseas operations, the petitioner has refined its training programs and curriculum over the years to integrate learning from their experience in commercial UAS operations. With that experience, the petitioner has also established a training

³ The term “Pilot in Command (PIC)” will be used throughout this document when referring to the “Controller.”

academy in Northern California to train personnel for their proposed United States (U.S.) part 135 air carrier operations. The new academy will utilize a program and curriculum, which adapts and customizes its international operations to meet training requirements of part 135 air carrier operations.

The training program outlined in petitioner’s Operations Training Manual (OTM) consists of various phases of training which include: (1) instructor-led training (i.e. classroom instruction); (2) observation of qualified personnel (“shadowing”); (3) drills (i.e. live or computer-based simulations of part 135 operations); (4) application (flight training with the UA outside part 135 operations); and (5) practical evaluation (checkride). Petitioner states that its training program aims to provide the foundational knowledge of a commercial pilot applicable to what a part 135 PIC needs to know and consider to make aeronautical decisions. Training includes meteorology and recognition of critical weather situations and the use of aeronautical weather reports and forecasts. Crewmembers also receive training and testing on procedures for operating in the National Airspace System (NAS), crew resource management, and use of an aircraft flight manual. Abnormal and emergency procedures, use of checklists, and how to notify the National Transportation Safety Board, in the event of an accident, are also trained. These elements are continuously reinforced through flight training and checking and computer-based ground training that is representative of part 135 operations without using actual aircraft.

The petitioner asserts that their highly automated systems used in their UAS provide an equal level of safety compared to current operators within the NAS. The petitioner proposes that operations under this exemption will be overseen by PICs who possess, at least, a valid part 107 remote pilot certificate (RPC) with UAS rating and a second-class medical certificate. The petitioner requires those individuals to complete a training and qualification program, approved under the petitioner’s part 135 air carrier certificate, prior to serving in that role. The petitioner states that the PIC has final responsibility and authority for the safe operation of the flights and will oversee operational missions of the UA.

The petitioner proposes to include the following personnel⁴ in operations under this exemption. Table 1 summarizes duty positions, functions, and qualifications contained in the petitioner’s General Operations Manual (GOM) and OTM.

Table 1 - Duty Positions, Functions, and Qualifications

Duty Position	Functions	Qualifications
Controller (PIC) Note: The term, “Pilot in Command	Maintains a safe and orderly flow of the Sparrow UA into and out of the departure and arrival area (aka Nest) and actively monitors and issues	<ul style="list-style-type: none"> • Meets all requirements of FO (see below). • Holds a current RPC.

⁴ The petitioner has also established the following additional support positions: 1) The Flight Operations Lead (FO Lead) ensures flight operations at assigned Nests are conducted safely and in compliance with documented regulatory requirements, policies, and procedures. 2) The “Maintenance Manager” is responsible for the execution of all Zip and Nest maintenance at their assigned launch/recovery areas (Nest).

Duty Position	Functions	Qualifications
(PIC)” will be used throughout this document when referring to the “Controller.”	commands to all UAs operating from the departure point. The controller, when on duty, is the final authority as to the operation of the Sparrow UA.	<ul style="list-style-type: none"> • Holds at least a second-class medical certificate. • Has completed training requirements outlined in OTM. • Is a qualified maintenance technician (see below).
Flight Operator (FO)	Responsible for safe loading, assembly, launch, recovery and disassembly of the UA. Has delegated authority from the PIC to conduct preflight inspections to determine UA is in airworthy condition.	<ul style="list-style-type: none"> • Has completed FO training requirements as outlined in the OTM, • Is a qualified maintenance technician (see below).
Visual Observer (VO)	Responsible for monitoring airspace along the UA’s flight routes that are beyond the PIC’s view.	<ul style="list-style-type: none"> • Has completed VO training requirements, as outlined in the OTM. • Holds a current RPC.
Maintenance Technician	Is responsible for maintaining the UAS in a safe, airworthy, efficient and reliable condition, including assembly and disassembly of the UA.	<ul style="list-style-type: none"> • Has satisfactorily completed Zipline MTX-101 maintenance training course, as outlined in the General Maintenance Manual (GMM). • Has successfully completed the Zipline maintenance training applicable to the work or job. • Holds a valid and current FAA mechanic or repairman certificate, with the appropriate rating for the work or job performed.
Flight Operations Instructor (FOI) Note: The term “Instructor” will be used throughout this document when referring to the “Flight Operations Instructor.”	FOIs are responsible for training flight operators, controllers, and VOs. FOIs are responsible for the delivery of instructor-led training and on-the-job training for personnel receiving initial or recurrent training. FOIs will also be qualified as a PIC and FO and are expected to have mastery of assigned systems.	<ul style="list-style-type: none"> • Hold a private pilot certificate. • Hold a current part 107 certificate. • Hold a current second-class medical certificate. • Meet FO qualifications • Meet PIC (controller) qualifications

Duty Position	Functions	Qualifications
		<ul style="list-style-type: none"> • Have six months of qualified Zipline flight operations experience • Have 120 flight hours as a PIC. • Complete FOI training outlined in OTM. • Complete FAA observation.
<p>Flight Operations Evaluator (FOE)</p> <p>Note: The term “Check Pilot” will be used throughout this document when referring to the “Flight Operations Evaluator.”</p>	<p>FOEs are fully qualified and experienced FOs and PICs who are trained to conduct annual and ad hoc evaluations for FOs and PICs.</p>	<ul style="list-style-type: none"> • Meet all FOI qualifications • Complete FOE training outlined in OTM. • Receive Director of Operations Unmanned (DOU) approval. • Hold an FAA approval letter • Complete FAA observation every 24 months.

The petitioner’s operation requires a minimum of two crewmembers, including a PIC and a FO. A VO is also used when required for the flight route because the UA will travel beyond the visual line of sight of the PIC. The FO receives a pre-assembled package, delivered by a fulfillment team member. The FO follows the loading procedure in the petitioner’s company manuals. Among other tasks, this procedure includes: verifying that the package complies with the company’s hazardous materials requirements, complying with weight and balance limitations, checking that the parachute is folded correctly, and ensuring the package is in a condition that it will contain its load in the delivery process. The cargo is then loaded into the aircraft and the security of the cargo is verified by the PIC. Specifically, the PIC must verify that the contents are packed and secured in a manner that limits movement and that the package center of gravity is within +/- 0.8 inches (2 cm) of the center of the box in any direction.

Prior to launching, the Zip is assembled by a FO, who holds appropriate maintenance qualifications, and a maintenance check is completed. Once all of the operational checks and weather checks are complete, and the airspace is free of conflicting traffic, the launcher accelerates the Sparrow to flight speed using the launcher, a servo-electric mechanism. After the Sparrow has launched and is in flight, in the event of an abnormal condition, the PIC has the ability to issue one of seven commands through the Control Mini App to any individual UA or all Sparrow aircraft under the control of the PIC. Examples of those commands are:

- Return to Nest - This is used when a PIC needs to manually command the Zip to return to the Nest.
- Resume Mission - This is used to command a Zip to depart a Hold or to Turn-Around at the next available Turn-Around point and resume course to its original delivery destination(if it has not experienced a Mission Failure).

- Hold ASAP - Commands the Zip to enter into a Hold as soon as possible.
- Go to Hold - This is used when a PIC needs to manually command a Zip to go to one of its predetermined transit path's Holds.
- Parachute at Nest - This is used when a PIC needs to manually command an alternative landing, which is an intentional, controlled parachute landing at the Nest.
- Parachute at Green Site - This is used in the event of Primary Command and Control (C2) Link Loss or Total C2 Loss and is typically automatically (system) triggered.
- Parachute Immediately - This is used when the PIC needs to command the Zip to immediately deploy its Paraland System. After deployment, the Zip will land slowly and safely wherever the Zip is on its transit path.

Upon return to the Nest, a recovery system uses a raised capture line to capture the Zip and, once the flight is complete, appropriate maintenance personnel once again disassemble the Zip. The petitioner also requests appropriate flight and duty relief specific to its operations, which it requests to apply to its PICs and VOs.

The petitioner notes that the Control Mini App is secured against unauthorized access. Only users with appropriate access code credentials and permissions may send commands to a Sparrow aircraft.

The petitioner states that the design of their aircraft enables them to easily inspect the condition and health of the system. Their modular system allows the petitioner to quickly change defective components for new ones. The petitioner concludes that this simplified design increases reliability, reduces the need for both complex frequent maintenance and associated inspections. The petitioner argues this translates to greater system availability, without a reduction in safety. Additionally, the petitioner employs a bug-tracking system to track errors, faults, and other operational issues in order to diagnose and fix issues that emerge during operations.

As mentioned previously, the petitioner utilizes proprietary software called Path Planner, which prepares an optimized flight path from the Nest to each designated delivery site. Path Planner ensures that each route recognizes and integrates all restrictions that have been inserted into the database. Regulatory restrictions and keep-out zones prevent transit close to places such as airports, schools, busy highways, and gathering places. The petitioner explained that the system also provides notification to the operator if a safe and viable route does not exist, after applying the restrictions in effect when determining a route between a Nest and a delivery site. Factors considered by the planning software include: safety, regulatory, efficiency, and UA performance limitations.

The petitioner will conduct its operation during daylight hours under visual meteorological conditions (VMC) and is not authorized flight into known icing or known precipitation. The petitioner asserts that using the Path Planner software ensures the petitioner confirms that flight paths are compatible with the aircraft's performance envelope, and are short enough to have sufficient battery margins to cover possible changes in wind, unexpected weather, and operational delays. Trained VOs are positioned approximately every two to three nautical miles, depending on the conditions, in order to observe surrounding airspace and report any change in

weather activity. Initial and ongoing weather assessments are made via ForeFlight, a commercially available flight information and weather display application, supplemented by other official sources that may provide more timely and/or specific information. Sensors on the UA detect increased turbulence that could affect the UA's ability to continue a successful flight, and, if needed, will automatically discontinue the flight by returning to the Nest, or, in extreme circumstances, terminate the flight by deploying the Paraland System. PICs monitor the UA and, if an aircraft detects weather outside acceptable operating parameters, the UA can be recalled and other UA missions can be held, recalled, or terminated as well.

The petitioner utilizes a continuous airworthiness maintenance program (CAMP) in accordance with § 135.411(a)(2). A description of their CAMP is detailed in their GMM. General elements include:

- Organizational structure;
- Airworthiness responsibility;
- Maintenance procedures;
- Maintenance schedule;
- Required Inspection Items (RII);
- Maintenance records;
- Contract maintenance;
- Maintenance training; and
- Continuing analysis and surveillance system (CASS).

Currently, the petitioner has not implemented any FAA-recognized internal safety programs. The petitioner developed a System Analysis and Safety Assessment document and provided it to the FAA. This document described their operation and identified risk levels associated with their UAS. The petitioner concluded that identified risks in their operation were in an acceptable range, using the Safety Risk Management (SRM) process.

Comments and Responses

A summary of the petition was published in the Federal Register on May 11, 2020 (85 FR 42972). The FAA received and considered six comments from one individual and five aviation organizations. Novant Health, Commercial Drone Alliance (CDA), and the Small UAV Coalition (SUAVC) generally supported the petition, while the Airline Pilots Association (ALPA), Airlines for America (A4A), and one individual expressed concerns with the petition.

Comments in Support of the Petition

Among the comments received, those supporting the petitioner's request include: Novant Health, CDA, and SUAVC. These commenters expressed support for the safe and efficient integration and expansion of the role of UAS operations in the NAS. SUAVC stated that operations such as these benefit the public at large by providing substantial health and safety benefits through contactless delivery, responding to the COVID-19 pandemic, and reducing stress on the traditional surface transportation systems. Novant Health noted that the petitioner has flown over

1,300 miles BVLOS and worked with Novant Health to carry over 150 units of personal protective equipment in support of the COVID-19 pandemic relief effort of 2020.

Comments Concerning Proprietary Documents, More Information, and Relief under the Exemption

Commenters expressed concern that the petition did not contain enough information for the public to completely evaluate the request and provide a level of safety commensurate with the rules from which the petitioner requested relief. An individual commenter also stated, that without seeing more details of the petitioner's operation, they could not effectively comment on the safety aspects, as described by the petitioner. One commenter said the information provided in the Aircraft Flight Manual, which provided data on performance, has not been published for public review and comment. The commenter expressed concern of a lack of available metrics including: engine failure rates per hour, battery qualification against fire hazards during ballistic ground impact, parachute failure rates, UAS lethality during parachute descent, and safety and security provisions at emergency landing sites.

ALPA commented that the FAA should consider changes to its regulations through rulemaking, rather than granting exemptions for UAS commercial operations. It opines that UAS commercial operators should not be given exemptions if they cannot comply with current regulations, and that they should adapt their system to be in compliance or work with the FAA to amend its regulations.

In 2012, Congress first charged the FAA with integrating UAS into the NAS. Since then, the FAA has initiated rulemaking to further enable operations of UAS. For example, recently, the FAA published a final rule for Operation of Small Unmanned Aircraft Systems over People. Because the proposed operation would not fit squarely within the existing regulatory framework, a phased series of exemptions, leading to rulemaking, is appropriate and can be used to allow flight operations, without adversely affecting safety in the interim. The FAA intends for this exemption to add to the foundational framework of safety, to enable UAS cargo delivery operations for compensation or hire, within the United States, utilizing grants of operationally specific exemptions from current regulations. The operations authorized by this exemption will assist in providing the FAA with operational data necessary to properly inform the safety analysis of any such rule.. The FAA is using these operational scenarios, under strict observation and subject to conditions and limitations, to allow industry to begin operating. This, in turn, will provide the FAA with information to adjust the regulatory framework, to enable more expanded UAS operations. In this regard, the FAA views these exemptions as first steps toward rulemaking.

The FAA reviewed the petitioner's proposed operations and proposed safety mitigations, as further outlined in its Concept of Operations (CONOPS), aircraft manuals, and commercial operations manuals. As part of its safety risk analysis, the FAA relied on materials marked as proprietary by the petitioner to make determinations about the petitioner's systems and capabilities. Accordingly, while these materials have not been released in their entirety, they have been identified in the docket for this exemption.

Comments on General Safety Concerns

ALPA and an individual expressed general safety concerns. ALPA states that it cannot support the petitioner's request without further details of their system, and assurance of mitigating measures when operating multiple UAS weighing as much as 50 pounds, monitored by a single pilot. They contend that mitigations must be in place to achieve an equivalent level of safety for unmanned aircraft system operations, as required by Section 44807 Special Authority for certain UAS in Public Law 115–254. Additionally, ALPA states the significance of the petitioner's request, both by the number of 14 CFR parts affected, as well as the scope requested for relief, is of concern. ALPA also expressed concerns that the petitioner does not offer a means to control the airspace or areas of operations. They state that there should be a pre-approved and defined flight path with technology (i.e., geofencing) to stay a safe distance away from people, business, and terrain. There must be means both to ensure that the UAS(s) remains within the defined airspace and that the hazard of other aircraft intruding on the operation is mitigated.

An individual commented that the petitioner has identified potential contingency landing areas due to inflight failures. However, it does not describe how the UA is rendered inert and assures safety to those on the ground. Further, the petitioner did not indicate how recovery of its UA, by unknown persons, would precluded repurposing of the aircraft, its components, or software by bad actors engaged in threatening or other illegal activities.

The FAA acknowledges these general public safety concerns related to persons, property, and other aircraft, and agrees that ensuring the safety of the public and property on the ground and aircraft in the NAS is essential. The FAA may grant an exemption from applicable regulations when an operator or an operation is unable to meet the regulatory requirements. To do so, the FAA must make a finding that granting the exemption is in the public interest and that operations conducted under the terms, conditions, and limitations of the exemption would not adversely affect safety, or that they would provide a level of safety at least equal to that provided by the rules from which the petitioner is being exempted. As mentioned previously, the FAA conducted a safety risk analysis which assessed the hazards, outcomes, and risk mitigations for the petitioner's proposed operations. The agency determined the risk of the proposed operations is acceptable and that any operation conducted by the petitioner under the terms, conditions, and limitations of this exemption can be conducted under an equivalent level of safety of applicable regulations, or without adversely affecting safety.

As to the comment regarding aircraft recovery by unknown persons; the petitioner constantly monitors the aircraft flight path. Due to flight following procedures, the petitioner has the capability to recover the aircraft quickly, in the event of an emergency landing. The petitioner is also required by this exemption to use restricted access emergency landing areas and utilize restricted takeoff/landing sites to prevent recovery of the UA by known persons.

The FAA has analyzed the petitioner's system regarding flight planning and finds they develop preplanned automated routes, taking into account a host of factors that include: terrain, historic air traffic data, airspace constraints (geofencing), and population density. The VO scans the airspace and ground along the flight route to identify hazards and communicates hazard

information to the PIC. Using this information, the PIC is able to avoid these real-time hazards and can issue commands to abort a launch, recall the UA, initiate a predetermined hold or, if necessary, terminate flight via parachute landing. The FAA agrees that this exemption must provide a means to ensure that the UA remains within the defined airspace and that the hazard of other aircraft intruding on the operation is mitigated, and includes conditions and limitations in this exemption to ensure that the operation does not cause an adverse effect on safety.

Comments on Impact to Manned Aviation and Collision Risk

A4A, ALPA and one individual had concerns about the impact that UAS commercial package delivery would have on manned, or traditional, aviation. A4A commented that the FAA should take appropriate action to inform aviation operators of the presence of the petitioner's delivery service, or where UAS service is being conducted in proximity to airports, to help raise awareness of airlines flying into airports in that area. ALPA commented on its long-held position for all aircraft in the NAS to operate to the same high level of safety. The petition states the PIC and VO will ensure the requirements to see and avoid, § 91.113, are met without offering any capabilities such as detect and avoid (DAA) to achieve this critical safety function. The PIC will be located at the petitioner's Distribution Center, while the VO is required to watch the airspace as the UA flies to and from its destination. ALPA states it is unclear how this is possible and that the petition offers no technology capable to accomplish this safely. Related to a collision risk, and in regard to altimeter settings, ALPA stated that, according to the petition, the aircraft will not have a barometric altimeter, as required by § 91.121, so the ability to accurately maintain altitude must be addressed.

The petitioner's operations must comply with the additional performance-based parameters in this exemption's conditions and limitations, and the petitioner will begin its part 135 operations by delivering to specific destinations for which the petitioner has arranged exclusive use or access control, with a corresponding Certificate of Waiver or Authorization (COA) for compliance with § 91.113. The FAA agrees that ensuring the safety of the NAS is essential. The FAA is using these operational scenarios, under strict observation with specific conditions and limitations, to allow the petitioner to begin operating. The petitioner will have multiple VOs to monitor the surrounding airspace and detect potential conflicting traffic, in the absence of DAA technological solutions, in addition to other mitigations provided by the COA. Regulatory relief from § 91.121 is discussed below.

As discussed further in the analysis, the FAA has determined that flight operations may be conducted only when visibility is at least two statute miles, regardless of VFR minimums for the class of airspace within which the operation is being conducted. VOs must be regularly stationed along the route of flight, as required, to ensure overlapping of visual range between adjacent observers, maintain, and utilize two-way communication between the VOs and the PIC.

Comments on UA Identification and Unmanned Aircraft System Traffic Management (UTM)

A4A commented that identifying locations of UAS operations in proximity to airports could be done through local air traffic control information services and Notices to Airmen (NOTAMs), to help raise awareness of aircraft flying into airports in those areas. They added, since the petition

does not specifically designate locations, and it is possible that the operating areas for the petitioner may expand in the future, it is prudent for the FAA to take this action. ALPA recommends an electronic means (i.e., remote identification) to surveil the UA, as well as have the proper lighting when operating in VFR conditions.

In addressing these concerns, the FAA notes the petitioner conducts public outreach as part of its assessment. In addition, the petitioner coordinates with air traffic control whenever operations are involved in controlled airspace, and air traffic control also issues a waiver for § 91.113 for each operations area. Finally, NOTAMS will be used to inform other pilots of nearby UAS operations when operations are conducted.

Additionally, the petitioner has registered its aircraft under part 47 and obtained an FAA-issued N number. The FAA notes that UTM and remote identification are not currently required for this operation. However, operators must comply with the the remote identification requirements in part 89 in accordance with the compliance dates established in that part.⁵ As such, the FAA did not consider UTM or remote identification during its assessment of the safety of the petitioner's operations. The FAA has determined that the petitioner's proposed actions are appropriate mitigation for the risk of the limited operations covered by this exemption, and that the conditions and limitations of this exemption provide an equivalent level of safety to those required by applicable regulations.

Comments on Pilot Certification and Medical Certificates

ALPA stated the petitioner is requesting the PIC be exempted from being a traditionally trained and certificated commercial pilot with an instrument rating, and instead only possessing a part 107 certificate. ALPA maintains that the pilot must hold at least the equivalent of a current FAA commercial pilot certificate for an appropriate category and class for the type of aircraft being flown, as well as specific and adequate training on the UAS make and model intended to be used. Similarly, they state a current second-class FAA medical certificate should be required for a UAS pilot and VO operating an aircraft for compensation or hire, in commercial operations, as is required for other pilots operating in the NAS today.

Through the conditions and limitations of this exemption, the FAA is requiring the PIC to hold a valid RPC issued under part 107, maintain a second-class medical certificate, and complete the petitioner's part 135 training program, which includes a qualification check and initial operating experience, before serving in the capacity of a PIC. For the VO, the FAA is requiring the VO to hold a valid RPC issued under part 107, and successfully complete the organization's VO training curriculum, which includes an evaluation of their duties listed in the company's GOM. For the reasons discussed in the disposition of relief section, the FAA has determined that these requirements will ensure no adverse impact to safety for this operation.

⁵ Remote Identification of Unmanned Aircraft final rule, 86 FR 4390, January 15, 2021, *available at* <https://www.federalregister.gov/documents/2021/01/15/2020-28948/remote-identification-of-unmanned-aircraft>

Comments on Bio-Hazard and Medical Supply Concerns

ALPA expressed concern that the petitioner plans to use their UAS for shipping medical supplies and cargo delivery. ALPA noted that since this delivery service relies on a parachute drop system there needs to be procedures in place, in the event of a spill or inaccurate delivery, especially when dealing with biohazardous materials. Weather can play a critical part where or how these boxes are delivered to their intended recipient. A possible mitigation would be to ensure the cargo is placed in a crash-hardened container. The petition also states relief from requiring a flight manifest in the aircraft, this is highly unacceptable when dealing with biohazard materials. All flights should require a paper manifest inside the container, as a way to ensure that proper handling of the cargo is adhered to. An individual commenter expressed concern that the UAS will be used for delivery of medical supplies, but the petition does not address the public safety aspects of possible unrestricted access to prescription medications, in the event of abnormal flight operations.

In reviewing these comments, the FAA noted that, as a certificated part 135 operator, the petitioner will follow requirements defined in their approved Will-Carry Hazardous Materials Procedures Manual (HMPM), which includes training for personnel performing hazmat-related job functions, as specified in § 135.501(a). Also, the petitioner will be issued Operations Specification (OpSpec) A055, defining requirements for the carriage of hazardous materials. During the course of part 135 certification and the issuance of this exemption, the FAA considered the safety implications for the petitioner to safely operate their aircraft, while ensuring persons and property on the ground are protected. The operator is required to use restricted access emergency landing areas, utilize restricted takeoff/landing sites, and evaluate the risk of hazmat loss as part of the ground risk assessment that must be submitted to the FAA for acceptance. The FAA finds that this specific concept of operations can be implemented safely as proposed, and as limited by the conditions and limitations of this exemption. With respect to establishing precedent, the FAA conducts a case-by-case analysis of each petition for exemption, and its finding in this exemption is limited to the facts presented. Each subsequent request will be evaluated based on its own unique CONOPS and related data.

Additionally, the certificate holder's hazardous materials program does not authorize the transport of items classified as biohazard or biohazardous waste. The certificate holder is required to assess and mitigate risks, in the event of a spill or inaccurate delivery of packages.

FAA's Analysis and Disposition of Petitioner's Requests

This portion of the exemption lists the regulatory sections from which the petitioner requests relief, addresses the petitioner's basis for requesting relief, and provides analysis and disposition of each request. As a preface to the analysis that follows, the FAA notes the following additional facts that informed the analysis of the petitioner's request. First, 49 U.S.C. 44701(d)(1)(A) directs the Administrator of the FAA to consider the duty of an air carrier to provide service with the highest possible degree of safety in the public interest. The FAA finds this standard scalable for the risk posed by the operation of a UAS, in a commercial package delivery operation, as compared to the risk posed by a manned aircraft carrying passengers. The relief granted in this

exemption considers the unique characteristics associated with commercial package delivery operations using unmanned aircraft and the operating environment in which the petitioner will conduct commercial package delivery operations with its unmanned aircraft.

For the purpose of adjudicating the applicant's application for air carrier certification, and receiving additional information related to this exemption, the FAA and the petitioner have engaged in both written and oral communication. The FAA summarized the information it received that is relevant to the petitioner's proposed operation in this document.

The FAA has also carefully considered the petitioner's plans to expand operations. Consistent with its analysis, the FAA has included conditions and limitations in this exemption that are not limited to one specific location or route, but rather define the characteristics that make the operations and operating area acceptable for the petitioner's part 135 operations.

As the FAA gains more data and experience related to operations of this kind and learns from each operator, the FAA may adjust its policy. Such adjustments might warrant a revision to this exemption or the issuance of a new exemption. The specific grants and denials in this exemption are related directly to the petitioner's operation and may not be the same for another petitioner. The FAA's determination to grant or deny relief under this exemption is subject to change, based on future data. In many of these cases, once the FAA has gathered relevant data from the petitioner, it is plausible that the determination could be changed, or that a different petitioner with different data would have its request adjudicated differently, as is the case with any exemption request.

Additionally, the petitioner has applied for a type certificate (TC) for the Sparrow UAS; pending that determination, the FAA has also issued, Exemption No. 19110, to provide relief from the regulatory airworthiness certification requirements, subject to certain conditions and limitations. This exemption is consistent with the Administrator's determination under 49 U.S.C. 44807 that the Sparrow UA, which the petitioner intends to use for operations described in this exemption, may operate safely in the NAS. The FAA and the petitioner expect that Exemption No. 19110, will eventually be superseded by an appropriate airworthiness certificate for the Sparrow, contingent upon successful completion of the type certificate process.

This exemption provides relief from certain sections of parts 61, 91, and 135 for the petitioner to conduct air carrier operations in accordance with part 135. This exemption relief is effective immediately upon receipt of a part 119 air carrier certificate for part 135 operations from the Administrator.

A summary of the relief granted in this exemption is provided in Table 2.

Table 2 – Summary of Regulatory Relief

Regulatory Section	FAA Decision
61.3(a)	Granted
61.133	Denied
91.7(a)	Granted in Exemption No 19110

Regulatory Section	FAA Decision
91.109(a)	Granted
91.119(b) and (c)	Granted
91.121	Granted
91.151(a)	Granted
91.205(c)(4)	Granted
135.21(f)	Granted
135.25(a)	Granted in Exemption No. 19110
135.63(c) and (d)	Granted
135.65(a) and (d)	Granted
135.95(a)	Granted
135.143(a)	Granted
135.149(a)	Granted
135.161(a)	Granted
135.203(a)	Granted
135.205(a)	Granted
135.209(a)	Granted
135.243(b)(1) through (b)(3)	Granted
135.267	Granted
135.337 (b)(1)	Granted
135.338(b)(1)	Granted
135.339(e)(3) and (e)(4)	Granted
135.340(e)(3) and (e)(4)	Granted

14 CFR 61 - Certification: Pilots, Flight Instructors, and Ground Instructors

§ 61.3(a) - Requirement for Certificates, Ratings, and Authorizations

Section 61.3(a) prescribes that no person may serve as a required pilot flight crewmember unless that person has in their possession appropriate pilot certificates or authorizations.

As discussed previously in this document, the petitioner proposes to use several different UAS personnel positions as part of its layered safety mitigation strategy. Because the relief to certain part 61 requirements are dependent on the part 135 pilot requirements, the part 61 regulations will be discussed in the analysis of 14 CFR § 135.243.

§ 61.133 - Commercial Pilot Privileges and Limitations

Section 61.133 prescribes commercial pilot privileges and limitations. Under § 61.133(a)(1), a person who holds a commercial pilot certificate may act as PIC of an aircraft for compensation or hire only if the person is qualified in accordance with part 61 and with the applicable parts of Title 14 of the CFR that apply to the operation; part 135 in this case.

Because the petitioner's pilots are acting as PIC for compensation or hire, they would be required under part 61 to hold at least a commercial pilot certificate. However, insofar as the petitioner is granted an exemption from 14 CFR § 135.243, as explained in the analysis for that section, its pilots will not be exercising the privileges of a commercial pilot certificate and the pilots do not require relief from § 61.133. Accordingly, the request for relief from this regulation is not granted.

14 CFR 91 - Subpart A - GENERAL

§ 91.7(a) – Civil Aircraft Airworthiness

Section 91.7(a) prescribes that no person may operate a civil aircraft unless it is in an airworthy condition.

The petitioner is actively pursuing an aircraft type certification for their Sparrow UA, with the FAA's Aircraft Certification Office, and has applied for a 44807 airworthiness exemption while they pursue type certification under 14 CFR § 21.17(b). The petitioner's requests for relief related to aircraft airworthiness—14 CFR §§ 91.7 and 135.25—are addressed in Exemption No. 19110.

14 CFR 91 - Subpart B - FLIGHT RULES

§ 91.119(b) and (c) – Minimum Safe Altitudes: General

Section 91.119 prescribes minimum safe altitudes. Specifically, § 91.119(b) prescribes that, except when necessary for takeoff or landing, no person may operate an aircraft over any congested area of a city, town, or settlement, or over any open-air assembly of persons, below an altitude of 1,000 ft. above the highest obstacle within a horizontal radius of 2,000 ft. of the aircraft. Section 91.119(c) states, over other than congested areas, no aircraft may be operated below an altitude of 500 ft. above the surface, except over open water or sparsely populated areas, and in those cases, the aircraft may not be operated closer than 500 ft. to any person, vessel, vehicle, or structure.

The petitioner requests relief from the requirement of the minimum altitudes for operating an aircraft over congested and non-congested areas because, as described previously, the petitioner plans their routes such that their aircraft operates at or below 400 ft. AGL, for the duration of the entire flight. After evaluating the petitioner's proposed mitigations and the additional limitations discussed in the analysis that follows, the FAA finds that it would not adversely affect safety to permit the Sparrow to operate at altitudes lower than those described in § 91.119(b) and (c). The aircraft is only permitted to operate at a maximum altitude of 400 ft. AGL to reduce risk to aircraft with persons on board. The FAA includes in this exemption, conditions and limitations regarding obtaining consent from customers and securing the takeoff and landing site that it analyzed in previous exemptions (e.g., Exemption No. 18163) and finds applicable to this operation. These conditions and limitations ensure that the people involved in the operation are aware of the risks of participation and that people who are not involved are not able to impact the aircraft or be impacted by the aircraft in any way. The petitioner must ensure all persons

engaging closely with the small UA remain at a safe distance during operations and are aware of potential risks. Condition and Limitation No. 9 requires the petitioner to receive consent that indicates participants are aware of the potential risks of UA operations and these individuals provide consent to participate in the operation, notwithstanding those risks. Condition and Limitation No. 50 requires the operator to provide notification to each delivery customer and instruct the customer to remain clear of the UA during the delivery stage of flight by a distance sufficient to ensure the UA does not cause a hazard to the customer or other people on the ground.

The FAA also provides a series of requirements listed in Condition and Limitation Nos. 21, 22, 23, 24, and 25 encompassing area planning, ground risk, operations over people and emergency operations, which must be utilized by the petitioner when evaluating proposed areas of operation. The petitioner will submit a proposal to the FAA for acceptance, each new area of operation that includes operating area boundaries, estimated number of daily operations, and other characteristics of the operations expected in the new area of operation. The FAA acceptance process also includes adherence to the National Environmental Policy Act (NEPA), which requires the FAA to evaluate the potential environmental impacts that may result from the FAA's actions. Future expansions to new operating areas, or expansions from existing operating areas, will be evaluated in accordance with the requirements of NEPA and the FAA's NEPA implementing order, FAA Order 1050.1F.

Once the FAA determines that a proposed area of operations is acceptable, the area of operations will be authorized in the petitioner's Operation Specifications (OpSpecs). As part of the area of operations planning process for a new area, and before operations occur, the operator must ensure sufficient connectivity coverage concerning command and control (C2) is maintained. To facilitate this review, Condition and Limitation No. 24 requires the operator to document their analysis of C2 coverage in a communications service assessment, including how the C2 will be monitored during operation. The communications service assessment must be submitted to the FAA. Prior to each flight, the pilot must also ensure as a component of preflight that C2 coverage is available for the operation, in accordance with Condition and Limitation No. 39.

Because terrain, man-made obstacles, and people on the ground create unique hazards for each area under consideration, Condition and Limitation No. 25 requires the operator to perform an assessment of those areas to ensure that risks associated with those hazards have been mitigated as low as reasonably practicable under normal or abnormal conditions. This ground risk assessment must be submitted to the FAA. The provisions listed in this condition and limitation are performance-based and do not stipulate a specific numerical value, due to the unique nature of each operational area. Appropriate numerical values are proposed by the operator and documented in their ground risk assessment submitted to the FAA for review and acceptance.

As part of the ground risk assessment process, in accordance with Condition and Limitation No.25, in order to ensure that the planned operation is conducted with all risks mitigated as low as reasonably practicable, and the UA operate as predicted during the route design process, the operator must perform a validation check on the proposed route and document the results before

operating in this new area. These results must be submitted to the FAA and will be verified against the areas where overflight is prohibited consistent with Condition and Limitation No. 22.

The FAA has determined that UA operations in the areas identified in Condition and Limitation No. 21 such as open-air assemblies of people, among other listed prohibitions, would result in a greater severity of injury or death to people or greater damage to infrastructure on the ground should an unexpected event occur and is continuing to generally prohibit flight operations under those circumstances to ensure petitioner's operations do not cause an adverse effect on safety. The areas identified in Condition and Limitation No. 21 are similar to those for other UAS operators with exemptions that allow part 135 operations, with modifications for specificity to this petitioner's concept of operations.

Condition and Limitation No. 22 requires the petitioner to identify designated areas that the UA can reach if an unexpected condition occurs during flight operations and the UA is unable to complete the intended mission. These safe emergency landing areas must meet certain specifications in order to reduce the safety risk of the operation. Condition and Limitation No. 22 states that those areas be known in advance to the PIC operating the aircraft, be co-located with a VO or otherwise monitored and controlled by the petitioner's personnel, or controlled, fenced, or otherwise secured in an area with the landowner awareness, or as approved by the Administrator. It must also provide for a landing without undue hazard to persons or property on the ground, be in areas with a low likelihood of exposed persons, such as forested areas providing significant sheltering, farmland, or prairies, and avoid prohibited structures and roads that pose a risk to persons and property. These specifications are designed to reduce the risk to nonparticipating persons or structures, if there is an emergency. Condition and Limitation No. 44 also includes a review of ground risk and alternate landing site elements as part of the PIC's preflight responsibilities, in connection with the conditions and limitations requiring establishment of such areas in this exemption.

The FAA has determined a prescriptive minimum distance from structures or roads is not necessary for the petitioner's operation, but rather that the petitioner must determine a safe distance to remain from these sites during normal operations, and this distance must be contained in the petitioner's GOM. The petitioner is permitted to overfly roadways in a transitory manner. In consideration of the need of the aircraft to transition to and from cruise altitude during operations Condition and Limitation No. 56 requires the petitioner to remain at least 100 ft. away from manmade obstacles and terrain, except when the aircraft climbs and descend for launch and recovery and package delivery. Those circumstances occur when the aircraft is within 250 ft. laterally of a launch and recovery site or delivery area.

In Exemption Nos. 18163D and 18339C, the FAA explained that operations that frequently occur at low altitudes in close proximity to people require conditions and limitations that provide the FAA assurance that these operations are conducted without adversely affecting the higher degree of safety that air carriers are held to, which necessarily requires compliance with more mitigation measures than certain other UAS operations. In light of these considerations, the FAA is including additional conditions and limitations related to areas of operations and associated elements (AE), based on the FAA's determination that AE will be evaluated as related to relief

from the operating regulations instead of being evaluated as a part of the type certificate. The AE limitations are necessary to ensure that operations can occur with relief from § 91.119 without an adverse effect on safety considering the separation of AE from the aircraft's type design. Given the level of risk that exempting from this regulation entails, it is appropriate to ensure that AE are both working reliably and able to provide the PIC with the information necessary to safely continue operations. Accurate altitude information is a key part of the safety of any aircraft operation and the real-time, accurate provision of information discussed in the paragraphs that follow is necessary for the PIC to take all actions necessary to ensure the safety of the operation at a low altitude.

The petitioner will have 120 calendar days from the effective date of this exemption to comply with Condition and Limitation Nos. 26, 30, 32, 33, and 34. The petitioner must submit documentation necessary to show compliance with these conditions and limitations to the FAA no later than 90 days from the effective date of this exemption for FAA review. The 120-day and 90-day timeframes are established in Condition and Limitation No. 35.

Although the FAA does not directly impose airworthiness design criteria for AE as part of the type certification of the aircraft, AE such as pilot interface equipment, displays, and software must be evaluated and approved by the FAA. The aircraft is designed to monitor and transmit all information required for continued safe flight and operation. The pilot interface equipment must be able to display this information to the pilot in order for the pilot to control and monitor the UA during its operation. Without this information displayed to the pilot, the pilot would not be able to determine if the aircraft is being operated safely as intended.

The pilot interface must display all information required for continued safe flight and operation. Due to this critical function, the pilot interface plays in allowing the PIC to ensure that the UA is being operated safely, the operator must provide, and the FAA must evaluate and approve, the pilot interface through the configuration control document. The pilot interface must provide audible and visual alerts of any degraded system performance, UA malfunction, or loss of C2 link with the UA that may impact continued safe flight. The FAA expects the pilot interface display to include:

- Airborne UA location information;
- Alerts, such as an alert following the loss of the C2 link and function;
- The status of all critical parameters of all energy storage systems;
- The status of all critical parameters for all propulsion systems;
- Flight and navigation information, as appropriate, such as airspeed, heading, altitude, and location; and
- Communication and navigation signal strength and quality, including contingency information or status.

Therefore, the FAA is including Condition and Limitation No. 27 to ensure that the pilot interface displays all information required for continued safe flight and operation. The information required to appear on the display must be approved by the FAA and will be considered as part of the approval of the configuration control document.

Condition and Limitation No. 26 requires the petitioner to provide the FAA with a complete and unambiguous description of its UAS configuration, including any AE and their interface with the UA, so that their availability or use is readily apparent and the FAA can evaluate the operator's use of AE. The FAA is in the process of reviewing the petitioner's configuration control document and continued operations are contingent on successful completion of review of that document, as set forth in Condition and Limitation No. 35.

UAS operators must ensure that AE are appropriately maintained. Condition and Limitation No. 32 requires that the operator document the policies and procedures for ensuring that the AE meet the requirements allocated to those elements, prior to and during each operation. The FAA will review the petitioner's maintenance program and continued operations are contingent upon FAA acceptance of that document, as prescribed by Condition and Limitation No. 35. The FAA expects the operator's maintenance program document required by Condition and Limitation No. 32 to include, where applicable:

- A method for determining the maintenance and inspection to be performed;
- Maintenance and inspection schedules, inspection requirements, and preflight inspection requirements;
- The appropriate person or entity to accomplish the maintenance and the necessary qualifications and training;
- A method for the recording of AE discrepancies and corrective actions;
- A method for the performance of maintenance and system changes, including functional tests;
- A method for determining if the AE is capable of meeting its intended function and is ready for operation after maintenance;
- A method to ensure records include a description of the work, date completed, and the person or entity that performed the work;
- A method for AE maintenance recordkeeping, such as work orders, invoices, etc. that indicates the AE has been properly maintained. The maintenance records must include enough information to determine that scheduled inspections and maintenance have been accomplished;
- A method for AE parts disposition and life limits (if limits are established); and
- An AE error reporting, evaluation and mitigation program.

The petitioner will determine how it will meet the maintenance requirements noted above. For example, this assurance may take the form of maintenance instruction; or, when using AE that are equipment, this assurance may take the form of additional qualification criteria to ensure that the equipment meets specifications (e.g., a device with specific processing power, storage capacity, and operating system evaluation criteria). When using AE that rely on third-party services (such as a communications link provided by a cellular network or, in the future, an unmanned traffic management system), this assurance could include qualification and in-service monitoring criteria to detect out-of-compliance performance and initiate corrective action, such as avoiding new operations into areas of known coverage gaps until such time as the communication service provider verifies that the gap is eliminated.

Condition and Limitation No. 33 requires the operator evaluate the manufacturer's AE maintenance and inspection requirements to determine the proper training and qualifications necessary to maintain those AE. The operator must then identify those training and qualification requirements in its manual system. The FAA will review the level of maintenance and any required training and qualifications to ensure they are proportionate to that AE's level of risk. These criteria should align with the AE's manufacturer or service provider's established requirements, when available. An industry standard could also be appropriate.

Changes to AE, including software updates, may impact the airworthiness of the aircraft. To ensure that the AE provide the functionality, performance, reliability, and information necessary to interface with the UA, the FAA may require the petitioner to perform a functional test of the system. Furthermore, changes or updates that appreciably affect the AE would require FAA evaluation prior to further operation of the aircraft. Accordingly, changes to the petitioner's AE will be managed using an FAA-accepted process. This process must detail how changes to AE that appreciably affect the reliability, operational characteristics, or other characteristics affecting the safe operation of the UA will be identified by the operator. All AE changes that appreciably affect the reliability, operational characteristics, or other characteristics affecting the safe operation of the UA require FAA approval. The operator may implement any change to AE that has no appreciable effect on the UA as determined using the FAA-accepted process. This requirement is set forth in Condition and Limitation Nos. 30 and 31.

§ 91.121 – Altimeter Settings

Section 91.121 prescribes that each person operating an aircraft shall maintain the cruising altitude or flight level of that aircraft by reference to an altimeter that is set, when operating below 18,000 ft. mean sea level (MSL), to the current reported altimeter setting of a station along the route and within 100 nautical miles of the aircraft and, if there is no station within the area prescribed, the current reported altimeter setting of an appropriate available station or, if the aircraft is not equipped with a radio, the elevation of the departure airport or an appropriate altimeter setting available before departure. At or above 18,000 ft. MSL, the altimeter is set to 29.92" altitude pressure, or take the flight level equivalent of the minimum altitude in ft. and add the appropriate number of ft. specific in the chart, according to the current reported altimeter setting.

The petitioner requests relief from the regulatory requirement because the Sparrow UA will operate at or below 400 ft. AGL. The petitioner states that it incorporates a GPS-aided inertial navigation system for navigation, which provides altitude information. The aircraft is also equipped with two air data sensors, which can serve as a redundant system for altitude information, in case the global navigation satellite system (GNSS) sensors are unavailable or inoperative. The petitioner's UAS will integrate altitude measurement data, including GPS and barometric pressure-based information, sufficient for the UA to determine its altitude, speed, and flight path, in a manner appropriate to operate at or below 400 ft. AGL while avoiding terrain and obstacles.

The purpose of a traditional adjustable barometric pressure altimeter is primarily to provide aircraft with the ability to de-conflict from each other using a common measure. The FAA recognizes that small unmanned aircraft operate in a very different environment from that of traditional aircraft within the NAS, requiring different systems to de-conflict from other aircraft and obstacles on the ground. Given the information provided by the petitioner, the FAA agrees with the proposed concept of operating the UA by reference to the height above ground level, rather than reference to mean sea level, using the altitude reporting systems described.

In consideration of the foregoing, the FAA finds that relief from 14 CFR § 91.121 is appropriate, and grants relief to operate the UA by reference to the height above ground level, rather than in reference to mean sea level, using the altitude reporting systems described. Because the PIC operating the aircraft will ensure that the altitude is continuously updated during flight, via the automated altitude reporting systems, the FAA finds that granting relief will not adversely affect safety.

§ 91.151(a) – Fuel Requirements for Flight in VFR Conditions

Section 91.151(a) prescribes that no person may begin a flight in an airplane under VFR conditions unless, considering wind and forecast weather conditions, there is enough fuel to fly to the first point of intended landing and, assuming normal cruising speed, during the day, to fly after that for at least 30 minutes, or at night, to fly after that for at least 45 minutes.

The petitioner requests relief from the prescriptive requirements for time-based fuel reserve. Information in the petitioner's manual system states that a flight route will never be approved utilizing their Path Planner software if a Sparrow UA flying that route cannot complete the flight with at least 10 minutes of battery capacity remaining. The Path Planner software conducts analysis during the planning phase to ensure adequate power for the flight plus 10 minutes available power. Additionally, a battery diagnostics test is accomplished during preflight. Throughout the flight, the PIC receives battery information regarding the UA to apprise the PIC of remaining energy. Furthermore, safety control measures are in place that allow the PIC to command the UA to Return to Nest, when the Sparrow aircraft's battery life reaches 5 minutes. Finally, the PIC has the ability to activate the Paraland system, at predesignated spots along the route, if battery power goes below a predetermined level. The petitioner states their route planning provides the operation with an equivalent level of safety as the fuel reserve requirements of heavier and less precisely planned traditional aircraft operations.

The FAA has reviewed and assessed the petitioner's preflight planning, pre-departure, and continual monitoring procedures found in the petitioner's operations manual, and FAA-imposed mitigations in the conditions and limitations regarding necessary battery energy requirements as a percentage of reserve battery power, or in accordance with the UA manufacturer's stated minimum power reserve, prior to conducting the intended operation. These requirements are consistent with previous UAS specific relief for daytime VFR conditions granted in Exemptions No. 18163 and 18601. Accordingly, the FAA finds that relief can be provided from § 91.151(a) without causing an adverse effect on safety, subject to compliance with the prescribed conditions and limitations.

14 CFR Part 135 - Subpart B - FLIGHT OPERATIONS***§ 135.25(a) – Aircraft Requirements***

Section 135.25(a) prescribes that no certificate holder may operate an aircraft under 14 CFR part 135 unless that aircraft is registered as a civil aircraft of the U.S. and carries an appropriate and current airworthiness certificate issued under this chapter; and is in an airworthy condition, and meets the applicable airworthiness requirements of this chapter, including those relating to identification and equipment.

The petitioner is actively pursuing an aircraft type certification for their Sparrow UA, with the FAA's Aircraft Certification Office, and has petitioned for relief in accordance with 49 U.S.C. 44807 for aircraft airworthiness while pursuing type certification. The petitioner's requests for relief related to aircraft airworthiness, 14 CFR §§ 91.7 and 135.25, are addressed in Exemption No. 19110.

§ 135.63(c) and (d) – Recordkeeping Requirements

Sections 135.63(c) and (d) prescribe, for multiengine aircraft, that each certificate holder is responsible for preparing an accurate load manifest, in duplicate, containing information concerning the loading of the aircraft. That aircraft shall carry a copy of the completed load manifest, in the aircraft, to its destination. The certificate holder shall keep copies of completed load manifests for at least 30 days at its principal operations base, or at another location used by it and approved by the Administrator.

The Sparrow UA is a multiengine UA and the petitioner requested relief from the requirements related to the carriage of a load manifest, because the size and characteristics of the Sparrow make it impractical to comply with the regulation. Related to this requirement, the petitioner asserts that the FAA has previously held that similar rules requiring carriage of manuals aboard aircraft are not applicable to UAS, provided the operator makes the manuals readily available for ground personnel and the PIC and available at the PIC's duty station. The petitioner provides that it has developed procedures for the preparation and accuracy of a load manifest, to ensure that it contains sufficient information concerning the loading of the aircraft, and to ensure that the petitioner does not exceed any critical loading factors.

The FAA will require the petitioner to maintain a record of the maximum total payload carried on each flight and include applicable information contained in § 135.63(c). The petitioner must keep this record for at least 30 days at its principal operations base, or at another appropriate location approved by the FAA, in accordance with § 135.63(a). The FAA will also require the petitioner to provide current copies of the aircraft loading procedures to all persons responsible for the loading of their aircraft, addressing weight and payload limits. Also, the petitioner must use actual weights for determining the weight of cargo loaded onto its aircraft, or another method authorized by the Administrator.

The FAA has determined that granting relief from the requirement to create duplicate copies of the load manifest in § 135.63(c) and from the requirement to carry a copy of the load manifest on

the aircraft in (d) would have no adverse effect on safety, when made available to ground personnel and the PIC and available at the PIC's duty station. Accordingly, relief is granted to §135.63(c) and (d) subject to compliance with the conditions and limitations of this exemption.

14 CFR Part 135 – Subpart C - AIRCRAFT AND EQUIPMENT

§ 135.149(a) - Equipment Requirements: General

Section 135.149(a) prescribes that no person may operate an aircraft unless it is equipped with a sensitive altimeter that is adjustable for barometric pressure.

The petitioner requests relief from the requirement and states its UAS will employ several systems to calculate altitude sufficient for their proposed operations. Due to the maximum operating altitude limit and 50 nm range, inflight changes in barometric pressure are considered minimal, thereby removing any practical need to make an altimeter adjustment. The petitioner asserts that its UAS will employ several systems to calculate altitude sufficient for obstacle clearance, sufficient for their proposed operations, and will only operate at altitudes of 400 ft. AGL and below.

The FAA acknowledges that for traditional aircraft that operate at higher altitudes and longer distances, the ability to adjust the altimeter for current barometric pressure is important to ensure that all aircraft are safely flown at appropriate altitudes and that a standard measurement is utilized by those types of aircraft operating in the same proximity of one another. The petitioner's UAS operates in a different environment than those of manned aircraft. Due to the relatively short range of the petitioner's routes, inflight changes in barometric pressure would be negligible, and therefore negate the need to adjust for a change in barometric pressure. As stated previously, the Sparrow UA typically operates at a maximum altitude of 400 ft. AGL, and the range of the aircraft is within the altimeter setting requirements of § 91.121(a). The Sparrow UA uses GPS and pressure sensors to select and maintain its height above the ground, and calibrates barometric pressure at the time of each takeoff.

Reviewing the petitioner's information concerning the Sparrow UA, the FAA notes that the UAS incorporates a GPS-aided inertial navigation system for navigation, which provides altitude information. The aircraft is also equipped with two air data sensors, which serve as a redundant system for altitude information, in the case that the GNSS sensors are unavailable or inoperative. The petitioner's UAS integrates altitude measurement data, including GPS and barometric pressure-based information, sufficient for the UA to determine its altitude, speed, and flight path in a manner appropriate to operate at or below 400 ft. AGL, while avoiding terrain and obstacles. As stated in the discussion regarding § 91.121, the FAA recognizes that small UAS operate in a very different environment from that of traditional operations within the NAS, requiring different systems to de-conflict with other aircraft and obstacles on the ground. Given the information provided by the petitioner, the FAA understands the value of operating the UA by reference to the height above ground level, rather than reference to mean sea level, using the altitude reporting systems described.

The petitioner will be required to conduct its operation with references to AGL, at a minimum safe altitude during cruise flight of 130 ft. AGL, and a maximum altitude of 400 ft. AGL. The altimetry system will be calibrated, the accuracy of value validated, and determined to be operational for each flight by the PIC, and all altimetry augmenting instrumentation and software must be operational prior to the flight.

Accordingly, the FAA finds that relief will not adversely affect safety and can be granted from 14 CFR § 135.149(a), subject to compliance with the conditions and limitations of this exemption.

§ 135.161(a) - Communication and navigation equipment for aircraft operations under VFR over routes navigated by pilotage

Section 135.161(a) states that “no person may operate an aircraft under VFR over routes that can be navigated by pilotage unless the aircraft is equipped with the two-way radio communication equipment necessary under normal operating conditions to fulfill the following:

- (1) Communicate with at least one appropriate station from any point on the route, except in remote locations and areas of mountainous terrain where geographical constraints make such communication impossible;
- (2) Communicate with appropriate air traffic control facilities from any point within Class B, Class C, or Class D airspace, or within a Class E surface area designated for an airport in which flights are intended; and
- (3) Receive meteorological information from any point enroute, except in remote locations and areas of mountainous terrain where geographical constraints make such communication impossible.”

The petitioner requests relief from the requirements of § 135.161(a). The petitioner states that the Sparrow UA will not have a person onboard, and does not have procedures requiring two-way radio communication relayed through equipment installed on an aircraft. They will not conduct their proposed operations in any Class B, C, or E airspace, they do not have procedures requiring meteorological information relayed through equipment installed on the aircraft, and crewmembers operate the UA from a Ground Control Station (GCS) at the relevant "Nest", which is equipped with reliable communications interfaces to communicate with air traffic control whenever needed. In similar previous circumstances evaluated by the FAA, the FAA has determined that requiring two-way radio equipment would not improve the level of safety for proposed operations that did not require a UA to relay two-way radio communications and granted exemptions from this requirement.

The FAA has reviewed the petitioner's information within their GOM and agrees the PIC conducting part 135 VFR operation must have the ability to communicate and receive inflight meteorological information. Since the PIC is not located in the aircraft, but instead located at a Ground Control Station (GCS), in order to maintain an equivalent level of safety for part 135 unmanned aircraft operations, that communication equipment must be available at the PIC's

GCS. An exception to this would be if communications are relayed by the aircraft. In that case, then the aircraft would also be required to have the required communications equipment installed onboard those aircraft. Any required communication equipment must be evaluated and approved by the FAA to ensure that it complies with any requirements from air traffic control and is able to comply with the certificate holders procedures. This also ensures that the equipment is reliable and readily available when needed.

The FAA finds that relieving the requirement for two-way radio equipment on the Sparrow aircraft will not adversely affect the safety of the petitioner's proposed operations. The FAA has also determined that as long as the petitioner's operation does not require the UA to relay two-way radio communications, then the operation can be conducted with an equivalent level of safety without radio equipment installed on the aircraft. However, the FAA is also requiring that the PIC's GCS to be equipped with an FAA authorized communication device when the certificate holder is required to monitor or communicate with local air traffic control.

Condition and Limitation No. 29 requires the petitioner to equip the ground control station with communication equipment that is readily available to the PIC and others who will communicate with the PIC, and be operable during flight. Also, a reliable backup communication method acceptable to the FAA is required.

For communication between a PIC and one or more VOs by use of an electronic communication device, the PICs and VOs must be provided with enough devices for timely, effective communications, and the device must provide for real-time communications. To maintain a sterile environment, non-essential communications during flight operations are prohibited.

Accordingly, relief is granted to § 135.161(a), in accordance with the conditions and limitations listed in this exemption.

14 CFR Part 135 – Subpart D - VFR/IFR OPERATING LIMITATIONS AND WEATHER REQUIREMENTS

§ 135.203(a) - VFR: Minimum Altitudes

Section 135.203(a) prescribes that, except when necessary for takeoff and landing, no person may operate under VFR an airplane during the day below 500 ft. above the surface or less than 500 ft. horizontally from any obstacle; or at night, at an altitude less than 1,000 ft. above the highest obstacle within a horizontal distance of 5 miles from the course intended to be flown or, in designated mountainous terrain, less than 2,000 ft. above the highest obstacle within a horizontal distance of 5 miles from the course intended to be flown.

The petitioner requested relief from § 135.203(a), for both vertical and horizontal minimum altitudes, and the FAA narrows the relief to § 135.203(a)(1) because the petitioner's operations will be limited to day VFR flights only. The petitioner asserts that the normal maximum operating altitude of the Sparrow UA is 400 ft. AGL. The petitioner has also states that the pre-flight mission planning takes into account published obstacles, and digital terrain elevation data.

The petitioner's minimum altitude for package delivery is 60 ft. AGL, with a planned cruise altitude between 130 ft. and 380 ft. AGL.

The FAA reviewed the information that was provided by the petitioner, the specifics of which are not disclosed in this document because of their proprietary nature. Review of this request requires consideration of different operational considerations between manned and unmanned aircraft operations. In manned aircraft operating in VFR conditions, the pilot onboard has the ability to adjust the altitude of the aircraft to avoid ground obstacles, regardless of what altitude the altimetry system is indicating. For unmanned aircraft that are operated beyond visual line of sight of the PIC or VO, there is more reliance on the data that the system uses for altitude selection and indication, as well as the ability of the autoflight control system to maintain that desired altitude. Therefore, the FAA must take into account ground obstacle and terrain data, aircraft altimetry system accuracy, and the autoflight systems tolerances to maintain a set altitude.

The FAA has determined that the operator must assure vertical and lateral clearance between the planned UA flight path and obstacles. An obstacle clearance vertical distance error that degrades real clearance above an obstacle to the point of zero clearance or a negative clearance (or interference) is not acceptable. To mitigate this risk, when planning its routes, the petitioner will be required to evaluate their complete system and establish mitigations to ensure its routes comply with the exemption conditions and limitations. These precautions will ensure a safe altitude is maintained to prevent undue hazards to persons or property on the surface.

After evaluation of information contained in the petitioner's manuals and concept of operations, the FAA finds the combined effect of use of the petitioner's route planning software, which incorporates altitude control systems described in the analysis of the petitioner's request for relief from § 135.149(a) above and its use of VOs would have no adverse effect on safety. Accordingly, the FAA grants relief from § 135.203(a)(1), subject to compliance with the conditions and limitations of this exemption.

§ 135.209(a) – VFR: Fuel Supply

Section 135.209(a) states that “no person may begin a flight operation in an airplane under VFR unless, considering wind and forecast weather conditions, it has enough fuel to fly to the first point of intended landing and, assuming normal cruising fuel consumption - (1) During the day, to fly after that for at least 30 minutes; or (2) At night, to fly after that for at least 45 minutes.”

The petitioner requested relief from § 135.209(a) because a minimum battery charge is prescribed for each route that includes spare capacity reserved to handle adverse meteorological conditions and the maximum number of failed recovery and delivery passes. Also, extensive testing of their system shows energy budgets in route planning are conservative, and provide reserves that are proportional for the proposed operations.

The FAA finds that, based upon the information provided, relief from the current time-based fuel reserve requirements is appropriate for the UA's battery-power reserves. Although the petitioner requested relief from time-based fuel reserves, upon review of their manuals, the FAA found that

the petitioner's flight planning energy reserve requirements, as well as the low energy threshold alerts provided to the PIC, were all time-based. Although the petitioner's aircraft does not use petroleum based "fuel" it does use electrical energy stored in a battery to provide power to enable flight. Without this electrical energy, the petitioner's aircraft would not be able to maintain sustained flight. Therefore, the PIC must know the electrical energy requirements needed to complete a flight, and must take in consideration such variables as wind and forecast weather conditions when making this determination. Additionally, the PIC must be provided, in a manner useful, the aircraft's current available energy during flight, so they can evaluate if they need to take action due to a greater than planned electrical energy requirement or drain. The FAA believes that compliance with the mitigations found in Condition and Limitation No. 41 of this exemption will result in providing for a level of safety equivalent to that provided by the regulation. These mitigations ensure that there is enough available power for the UA to complete the intended flight and that the operator has in place contingency plans in the case of battery depletion greater than anticipated.

Accordingly, relief is granted to § 135.209(a), in accordance with the conditions and limitations listed in this exemption.

14 CFR Part 135 – Subpart E - FLIGHT CREWMEMBER REQUIREMENTS

As discussed previously, the petitioner proposes to use several different UAS personnel positions as part of its layered safety mitigation strategy. The FAA's analysis is based on the duties of the crewmember (PIC, VO, and FO), as defined by the petitioner. The FAA regulations do not fully contemplate the operation as proposed. Each position carries unique roles and responsibilities as described in the GOM and petition summary. Although individuals may be qualified to perform multiple roles, no person may serve in more than one operational role concurrently. In particular, the PIC must remain in that role until all aircraft have landed.

The following sections contain the FAA analysis of each duty position and describe the relief, where warranted, from the existing requirement.

Controller (PIC)

§ 135.243(b)(1) – Pilot in Command Qualifications

Section 135.243(b)(1) states that, except as provided in paragraph (a) of this section, no certificate holder may use a person, nor may any person serve as PIC of an aircraft under VFR unless that person holds at least a commercial pilot certificate with appropriate category and class ratings and, if required, an appropriate type rating for that aircraft.

The petitioner requests relief from the requirements for its PICs, under VFR conditions, to hold a commercial pilot certificate with category, class, and type ratings based on the fact that all its PICs (Controllers) will hold part 107 RPCs, hold at least second class medical certificates, and be trained and checked in the petitioner's FAA-approved training program.

In prior exemptions, the FAA has noted that a commercial pilot has foundational knowledge applicable to what a part 135 pilot in command needs to know and consider to make sound aeronautical decisions.⁶ The FAA further explained that commercial pilots receive training and testing on meteorology, to include recognition of critical weather situations and the use of aeronautical weather reports and forecasts. Commercial pilots also receive training and testing on procedures for operating in the National Airspace System (NAS), crew resource management, and aeronautical decision-making and judgment. A commercial pilot is also well versed in the use of an aircraft flight manual, abnormal and emergency procedures, use of checklists, understanding effects of exceeding aircraft performance limitations, and how to notify the National Transportation Safety Board in the event of an accident.

In Exemption No. 18163A, the FAA granted relief from the commercial pilot certificate requirement and permitted the petitioner's PICs to hold part 107 RPCs with an FAA-issued pilot authorization for part 135 operations, after the PICs successfully completed the petitioner's FAA-approved training and checking program. The FAA concluded, in Exemption 18163A that, although the part 107 RPC ensures the PIC has knowledge of the operating environment (e.g., 400 ft. AGL and below) in which the PIC will be operating the unmanned aircraft, the part 107 certificate does not itself contain pilot privileges for operations outside of part 107. As a result, the FAA issues a letter of authorization to the holder of a part 107 certificate authorizing the pilot to serve as a PIC for the petitioner in its part 135 operation. In addition, to overcome the absence of commercial pilot certificates, the FAA imposed additional requirements on PICs, including supervised operating experience with a check pilot and increased line check frequency.

Because the petitioner proposes to use PICs who hold part 107 certificates, the FAA has determined that similar requirements imposed in Exemption No. 18163A are appropriate. Therefore, as set forth in the conditions and limitations in this decision, the petitioner's PICs must hold a valid part 107 certificate (which includes meeting the recency requirements of § 107.65), complete the petitioner's FAA-approved training program and receive a specific, FAA-issued pilot authorization. As explained in Exemption No. 18163A, this authorization provides the authority for the pilot to serve as a PIC for the petitioner, in its part 135 operation, without holding a commercial pilot certificate.

Because petitioner's pilots will not hold commercial pilot certificates, the FAA has reviewed its training program and determined that the areas of knowledge for a commercial pilot certificate, highlighted earlier in this section, have been incorporated to some degree into the petitioner's approved training program. The instructor-led ground training includes FAA regulations, reporting requirements, airspace, crew resource management, aeronautical decision-making, weather, and flight operations. This training will be continuously reinforced through flight training and checking, to include computer-based simulation without using actual aircraft, followed by training flights that represent the petitioner's part 135 operations. After the instructor is confident in the trainee's ability to function and perform assigned duties without assistance, the trainee will be moved to the practical evaluation (check ride) phase. Because the

⁶ See Exemption No. 18163A (Wing); Exemption No. 18601 (Amazon).

knowledge areas covered in the petitioner's approved training program will not be equal in depth and breadth to what is required to obtain a commercial pilot certificate, the FAA has determined that more frequent training and checking than that required under part 135 is necessary to ensure the pilots have adequately retained the required knowledge and skills necessary to operate safely. Therefore, the FAA will require the petitioner's PICs to complete recurrent training every six calendar months instead of a typical annual requirement as prescribed in § 135.343 and complete a line check every three calendar months⁷ instead of the annual requirement as prescribed in § 135.299. As set forth in Condition and Limitation No. 78, an FAA Operations Aviation Safety Inspector must be the evaluator for at least every other line check and the operator must notify the FAA at least 15 days in advance when pilot line checks are needed so they may serve as the evaluator for a particular line check.

The FAA will also require the petitioners check pilots to review operational and training data and identify any lessons learned or areas of improvement that can be incorporated into the approved training program, on a quarterly basis. The more frequent recurrent pilot training and line checks, in addition to check pilot quarterly requirements, are captured in Condition and Limitation No. 78 for line checks and Condition and Limitation No. 79 for recurrent training. The FAA will also be collecting data from the petitioner's training program, as well as the line checks, to assess pilot and training program performance, which may inform future FAA decisions in this area. To enable the collection of this data, the FAA has Condition and Limitation No. 15 requiring the petitioner to collect performance data on its training program. Additionally, the applicant will collect data on the line checks administered to its pilots and will provide all data to the FAA upon request.

The FAA is not requiring the PIC to hold the appropriate category, class, and type (if required) ratings for the aircraft flown in the petitioner's part 135 operation, as prescribed in § 135.243(b)(1). Because the petitioner's aircraft is not yet type-certificated, the appropriate category, class, and type is not yet defined. Additionally, the design and pilot interfaces are unique in comparison to traditionally type-certificated aircraft with a pilot on board. The petitioner's UAS does not currently fit into the existing category and class ratings for airman certificates issued under part 61, and the petitioner's pilots will not have any ability to directly manipulate the unmanned aircraft's flight controls. For these reasons, the FAA has determined that, for safe operations, the pilot's experience manipulating flight controls on board an aircraft is less relevant than the pilot's experience with the Sparrow aircraft itself. The FAA finds that the air carrier specific training for the Sparrow aircraft, and the more frequent recurrent training and the checking events will ensure PICs are properly qualified to control the aircraft and there is no adverse impact on safety.

Accordingly, relief is granted to § 135.243(b)(1) to the extent necessary to allow the petitioner to operate US registered UA, in on-demand air carrier operations, subject to the conditions and limitations described below.

⁷ The FAA initially imposed the same increased line checks in Exemption No. 18163A. The FAA subsequently decreased the frequency of line checks in Exemption No. 18163D based on the FAA's observation of the outcomes of the training program.

While the PIC is relieved from the requirement to hold a commercial pilot certificate, they are still conducting operations under part 135 for compensation or hire that would require the PIC to hold a second class medical certificate under § 61.23. Petitioner has indicated that its PICs will hold a second-class medical certificate. In Condition and Limitation No. 77, the FAA is requiring petitioner's PICs hold at least a valid FAA second-class medical certificate to provide assurance the pilot does not have a condition that would affect the safety of an operation. The FAA has determined that holding a second-class medical certificate provides reasonable assurance the pilot does not have a medical condition that would cause a safety risk to a flight operation because it requires a medical evaluation conducted by a designated airman medical examiner.

§ 135.243(b)(2) – Pilot in Command Qualifications

Section 135.243(b)(2) requires a PIC to have 500 hours of time as a pilot, including at least 100 hours of cross-country flight time, at least 25 hours of which were at night.

Because operations will be conducted only during the day, night experience is not necessary for the petitioner's PICs. As such, the FAA grants relief from the night experience requirements in § 135.243(b)(2) because the experience is not relevant to the PIC's safe operation of the UA.

The FAA also finds it unnecessary to require the petitioner's pilots to obtain 500 hours of flight time in order to conduct part 135 operations under this exemption. This flight time in an aircraft would be of limited benefit because the design and pilot interface with the petitioner's unmanned aircraft is significantly different from a type-certificated aircraft flown by a pilot on board. Additionally, although petitioner's PICs will be serving in part 135 operations, the PICs will conduct operations in the operational environment covered by part 107, including operating no higher than 400 ft. AGL, and will receive training and experience particular to the operational environment and the aircraft being flown.

Additional consideration is given to the fact that these aircraft fly a pre-programmed route and the pilot does not have the ability to directly manipulate the aircraft flight controls. The PIC can only direct outcomes that the aircraft will execute, based on programming or issued commands. Once launched, the petitioner's aircraft will not divert from its pre-planned route, unless a command is initiated by the system or the PIC.

The approved training program also employs scenario-based training to ensure the pilots properly assess the situation and employ the safest option. The aircraft will then follow the command input by the PIC, and perform that selected function, based on the preprogrammed parameters.

The Sparrow's range is limited to a radius of 50 miles from its launch location and, under normal conditions, the UA will not intentionally land anywhere except the point of departure (the Nest). The petitioner's operations will be conducted within the environment covered by part 107, while operating under part 135. Each flight has a preplanned route that the UA will follow for the outbound portion to a delivery site and return to the Nest. Flight routes are planned to minimize ground risk and will not overfly power plants, cell stations/towers, large crowd assembly points, schools (elementary, middle, high) or other areas deemed high risk during the flight route design

process. These flight routes are created and tested using both automated software tools and manual analysis of each flight route. When able, operations will be outside of Class A/B/C/D/E airspace to ensure that risk to aircraft is negligible. If flight will be inside controlled airspace, appropriate permissions and approvals will be obtained prior to flight. If a Mode C veil is available, an attempt will be made to operate inside the veil to increase cooperative aircraft detection capabilities (i.e., ADS-B). Both the Chief Pilot, UAS and Director of Operations, UAS will also perform a validation check to ensure potential no-fly areas, and collision hazards along flight routes, have been identified and mitigated. The flight route is then tested through a computer simulation to validate safety criteria is met.

Additionally, the petitioner's approved training program employs computer-based simulation, which can present pilots with weather, airspace and air traffic scenarios unique to their specific operational routes. Due to the nature of UAS, from the pilot perspective, this simulation is identical to actual flight in most respects and is more relevant than additional hours obtained serving as a pilot in manned aircraft.

The FAA is therefore granting the petitioner relief from the flight time requirements specified in § 135.243(b)(2) for its PICs. As stated above, a PIC is required to hold a valid part 107 certificate with a small UAS rating, comply with § 107.65, and satisfactorily complete an FAA-approved air carrier training program that provides operation and UAS specific training. However, despite the benefits of computer-based simulation training, and in consideration of the Sparrow's extended range capability, the FAA will require in Condition and Limitation No. 80 that the pilot, prior to acting as PIC, complete supervised operational experience with a check pilot on the specific route to be flown or, a route that is representative in distance and airspace complexity. This will ensure PICs have an adequate understanding of the route and airspace in which they will operate.

With the increase of UAS operations in the airspace under 400 ft. AGL and the unique operating requirements for those operations as compared to part 91 operations, the FAA finds that requiring the PIC to hold a valid part 107 certificate will ensure the PIC has knowledge of the operating environment in which the petitioner's part 135 operations will be conducted. In addition, completion of the petitioner's approved training program will increase the PIC's foundational knowledge (e.g., recognition of weather situations, aeronautical decision making, etc.) and experience specifically applicable to the petitioner's proposed operation and essential to ensure safety of a part 135 operation. The approved air carrier training program will also ensure the PIC obtains extensive ground training, robust flight training specific to the aircraft operated under this exemption, and frequent recurrent training and checking. Condition and limitation Nos. 78, 79, and 80 ensure the petitioner's PICs obtain and maintain the experience and qualification necessary to operate the Sparrow UA in part 135 operations, at or below 400 ft. The FAA finds that relief from the flight time requirements in § 135.243(b)(2) will not adversely affect safety. To best document experience operating the Sparrow UA, the FAA requires each PIC to log flight information, in accordance with their pilot letter of authorization and provide it to the Administrator upon request.

Accordingly, relief is granted to § 135.243(b)(2), to the extent necessary to allow the petitioner to operate U.S.-registered UA, in on-demand air carrier operations, subject to the conditions and limitations described below.

§ 135.243(b)(3) – Pilot in Command Qualifications

Section 135.243(b)(3) requires each PIC of an airplane to hold an instrument rating or an airline transport pilot certificate. Given the analysis and decisions related to § 135.243(b)(2) above, and the controlled nature of the petitioner's training, checking, and currency requirements for its PICs, the FAA has considered the intent of this section and, given the "day VFR only" nature of the petitioner's proposed operation, determined that an equivalent level of safety is achieved, provided the PIC is a certificated pilot under part 107, as well as trained and qualified under the petitioner's approved training program and follows the conditions and limitations provided in this exemption.

Accordingly, relief is granted to § 135.243(b)(3), to the extent necessary to allow the petitioner to operate U.S.-registered UA, in on-demand air carrier operations, subject to the conditions and limitations described below.

§135.243 - Other Required Personnel

Flight Operator

FOs are responsible for the overall safety of the operational environment of the launch and recovery site. FOs are also responsible to inform the PIC of air traffic conflicts, boundary violations, and deviations from planned flight paths and other abnormal events. The FO also has delegated authority from the PIC to conduct preflight inspections, visually checks the airspace is clear prior to flight, and initiates the UA launch upon the PIC's command.

The FO is a fundamental role which significantly assists the PIC with traditional PIC duties. The FAA has determined that the FO performs pilot functions because the FO will conduct a UA preflight inspection ensuring airworthiness of the UA and is responsible for safe operations at the launch and recovery site. The FO is also the crewmember that, at the PIC's direction, will command the launch of the Sparrow. Because these are normally duties and responsibilities of a part 135 PIC, the person performing these pilot functions is required to hold a commercial pilot certificate under § 135.243. The FAA, however, is granting relief from the requirement for FOs to hold commercial pilot certificates. Because FOs are not required to have the breadth of knowledge that a part 135 PIC is required to have, part 61 knowledge and practical testing, as well as the experience flying in the NAS, is not relevant to the duties they perform for the petitioner. Instead, the FAA is requiring the FO to complete the approved training program for FOs and hold a valid part 107 RPC (including compliance with § 107.65).

The aircraft preflight inspection is traditionally done under the authority of a pilot certificate, but may also be completed as a repairman task, if authorized. The petitioner's FOs conduct aircraft preflight under the authority of a repairman certificate; therefore, Condition and Limitation No. 85 requires the FOs to hold a valid repairman certificate to perform this task.

Visual Observer

The petitioner's proposed operations occur beyond visual line of site from the PIC. The petitioner's current fleet of aircraft do not provide an approved detect-and-avoid (DAA) technological solution to see and avoid other aircraft. Because of this, the petitioner incorporates multiple sources of information the PIC relies on to safely navigate the aircraft. The petitioner incorporates information from ADS-B In, air traffic radar feeds, and VOs, and it uses these inputs to make collision avoidance decisions and other flightpath changes necessary to avoid hazards. The petitioner proposes to position VO personnel along the route of flight to provide the PIC real-time environmental, weather, obstacle, and air traffic information, which are necessary for safe operation. The petitioner will provide a daisy-chain of VOs in sufficient quantity to observe the entire volume of airspace through which their aircraft will travel.

The FAA has previously granted exemptions for operations which occur beyond the visual line of sight of the PIC where VOs are utilized to monitor scan airspace. See Exemption No. 18163 (Wing Aviation LLC), Exemption No. 18339 (UPS Flight Forward), and Exemption No.18601 (Amazon Prime Air).

The petitioner's GOM for the proposed operations documents that VOs must hold an RPC issued in accordance with part 107. Consistent with prior exemptions, the FAA requires in this exemption that VOs hold a valid RPC issued in accordance with part 107 and comply with § 107.65. Because the RPC does not carry the authority for operations outside of part 107, an additional pilot authorization will be issued to these individuals following an oral and practical evaluation of their duties and responsibilities as defined in the petitioner's GOM. The authorization issued to each person will include appropriate conditions for the position. This is consistent with the relief granted in Exemption Nos. 18163, 18339 and 18601.

The individuals serving as VO must not have reason to know that they have a physical or mental condition that would interfere with the safe operation of the aircraft. In addition, because the visual observer is required to have good vision they must be able to see the airspace along the planned route clearly, recognize terrain, obstructions, see and avoid aerial hazards and other aircraft without undue hesitation. Visual observation must be accomplished and maintained by unaided vision, except vision that is corrected by the use of eyeglasses (spectacles) or contact lenses to maintain a normal field of vision.

In consideration of the duties and responsibilities of the VOs the FAA finds that holding a medical certificate is not warranted for these personnel. VOs do not have the ability to control or issue a direct command to the aircraft during flight operations; therefore, the risks associated with medical episodes are lower for them. In the event of loss of communication between a PIC and a VO due to medical emergency, or for any other reason, Condition and Limitation No. 29 requires the VOs sector to be vacated until communications are restored. In addition, there are multiple persons fulfilling these positions for any given flight, which also lowers the risk of a medical episode impacting the safety of flight. Accordingly, the FAA is granting relief from § 61.23(a)(2) for petitioner's VOs and a medical certificate is not required for VOs.

§ 135.267 – Flight Time Limitations and Rest Requirements: Unscheduled one- and two-pilot crews

Section 135.267 prescribes maximum number of hours, of commercial flight time, that one and two pilot crews may accrue in: 24 consecutive hours, calendar quarter, two consecutive calendar quarters, and calendar year. The regulation also prescribes a minimum length for rest periods, and the minimum required number of rest periods per calendar quarter.

The petitioner requests relief from this set of requirements to obtain flight and duty requirements more specific to the type of operation they are conducting, because PICs do not manipulate aircraft flight controls directly, but instead play a supervisory and monitoring role over automated systems that operate the Sparrow UAS. The petitioner states that PICs serve a critical role in their operation and have established a maximum duty day, a maximum duty week, and required minimum and continuous rest periods that are proportional for their proposed operations.

The petitioner's company manuals establish duty time limits for two duty positions, for persons they advocate are directly involved with flight operations of their UAS—the PIC and FO.⁸ The FAA has determined that, under traditional circumstances, the PIC performs their own visual preflight inspection of the aircraft, inspects the loading of the aircraft, and conducts their own visual surveillance of the airspace while flying the aircraft. Therefore, in granting this relief, the FAA establishes flight, duty and rest requirements that are specific to the type of operation the petitioner is conducting and proportionally distributes this relief among all employees performing equivalent duties and responsibilities. All personnel performing duties normally associated with PIC must abide by the same duty and rest rules. Accordingly, the FAA determined that it would meet an equivalent level of safety to that provided by the current PIC, FO and VO will be required to abide by the duty time limitations contained in the conditions and limitations of this exemption.

The current rule limits the amount of flight time that a person may serve, in all commercial flying, and this includes any commercial flying that the PIC accomplishes, including commercial flying conducted for someone other than the certificate holder. Although this applies to flight time, and the petitioner has asked for relief from flight time limitations, the FAA determined that in granting this relief, there should be a similar limit for total duty time in all commercial operations, so that an equivalent level of safety is maintained. Condition and Limitation Nos. 71, 72, and 73 limit duty time and prescribe rest requirements. This ensures when flight operations personnel are conducting commercial operations for another operator, those personnel will be in a condition for safe flight operations when working for the petitioner. The limitations on duty and rest are indicated for not only the PIC, but also for the VO and FO, which do not have a pre-established regulatory requirement for duty but are performing pilot duties as established by the FAA in prior analysis. Accordingly, the FAA applies the same duty time limitations to each of these positions to ensure proper rest, given the nature of the operation.

⁸ The petition mentions that it would apply flight and duty requirements to the PIC and the VO.

Accordingly, relief is granted to § 135.267, to the extent necessary, to provide duty-time limitations more specific to the petitioner's concept of operations and to apply those requirements to additional UAS crew in on-demand air carrier operations, subject to the conditions and limitations described below.

14 CFR Part 135 – Subpart H - TRAINING

§§ 135.337(b)(1) and 135.338(b)(1) - Qualifications: Check Airmen and Flight Instructors (Aircraft), Check Airmen and Flight Instructors (Simulator).

Sections 135.337(b)(1) and 135.338(b)(1) state that no certificate holder may use a person, nor may any person serve as a check airmen or flight instructor of an aircraft, respectively, in a training program established under subpart H of part 135 unless, with respect to the aircraft type involved, that person holds the airman certificates and ratings required to serve as PIC in operations under part 135. As discussed, § 135.243(b)(1) requires the PIC of an aircraft, under VFR conditions, to hold at least a commercial pilot certificate with the appropriate category and class ratings and, if required, an appropriate type rating for that aircraft.

The petitioner requests relief from the commercial pilot certificate requirement for instructors and check airmen and asserts that this request for relief is consistent with the relief requested for PICs, pursuant to § 135.243(b)(1)-(3), as well as previous grants of exemptions. In addition to meeting the qualifications (i.e., certificates and training) required to serve as a PIC, the approved OTM also requires that all crewmembers, operating as Flight Operations Evaluators (FOE) and Flight Operations Instructors (FOI), hold at minimum a private pilot certificate, have a certain amount of experience in Zipline's operations, and complete instructor or evaluator training.

The FAA is granting the petitioner relief from §§ 135.337(b)(1) and 135.338(b)(1) for the reasons discussed above for relief granted to the petitioner's PICs. However, because the petitioner's operations will be conducted in a pre-programmed operational environment similar to operations under part 107, the UAS FOEs and FOIs must hold a valid RPC, issued under part 107, and remain current in accordance with § 107.65. In addition, these individuals must hold a second-class medical certificate. Therefore, relief from §135.337(b)(1) and 135.338(b)(1) is granted, subject to the conditions and limitations listed below.

§§ 135.339(e)(3) and (4) and 135.340(e)(3) and (4) - Initial and Transition Training and Checking: Check Airmen and Flight Instructors (Aircraft), Check Airmen and Flight Instructors (simulator).

Sections 135.339(e)(3) and (4) and 135.340(e)(3) and (4) require that the initial and transition flight training for check pilots and flight instructors respectively must include training and practice in conducting flight checks from the left and right pilot seats.

The petitioner requests relief from these two requirements, because their GCS has only one PIC assigned to any Sparrow aircraft. Therefore, it would be impossible to comply with the seat position training requirements. The petitioner's training program shall ensure that each FOE and FOI is trained in the required normal, abnormal and emergency maneuvers, as well as the safety

measures to be taken in any emergency situation that is likely to develop during flight training and/or checking, and is consistent with the intent of the regulation.

The FAA recognizes consistent with past exemptions (Exemption No. 18601) that these requirements are impossible for the petitioner to meet because the ground control station does not have a left and right pilot seat. However, because these requirements apply to part 135 operations, the FAA finds it necessary to grant relief from these requirements to the extent the training must be conducted in both pilot seats. Therefore, the FAA finds that relief from §§135.339(e)(3) and (4) and 135.340(e)(3) and (4) would not adversely affect safety because the petitioner will comply with the conditions and limitations listed below.

Accordingly, relief is granted to § 135.339(e)(3) and (4), § 135.340(e)(3) and (4), in accordance with the conditions and limitations listed in this exemption.

FAA-Initiated Relief

Although the petitioner has not requested regulatory relief from the following regulations, after further analysis the FAA finds that the petitioner requires additional regulatory relief to conduct its operation.

§ 91.109(a) – Flight instruction, dual control requirement

Section 91.109(a) provides that no person may operate a civil aircraft (except a manned free balloon or an unmanned aircraft) that is being used for flight instruction unless that aircraft has fully functioning dual controls. However, this requirement is often impractical for unmanned aircraft that are operated from a control station located on the ground. The FAA's analysis reveals the petitioner's Ground Control Station (GCS) allows for unobstructed access to the aircraft controls from the side and rear of the control station seat. The FAA agrees that it would be impractical to require compliance with § 91.109(a) when a level of safety equivalent to that provided by the regulation can be achieved. The lack of physical barriers and access to the aircraft controls provides for a seamless and timely transfer of controls during training activity and therefore provides an equivalent level of safety. The FAA believes an equivalent level of safety can be achieved with the Instructor Pilot (IP) sitting or standing next to the control station and the trainee, where the IP can quickly and safely assume control of the unmanned aircraft.

Accordingly, subject to the petitioner's compliance with the procedures as described in the conditions and limitations, the FAA is granting relief from the requirements of 14 CFR § 91.109(a) to the extent necessary to allow the petitioner to conduct training with the Sparrow UA without fully functioning dual controls.⁹

⁹ Because part 135 flight training is required by FAA regulations, § 91.109(a) applies to the petitioner when flight training is being conducted under its approved part 135 training program. For UA operations conducted under part 91, the FAA notes that this regulation would not apply because part 91 unmanned aircraft "flight training" is not required by regulation to operate an unmanned aircraft.

§ 135.21(f) – Manual Requirements

Section 135.21(f) prescribes the requirement to carry appropriate parts of the GOM on each aircraft when away from the principal operations base. The appropriate parts must be available for use by ground or flight personnel.

The FAA finds that relief from § 135.21(f) is necessary and appropriate, because the petitioner operates small UAS that are not capable of carrying any personnel aboard the aircraft, which negates the need for manuals to be on board the aircraft.

The FAA finds an equivalent level of safety can be met, as long as the petitioner ensures the appropriate portions of the GOM are readily available for use by ground personnel and the PIC, when the pilot is at his or her duty station. The FAA includes Condition and Limitation No. **Error! Reference source not found.** to require the operator to provide manuals to personnel during the performance of their duties.

Therefore, the FAA finds that relief from § 135.21(f) would not adversely affect safety subject to compliance with the conditions and limitations contained in this exemption.

§ 135.65(a) and (d) – Reporting Mechanical Irregularities

Section 135.65 describes reporting mechanical irregularities. Section 135.65(a) prescribes that each certificate holder shall provide an aircraft maintenance log to be carried on board each aircraft, for recording or deferring mechanical irregularities and their correction. Section 135.65(d) prescribes that each certificate holder shall establish a procedure for keeping copies of the aircraft maintenance log, required by this section, in the aircraft for access by appropriate personnel, and shall include that procedure in the manual required by § 135.21.

Although the petitioner did not request relief from this requirement, due to the size and characteristics of the Sparrow UA, it makes it impractical to comply with the sections of this regulation. Previously held similar rules related to the carriage of records and manuals aboard UA are not applicable to UAS operations. Within the petitioner's GOM, Section 3.6, it describes how aircraft maintenance logs are available to the appropriate personnel.

The FAA finds an equivalent level of safety can be met, as long as the certificate holder ensures the appropriate portions of the aircraft maintenance log are readily available for use by ground personnel and the PIC, and that the petitioner has procedures requiring the aircraft maintenance log to be readily available when the pilot is at his or her duty station.

Accordingly, relief is granted to §135.65(a) and (d) in accordance with the conditions and limitations listed in this exemption.

§ 135.95(a) – Airmen: Limitation on Use of Services

Section 135.95(a) states that no certificate holder may use the services of any person as an airman unless the person performing those services holds an appropriate and current airman

certificate and is qualified, under this chapter, for the operation for which the person is to be used.

While the petitioner did not request relief from this section, to be consistent with the relief to § 135.243(b)(1) through (b)(3), the associated conditions and limitations that require the PIC to possess a RPC that remains current in accordance with § 107.65 and complete the petitioner's approved training and checking program, the FAA has determined that relief is necessary and appropriate, in lieu of a commercial pilot certificate issued under part 61. The FAA has also determined that granting relief from 14 CFR § 135.95(a) would have no adverse effect on safety. Accordingly, relief is granted to § 135.95(a), in accordance with the conditions and limitations listed in this exemption.

§ 135.143(a) – General Requirements

Section 135.143(a) states, no person may operate an aircraft under commercial operations unless that aircraft and its equipment meet the applicable regulations of this chapter.

The FAA determined that because the petitioner's UA currently holds an exemption from the requirement for an airworthiness certificate under 49 U.S.C. 44807, its aircraft does not meet the requirements of this chapter; therefore, as an administrative matter, relief from this provision is necessary. However, compliance with the conditions and limitations of this exemption ensures that relief from this provision does not cause an adverse effect on safety. Accordingly, the FAA is providing relief from this provision to the extent the petitioner requires it to operate in accordance with this exemption.

§ 135.205(a) – Visual Flight Rules (VFR) visibility requirements

The FAA reviewed the definitions of flight and ground visibility and finds that the petitioner requires relief from this provision. The FAA has determined that it is not possible for a UAS operator to determine flight visibility as defined by 14 CFR 1.1.¹⁰ Flight visibility means the average forward horizontal distance, from the cockpit of an aircraft in flight at which prominent unlighted objects may be seen and identified by day and prominent lighted objects may be seen and identified by night. Ground visibility means prevailing horizontal visibility near the earth's surface as reported by the United States National Weather Service or an accredited observer. The petitioner relies on use of ground visibility; accordingly, relief from this provision is only granted to the extent that the petitioner may substitute ground visibility for flight visibility when making a visibility determination.

In Exemption 18163 the FAA determined that UAS flight operations utilizing VOs may be conducted only when visibility is at least two statute miles, regardless of VFR minimums for the

¹⁰ The petitioner will also receive relief from § 91.155 in its certificate of authorization or waiver.

class of airspace within which the operation is being conducted. VOs must be regularly stationed along the route of flight as required to ensure overlapping of visual range between adjacent observers and maintain and utilize two-way communication between the VOs and the pilot. Condition and Limitation Nos. 43 and 53 address these visibility requirements.

The FAA has reviewed the petitioner's procedures for determining visibility minimums from weather sources authorized in its operations specifications and finds that the petitioner's current procedures and its compliance with Condition and Limitation No. 53 of this exemption will maintain an equivalent level of safety using visibility measured from the ground. Accordingly, the FAA is granting relief from § 135.205(a).

Other Conditions and Limitations

In furtherance of its public interest goals in issuing this exemption, the FAA is including conditions and limitations regarding data collection and recordkeeping requirements to ensure it receives the information necessary to continue working towards rulemaking in this area. These conditions and limitations (Nos. 11, 15, 16, 17, 18, and 51) require data collecting regarding the following topics to be submitted to the FAA: the total payload carried on each flight, training program and line check performance, documentation of the PIC, FO, and VOs for each flight in addition to the flight duration and duty and rest periods, a monthly report detailing all flight operations for that month, initial and final reports for flights that involved any interventions, incidents, or accidents, and a record of the remaining battery charge if a flight termination is initiated.

As the petitioner intends to increase size and complexity of its future operations, the FAA is proactively addressing conditions and limitations related to ratios regarding UA-to-PIC, VO-to-PIC, and Nest-to-PIC. Those conditions and limitations (Nos. 46-48) provide for approval of changes in ratios once requested by the operator. The FAA will conduct a safety evaluation for each ratio change at the time of request.

Public Interest

The petitioner asserts that, in over three-and-a-half years operating at national scale, in multiple countries, they have learned first-hand how UAS will integrate with the medical delivery operations in the United States and will respond to critical operations. Delivering medical supplies such as blood, vaccines, and specialty pharmaceuticals as far as 50 miles in less than an hour will help save the lives of women hemorrhaging in childbirth, improve rural communities' access to convenient and cost-effective medical care, and help seniors and others with difficulty traveling to obtain vital medical supplies safely and easily. Granting the exemptions is in the public interest because it will support the deployment and expansion of these critical and cost-effective medical delivery services in a rapid, safe, and efficient manner in the United States.

The petitioner asserts that UAS package delivery reduces stress on surface transportation infrastructure, and has less environmental impact than traditional surface or airborne transportation methods. The petitioner also stated that granting its petition would continue to foster the FAA's safe and reliable collection of data needed to authorize carriage of property by

UAS operators. More importantly, compliance with the conditions and limitations of this exemption would allow the petitioner, as an air carrier operating under part 135, to provide service with the highest possible degree of safety, in the public interest.

The petitioner intends to continue this building-block approach under its part 135 operating certificate. They state it will field its operations in a measured fashion beyond a 1:1 UA to PIC ratio, only once the FAA has determined that such operations are safe. As described in the petition and in supplemental documents, through the combination of VOs, coordination with air traffic control, and other proposed actions, the Sparrow would operate safely under the exemptions granted from applicable regulations.

The FAA agrees that granting the petition serves the public interest in multiple ways through continued service for residents to obtain essential goods on-demand and enabling businesses to continue operations during times of restriction. The 2018 FAA Reauthorization Act (Public Law 114-254) requires the FAA to “update existing regulations to authorize the carriage of property by operators of small unmanned aircraft systems for compensation or hire within the United States” within a year of the date of enactment. (Sec. 348; 49 U.S.C. 44808). Section 44808 also authorizes the petitioner to seek relief from current processes while the FAA updates its regulations.

Additionally, this exemption is issued in connection with the FAA BEYOND program. The BEYOND program builds off of the former UAS Integration Pilot Project that expired on October 25, 2020. The policy objectives for BEYOND align with those of the UAS IPP, includes “promoting innovation and economic development.” Assessment of scalable operations, using technology that falls outside of the current regulatory framework, is necessary to collect appropriate data to further evaluate the viability of this technology. Accordingly, granting this exemption further helps FAA and industry adapt for scalable and sustainable operations to advance the future of UAS commercial package delivery operations and the safe and efficient integration of UAS into the NAS.

The FAA’s Decision

In consideration of the foregoing, a grant of exemption is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. §§ 106(f), 40113, and 44701, delegated to me by the Administrator, Zipline International Inc. is granted an exemption from 14 CFR §§ 61.3(a), 91.109(a), 91.119(b) and (c), 91.121, 91.151(a), 135.21(f), 135.63(c) and (d), 135.65(a) and (d), 135.95(a), 135.143(a), 135.149(a), 135.161(a), 135.203(a), 135.205(a), 135.209(a), 135.243(b)(1)-(3), 135.267, 135.323 135.337(b)(1), 135.338(b)(1), 135.339(e)(3) and (4), 135.340(e)(3) and (4), to the extent necessary to allow Zipline International Inc. to conduct part 135 air carrier operations for commercial package delivery, using the Sparrow UAS, subject to the conditions and limitations listed below.

Conditions and Limitations

In this grant of exemption, Zipline International Inc. is hereafter referred to as the operator.

Failure to comply with any of the conditions and limitations of this grant of exemption renders this entire exemption void.

I. General

1. Operations authorized by this grant of exemption are limited to the Sparrow aircraft listed in OpSpec A003. Proposed operations of any aircraft other than the Sparrow requires a new petition or a petition to amend this exemption.
2. Exemptions granted from regulations contained in parts 61, 91 and 135 may be utilized only in conjunction with an air carrier certificate issued by the Administrator and as authorized by OpSpecs A001.
3. UA operating under this exemption that do not have a standard airworthiness certificate shall be maintained under a continuous airworthiness maintenance program (CAMP) as outlined in §§ 135.411(a)(2), 135.415, 135.417, and 135.423 through 135.443, or an approved aircraft inspection program (AAIP) under § 135.411(a)(1).
4. For part 135 operations, the operator must maintain and adhere to the following manuals and checklist, at the latest revision level, approved or accepted by the FAA.
 - a. General Operations Manual (GOM)
 - b. General Maintenance Manual (GMM)
 - c. Training Program Manual
 - d. Flight Event Response Manual
 - e. Will-Carry Hazardous Materials Operations Manual and Training Program
 - f. Zipline Sparrow Operations Checklist
5. Requests to change the scope or area of operations contemplated by this exemption must be made to the FAA certificate management team, who will determine if validation testing must be conducted in addition to an operational area assessment prior to approval, or if such a change requires an amendment to this exemption.
6. All documents used by the operator to ensure the safe operation and flight of the UA, including this exemption and Exemption No. 19110, and any documents required under 14 CFR §§ 91.9, 91.203, and 135.65 must be available to the PIC any time the aircraft is operating. These documents must be made available to the Administrator or any law enforcement official upon request.
7. If a discrepancy exists between the conditions and limitations in this exemption, the procedures outlined in the operator's part 135 manuals, the Unmanned Aircraft Flight Manual (UFM), the Unmanned Aircraft Maintenance Manual (UMM), or any provisions issued under a waiver to any part 91 requirement, the operator must comply with the most restrictive provision. The operator shall not make any updates or revisions to the above manuals that would affect the basis upon which the FAA granted this exemption, unless those updates or revisions are made in accordance with a petition to amend this exemption.

8. This exemption is not valid for operations conducted outside of the United States.
9. Persons participating in the operation of the UAS, including PICs, FOs, VOs, Fulfillment Operations Personnel, Maintenance Technicians, and the customer retrieving the package, must provide consent to the operator, in a form and manner acceptable to the Administrator, that indicates they are aware of the potential risks of UA operations and provide consent to participate in the operation, notwithstanding those risks. Record of each such consent must be available for review upon request by the FAA for three years from the date of termination of employment or removal of consent.
10. Remote pilot duty stations must be physically located within the United States and the locations must be provided to the FAA prior to operations at any new location.
11. The operator must maintain a record of the total payload carried on each flight. This record must be kept for at least 30 days at the principal operations base or at another appropriate location approved by the FAA and be made available to the FAA upon request.
12. The operator must have procedures in its GOM for the loading of its aircraft. Those procedures must ensure that the PIC has the necessary information to ensure that the maximum take-off weight (MTOW) and the maximum total payload are not exceeded for each flight.
13. The operator must provide copies of its current aircraft loading procedures to all persons responsible for the loading of its aircraft.
14. The operator must ensure that ground personnel, PICs, and other flight crewmembers have access to the portions of the manual system that pertain to their duties and responsibilities, during the performance of their duties.
15. The operator must collect performance data from its training program and line checks, and make that data available to the Administrator upon request. The data collected must include:
 - a. Identification by subject area or training module how often additional training or retraining of each crewmember was given;
 - b. Identification of any areas of retraining given to each crewmember during a satisfactory checking event; and
 - c. Records indicating any unsatisfactory tests and checking events and the reason(s) for the unsatisfactory performance by each crewmember.
16. The operator is responsible for maintaining the following data:
 - a. Date, name, and certificate number of the designated PIC responsible for each flight;
 - b. Date, name, and certificate number of the FO responsible for each flight;
 - c. Date, name, and certificate number of the VOs assigned for each flight;
 - d. Duration of each flight;

- e. The length of the rest period prior to each duty period for each PIC, FO and VO;
 - f. Total hours on duty per calendar day for each PIC, FO and VO;
 - g. Total duty time the designated PIC spent operating more than one aircraft, at the same time per calendar day, if authorized;
 - h. Total duty time the designated PIC spent operating the maximum authorized number of aircraft, at one time per calendar day, if authorized; and
 - i. Total number of “Land Now” commands per calendar day distinguishing between aircraft and PIC-initiated and reason.
17. The operator must submit a monthly report, for all flights conducted that month, and send the report to the responsible Flight Standards office by the 10th day of the month immediately following the data collection month, which includes the following:
- a. The number of part 135 flights that were initiated;
 - b. The number of part 135 flights that had any interventions, incidents, or accidents;
 - c. For flights that involved any interventions, incidents, or accidents, the certificate holder must provide the following information:
 - i. The causal factors for each event; and
 - ii. The names of crewmembers, their respective roles (PIC, VO, FO), and their locations; and
 - d. If the certificate holder has initiated any corrective actions to any previous interventions, incidents, or accidents, the specifics of such actions.
18. For flights that involved any interventions, incidents, or accidents, the operator must:
- a. Send an initial report to the responsible Flight Standards office within 24 hours of the event. The initial report should provide the following information:
 - i. A description of the event, including operational and environmental factors;
 - ii. A description of the initial, known contributing factors for the event; and
 - iii. Specify the names of the crewmembers involved in the operation and their respective roles (PIC, VO, FO).
 - b. Send a final report of the intervention, incident, or accident on completion of the investigation.

II. Unmanned Aircraft, Including Maintenance

19. The UA must have a flight control system with “Land Now” capability.
20. The operator shall not dispose of its life-limited parts in a manner that would lead to them being installed on another type-certificated aircraft without the recipient having knowledge of the accumulated time on the part.
21. The operator must adhere to the following regarding general operations:
- a. Flight operations must minimize ground risk and not overfly:
 - i. Power plants;
 - ii. Open-air assemblies of people;

- iii. Schools during times of operation (e.g., elementary, middle, high, preschool and daycare facilities);
 - iv. Moving vehicles, except transitory flight operations;
 - v. Roadways or highways, except transitory flight operations; and
 - vi. Any other area deemed high risk by the operator during the flight route design process.
 - b. Airspace Avoidance Areas:
 - i. The UA must remain clear of known areas with increased aviation activity (e.g., ultralight areas, aerobatic boxes, active military training routes, or other areas with a high volume of low altitude traffic); and
 - ii. The UA may not operate within 3 miles of any public use runway or other landing area, without suitable mitigations that are described in their GOM.
22. Prior to each operation, the operator must designate safe emergency landing areas that the UA can reach if it is unable to complete the intended flight, and identify such emergency landing areas to the PIC operating the aircraft. The emergency landing areas must:
- a. Be known in advance to the PIC operating the aircraft;
 - b. Provide for a landing without undue hazard to persons or property on the ground;
 - c. Be co-located with a VO, or otherwise monitored and controlled by the petitioner's personnel, or controlled, fenced, or otherwise secured in an area with the landowner awareness, or as approved by the Administrator;
 - d. Be areas with a low likelihood of exposed persons, such as forested areas providing significant sheltering, farmland, or prairies; and
 - e. Avoid prohibited structures and roads identified by the operator that pose a risk to persons and property.
23. The operator must adhere to the following regarding delivery and launch-and-recovery sites:
- a. The delivery site(s) will ensure a safe delivery can be completed and is clear of large trees, power lines or other obstacles that may create a hazard;
 - b. The launch-and-recovery sites must be clear of nonparticipating people and moving vehicles;
 - c. Launch-and-recovery sites must be limited to locations with access restricted to only persons participating in the operation and described in their manual; and
 - d. The operator must describe, in their manual, the distance non-participants must remain from all operations, to include delivery and launch-and-recovery sites.

III. Unmanned Aircraft System, Including Maintenance

24. For all current operations areas, and prior to conducting operations in a new area, the operator must complete a communication service assessment and submit it to the FAA for acceptance. The assessment must, at a minimum, include:
- a. A C2 analysis for all areas of operations, to include coverage and availability;
 - b. A monitoring plan that ensures connectivity is maintained and availability issues addressed; and

- c. C2 lost link procedures, including an analysis of those procedures.
25. For all current operations areas, and prior to conducting operations in a new area, the operator must complete a ground risk assessment and submit it to the FAA for acceptance. The assessment must, at a minimum, include all of the following:
- a. Consideration of the provisions of Condition and Limitation Nos. 21, 22, and 23.
 - b. Pedestrian and moving vehicle analysis that will consider possible flight paths, with the least presence of people and moving vehicles, during the planned time of operation;
 - c. Terrain and Man-made Obstacle Analysis. For all terrain and man-made obstacles that the certificate holder intends to overfly, the maximum height of such obstructions must be verified by the operator, or a third party, utilizing methods acceptable to the FAA;
 - d. Known weather hazards in the area;
 - e. Consideration of the implications of an unintended release of the types and quantities of hazardous materials authorized to be transported by the operator's Dangerous Goods Procedures Manual and OpSpec A055; and
 - f. A validation check to ensure compliance with the listed conditions and limitations of this exemption.
26. The operator must maintain a configuration control document that lists each associated element required to operate the UA in normal, abnormal, and emergency operations which must include, but is not limited to, ground station hardware, ground station software, ground station peripherals, offboard software, launch and recovery systems, launch pad, base stations, targets, GPS source provider, data links to include data link providers, handheld communication devices or systems.
- a. The associated elements list must identify the specific elements or minimum specifications for the elements necessary for operation of the UA.
 - b. The operator must determine through an evaluation and/or demonstration if the UA and/or associated elements identified in the configuration control document are suitable for operations.
 - c. The operator must submit the initial document and any subsequent changes to the configuration control document to the FAA for approval.
 - d. The configuration control document must reflect the latest UAS configuration.
 - e. The operator must retain all records related to the configuration control document for the duration of the exemption and for at least one year following exemption expiration and provide those records to the FAA upon request.
27. The pilot interface must display all information required for continued safe flight and operation. The information required to appear on the pilot interface display must be approved by the FAA and will be considered in the approval of the configuration control document.
28. The pilot interface must provide access to meteorological information. The device providing meteorological information and its installation must be acceptable to the

Administrator, and the information be readily available to the PIC while at the normal duty station.

29. If the operator's procedures or areas of operations require any type of communication with other persons, for the operation of the UA, the communications equipment must be readily available to the PIC and others who will communicate with the PIC and be operable during operations. Additionally, for communication between a PIC and one or more VOs by use of an electronic communication device:
 - a. The PICs and VOs must be provided with enough devices for timely, effective communications;
 - b. The device must provide for real-time communications;
 - c. There must be a reliable back-up communication method acceptable to the FAA;
 - d. Non-essential communications during flight operations are prohibited; and
 - e. If communication is lost between the PIC and a VO, for any reason, that VOs sector must be vacated until communications are restored. The operator must include this procedure in the GOM.
30. Changes to AE will be managed using an FAA accepted process. This process must detail how the operator will identify changes to AE that appreciably affects the reliability, operational characteristics, or other characteristics affecting the safe operation of the UA. All such changes require FAA approval. Any change to AE that has no appreciable effect on the UA may be implemented by the operator using the FAA accepted process.
31. Any maintenance, alterations, or system changes of any AE that could appreciably affect the operation or flight characteristics (e.g. replacement of a flight critical component) of the UA must be validated by a functional test prior to conducting further operations. If a functional test includes a functional test flight, the flight must be performed 500 feet from non-participating people. The operator must document the satisfactory completion of a functional test.
32. The operator must document and adhere to policies and procedures for maintenance that assure all associated elements of the UAS are capable of meeting the AE's intended function, prior to and during each operation.
33. For each AE the operator uses in its UAS, the operator must describe in its manual system any training and qualification requirements necessary for personnel who maintain those AE.
34. The operator must implement an AE error reporting, evaluation and mitigation program. The operator must evaluate any failures, anomalies, or other in-service problems to ensure that they do not represent a system deficiency that could cause an unsafe condition or result in a subsequent noncompliance with regulations or conditions and limitations. If a failure, anomaly, or in-service problem may result in subsequent noncompliance, the operator must correct the issue to prevent that non-compliance and must report the issue and correction to the FAA via the UAS Service Difficulty Reporting system (UAS SDR system).

35. The operator has 120 days from the effective date of this exemption to comply with Conditions and Limitation Nos. 26, 30, 32, 33, and 34. The operator must submit any documentation necessary to show compliance with these conditions and limitations to the FAA no later than 90 days from the effective date of this exemption for FAA review.
36. The operator may not perform maintenance, preventive maintenance, or alterations for another operator until the aircraft has obtained a standard airworthiness certificate, at which time 14 CFR § 43.3(f) will apply.

IV. Preflight

37. The operator must use actual weights for determining the weight of cargo loaded onto its aircraft or another method authorized by the Administrator.
38. The aircraft's barometric calibration system must be operative for flight operations and accurate to a value acceptable to the FAA Administrator and memorialized in the UFM. The operator must have procedures and checklists available:
 - a. For the responsible person to ensure the barometric calibration system is operative for flight, per approved procedures, during pre-flight inspection; and
 - b. For loss of barometric pressure calibration and/or input.
39. Prior to each flight, the PIC must ensure the C2 available complies with the operator's C2 requirements.
40. Prior to each flight, the PIC must ensure a pre-flight inspection was completed and determine that the UA is in a condition for safe operation. The pre-flight inspection must account for all potential discrepancies, e.g., inoperable components, items, or equipment.
41. The PIC is prohibited from beginning a flight unless considering wind and forecast weather conditions:
 - a. There is enough available power for the UA to conduct the intended operation and to operate after that with at least:
 - i. The minimum power reserve requirement must provide a remaining charge sufficient to facilitate a descent and landing without undue hazard to persons or property on the surface; or
 - ii. The UA manufacturer's stated minimum power reserve requirement; whichever is greater; and
 - b. The operator has contingency plans acceptable to the FAA in the case of battery depletion greater than anticipated.
42. Prior to each flight, the operator must consult advisory and warning publications or programs for any GPS availability or quality issues and confirm that GPS is expected to be available throughout the intended operation with acceptable performance. Additionally, the operator must consider the effect of degraded GPS inputs induced by adjacent structures and implement appropriate mitigations.

43. The operator must have a VO plan. The plan must provide:
 - a. Sufficient VOs are used to identify any non-participating aircraft prior to their entry into the planned operational area. Sufficient VOs is defined as the minimum number of VOs required to continuously observe at least a 2 statute mile radius of airspace surrounding the sUA in flight; and
 - b. VOs are physically located such that the remote PIC receives sufficient notice to ensure the UA remains well clear of all other aircraft.
44. Prior to beginning flight operations, the PIC must:
 - a. Verify that there is a VO plan that ensures sufficient VOs are available to be able to identify any non-participating aircraft prior to their entry into the planned operational area.
 - b. Verify that there are sufficient VOs available, as required by the plan;
 - c. Verify that all required VOs are briefed and are aware of the operational requirements of the VO plan to include.
 - i. Designated positions, physical locations, responsibilities, and crew resource management;
 - ii. Planned flight operating area;
 - iii. Launch-and-recovery sites;
 - iv. Ground risks;
 - v. Alternate landing sites;
 - vi. Verification of geo-fence boundaries;
 - vii. Verification of flight profile and course; and
 - viii. Procedures for avoidance of other aircraft.
 - d. Be familiar with all the content from the VO briefing.
45. The PIC must verify that the control station is configured to control the intended UA before flight.

V. Flight Operations

46. The operator may only conduct operations at a Nest-to-PIC ratio of 1:1 unless otherwise authorized by the FAA. The operator must successfully complete validation testing conducted by the FAA for an increase in the Nest-to-PIC ratio.
47. The operator may only conduct operations at a UA-to-PIC ratio of 1:1 unless otherwise authorized by the Administrator. The operator must successfully complete validation testing conducted by the FAA for an increase in the UA-to-PIC ratio.
48. The operator may only conduct operations at a VO-to-PIC ratio of 2:1 unless otherwise authorized by the Administrator. If the Administrator determines validation testing is necessary, the operator must successfully complete validation testing conducted by the Administrator.
49. The operator must:

- a. Ensure the aircraft is operated at a suitable altitude that will not cause a hazard to persons or property on the surface; and
 - b. Consider all equipment tolerances when determining such altitudes.
50. The operator must provide notification to each delivery customer and instruct the customer to remain clear of the UA during the delivery stage of flight by a distance sufficient to ensure the UA does not cause a hazard to the customer or other people on the ground.
51. The operator must record, and make available to the FAA, the remaining battery charge if a flight termination is initiated.
52. All operations must be conducted under day VFR. Flights under special visual flight rules (SVFR) or at night as defined in 14 CFR § 1.1 are not authorized.
53. For all operations:
 - a. The altitude of the aircraft must not exceed 400 ft. above ground level (AGL);
 - b. The aircraft must maintain at least 500 ft. below and 2000 ft. horizontally from any cloud; and
 - c. The visibility must be at least 2 statute miles, or higher, if required in specific airspace.
54. For all operations, the UA must have anti-collision light(s) as an additional means for collision mitigation that:
 - a. Are operable and on for all flight operations; and
 - b. Are visible from 3 statute miles for civil twilight operations.
55. The UA must remain clear of and give way to any manned aircraft at all times.
56. The UA must clear all terrain and all man-made obstructions by not less than 100 ft. until the UA is within 250 ft. laterally of a delivery site or launch-and-recovery site.
57. The PIC may not operate the UA from any moving vehicle or aircraft.
58. The PIC must abort the flight operation if unpredicted circumstances or emergencies that could potentially degrade the safety of persons or property arise. The PIC must terminate flight operations without causing undue hazard to persons or property in the air or on the ground.
59. The PIC must monitor the pilot interface to maintain flight location information for all airborne UA for which the PIC is responsible.
60. VOs must continuously scan their area(s) of responsibility and immediately notify the PIC whose areas of operations are affected, whenever they observe:
 - a. A new obstruction not plotted on the obstruction map or obstruction database;
 - b. The erection of an obstruction that begins during the course of a shift;

- c. Any other obstruction, hazard, or non-participating conflicting air traffic that may pose a risk to the operation;
- d. Any open-air assemblies of people; or
- e. Any weather condition that causes the VO to be unable to view the assigned airspace, new or existing obstructions, hazards.

VI. Required Personnel

- 61. No person may serve in more than one operational role concurrently.
- 62. No person may act as a PIC, or serve as an instructor, check pilot, FO, VO, or direct participant in the operator's part 135 operation if that person knows, or has reason to know, that the person has a physical or mental condition that would interfere with the safe operation of the aircraft.
- 63. No PIC may conduct operations at a UA-to-PIC ratio greater than that authorized by the FAA for that individual PIC.
- 64. No VO may simultaneously perform required crewmember duties at a VO-to-PIC ratio greater than that authorized by the FAA for that individual VO.
- 65. With vision that is unaided by any device, other than corrective lenses or eyeglasses, each VO must be able to identify all potential hazards without hesitation.

VII. Training, Certification and Duty

- 66. The operator is responsible for ensuring all persons responsible for the loading of its aircraft have been trained on the operator's loading procedures.
- 67. The operator must provide and document training on the conditions and limitations of Exemption Nos. 19110 and 19111 to all persons whose duties or responsibilities are impacted by the conditions and limitations.
- 68. Flight instructors and check pilots must remain in the immediate vicinity of a person being trained or checked.
- 69. The approved ratio of PIC-to-flight instructor must be listed in the approved training program. The FAA may authorize an increase in the PIC-to-flight instructor ratio for the operator after validation testing.
- 70. When performing the duties of a check pilot in training, checking, or in operational experience, the PIC-to-check pilot ratio cannot exceed 1:1.
- 71. PICs, FOs, and VOs are limited to a maximum 14-hour duty day, and to a maximum 50-hour duty week.
- 72. PICs, FOs, and VOs must receive a minimum of one day of continuous rest, free of all

responsibility for work or duty on behalf of the operator, per week, each week in which the operator schedules them for duty.

73. PICs, FOs, and VOs must take a minimum 10-hour continuous rest period within the 24 hours prior to reporting for duty.
74. All PICs on duty must be fit for duty when any UA are in flight. If a PIC must go off duty for any reason, including but not limited to biological necessity, nourishment, hydration, or illness, all UA being operated by the PIC must return to the Nest, in accordance with the procedures specified in the operator's GOM.
75. All VOs and FOs on duty must be fit for duty when any UA are in flight. If a VO or FO must go off duty for any reason, including but not limited to biological necessity, nourishment, hydration, or illness, all UA being operated in the VO's or FO's sector must first vacate the sector, and all UA must remain out of the VO's or FO's sector, until the VO or FO returns, unless a replacement VO or FO is in position to ensure adequate airspace coverage in accordance with the procedures specified in the operator's GOM.
76. Each PIC, FO, VO, check pilot, and instructor must hold an FAA-issued letter of authorization and a valid RPC, issued in accordance with 14 CFR part 107, and remain current in accordance with § 107.65. Each PIC must comply with the conditions and limitations therein to serve as the PIC of all aircraft listed in the certificate holder's operations specifications. Except for initial cadre, PICs are issued the authorization following satisfactory completion of the operator's approved training program. Each pilot must have the RPC, a government-issued photo ID and a copy of the pilot authorization in the pilot's possession and make such documents available upon request from the Administrator.
77. Each PIC and FO are required to hold at least a second-class medical certificate. A copy of this certificate must be kept in the pilot's records.
78. Prior to commencing operations under part 135, each pilot must complete initial pilot testing and a line check in accordance with §§ 135.293 and 135.299, respectively.
 - a. For the purposes of meeting § 135.299(a)(3), the representative airport for takeoffs and landings is the authorized location(s) identified in the operations specifications;
 - b. The § 135.293 and §135.299 evaluation must include operations and scenarios with the maximum number of UA-to-PIC ratio, VO-to-PIC ratio, and Nest-to-PIC ratio sought, for the individual pilot, in accordance with the approved training program;
 - c. Pilots must successfully complete the § 135.293 test every twelve calendar months;
 - d. Pilots must successfully complete a line check that otherwise meets the requirements of § 135.299, except they must be accomplished every 3 calendar months;
 - e. The provisions for a grace month in § 135.301 also apply to these requirements;

- f. Pilot performance on each check must be documented in the pilot's records. Reasons for unsatisfactory performance must also be documented and made available to the Administrator upon request;
 - g. An FAA Operations Aviation Safety Inspector must be the evaluator for at least every other line check and the operator must notify the FAA at least 15 days in advance when pilot line checks are needed so they may serve as the evaluator for a particular line check; and
 - h. Completion of these evaluations must be kept in the pilot's records.
79. Pilots must complete the training required by § 135.343 every six months.
80. Pilots must complete supervised operating experience with a check pilot on the specific route to be flown or a route that is representative in distance and airspace complexity, prior to serving as a PIC in part 135 operations.
81. Completion of the checking requirements required by §§ 135.293 and 135.299 does not satisfy recent experience requirements of §§ 61.56(d) (1) and 107.65(c).
82. The operator's PICs are required to log flight information in accordance with his or her pilot authorization. Each pilot must make the log available to the Administrator upon request.
83. VOs must be trained in accordance with the FAA approved training program and checked by an approved check pilot or a designated FAA Operations Aviation Safety Inspector. The operator must keep record of this evaluation in the VO's record. The evaluation includes the following areas:
- a. Duties and responsibilities as defined in the GOM to include normal and abnormal procedures;
 - b. Aircraft preflight procedures and use of checklists;
 - c. Communication and coordination procedures (i.e., crew resource management) with the PIC(s) and other operations personnel as described in the GOM and the Flight Manual;
 - d. General meteorology focused on cloud types and associated weather conditions that may be hazardous to the aircraft;
 - e. Use of scanning techniques and the ability to identify and report to the PIC(s) any airspace hazards, aircraft distance from clouds, and any other reportable information as described in the GOM;
 - f. Demonstration of knowledge of the operational environment (e.g., airports, active helipads/routes, hospitals) and the ability to maintain situational awareness for the operation; and
 - g. Knowledge of operational differences between part 135 and part 107 as it pertains to the VO's responsibilities if the VO is qualified to serve in this role for operations that do not occur in accordance with the operator's part 135 certificate.
84. FOs must be trained in accordance with the FAA-approved training program and checked by an approved check pilot or by a designated FAA Operations Aviation Safety

Inspector. A record of the evaluation must be kept in the operator's records. The evaluation must include the following areas:

- a. Duties and responsibilities, as defined in the GOM, to include normal and abnormal procedures;
- b. Aircraft preflight procedures and use of checklists;
- c. Communication and coordination procedures (i.e., crew resource management) with the pilot and other operations personnel, as described in the GOM and the Flight Manual;
- d. Knowledge of the operating limitations of the aircraft and strategies to maintain situational awareness when operating in an active Nest environment, airspace and weather; and
- e. Knowledge of operational differences between part 135 and part 107, as it pertains to the FO's responsibilities.

85. For those FOs who perform aircraft preflight inspections, the FOs must hold a valid repairman certificate. The FO must keep this document in the FO's possession and make it available upon request from the Administrator.

The Effect of the FAA's Decision

If you request an extension to this exemption, please submit your request by using the Regulatory Docket No. FAA-2019-0573 (<http://www.regulations.gov>). In addition, you should submit your request no later than 120 days prior to the exemption's expiration date listed below.

If you require an amendment to this exemption, please submit your request no later than 120 days prior to the date you need the amendment using the process indicated above.

Any extension or amendment request must meet the requirements of 14 CFR § 11.81.

This exemption terminates on May 31, 2024, unless sooner superseded or rescinded.

**LAWRENCE
M FIELDS**

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Date: 2022.05.10
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Lawrence M. Fields
Deputy Executive Director, Flight Standards Service