U.S. Department
of Transportation
**Federal Aviation
Administration**

Aviation Safety

800 Independence Ave

Washington, DC 20591

In the matter of the petition of

UAVIONIX CORPORATION

For an exemption from §§ 61.3(a)(1)(i), 61.3(c)(1), 91.7(a), 91.9(b)(2), 91.119(c), 91.121, 91.151, 91.203(a) & (b), 91.403(a) & (b), 91.405(a), 91.407(a)(1) & (2), 91.409(a)(1) & (2), 91.417(a) & (b) of Title 14, Code of Federal Regulations

Exemption No. **21097**

Regulatory Docket No. FAA-2022-0921

GRANT OF EXEMPTION

By letter dated June 30, 2022, Danielle Miller, Director of Safety, Northern Plains UAS Test Site, uAvionix Corporation (uAvionix), 4201 James Ray Drive, Grand Forks, ND 58202, petitioned the Federal Aviation Administration (FAA) on behalf of uAvionix for an exemption from §§ 61.3(a)(1)(i), 61.3(c)(1), 91.7(a), 91.9(b)(2), 91.119(c), 91.121, 91.151, 91.203(a) and (b), 91.403(a) and (b), 91.405(a), 91.407(a)(1) and (2), 91.409(a)(1) and (2), 91.417(a) and (b) of Title 14, Code of Federal Regulations (14 CFR). The proposed exemption would allow uAvionix beyond visual line of sight (BVLOS) operations for the purpose of research and development with the Rapace electric vertical takeoff and landing (eVTOL) unmanned aircraft system (UAS) which has a maximum takeoff weight of 26.5 lbs. in accordance with operating limitations stipulated as part of the Rapace's Special Airworthiness Certificate in the Experimental Category (SAC-EC). The petitioner also requests relief from: (1) the 14 CFR 61.3(a)(1) requirement to hold a pilot certificate issued under Part 61, and instead requests the pilot in command (PIC) hold a Remote Pilot Certificate and complete operator developed training specific to the UAS and the operating

environment, and (2) the 14 CFR 61.3(c)(1) requirement to hold the appropriate medical certificate.[1]

Petition for Exemption

uAvionix supports its request with the following information:

Unmanned Aircraft Systems (UAS)

uAvionix states that the Rapace UAS is a fully electronic UAS capable of vertical takeoff and landing (VTOL). uAvionix states that the Rapace UAS will operate under this exemption with a special airworthiness certificate (SAC) for experimental purposes in support of the State of North Dakota's Vantis Network. uAvionix states that the Rapace UAS is a combination of an air vehicle, ground control station (GCS), and command and control (C2) system. uAvionix states that the Rapace UAS is capable of vertical takeoff, hover, and forward flight using a combination of 4 vertical lift motors and 1 rear-facing pusher motor. The GCS portion of the system is a self-contained mobile command vehicle. The GCS contains a primary and back-up computer system. The computer system is capable of connecting to the Ground Radio System (GRS) through either a direct LAN or an LTE Network. The GCS is self-powered with provisions for connection to an APU or auxiliary 12V power source. Mission Planner is displayed within the GCS for the Remote Pilot in Command (RPIC)[2] to operate. The C2 portion of the system is a configurable network of ground and airborne radios. The Ground Radio Stations are networkable to allow a limitless range of connectivity between the GCS and AV.

uAvionix requests relief from 14 CFR § 91.7(a) because the Rapace UAS does not have a type certificate, and the term "airworthy," as stated in 14 CFR § 3.5(a), means that the aircraft conforms to its type design and is in a condition for safe operation.

uAvionix states that while the Rapace UAS operated by uAvionix will not have a type certificate, it will have a Special Airworthiness Certificate (SAC) in the Experimental Category and that the uAvionix flight crew will operate in accordance with SAC operating limitations. Additionally, uAvionix states that they will maintain the UAS in accordance with all manufacturer instructions and the RPIC will ensure that the aircraft is in an airworthy

[1] Although the petitioner did not request relief from 14 CFR § 61.23(a)(2), such relief is necessary as the regulation requires a person exercising the privileges of a commercial pilot certificate (which would be required absent the relief provided in this exemption) to hold at least a second-class medical certificate.

2 The FAA uses the term "PIC" instead of RPIC, the term used by the petitioner. See Table 1 for details regarding positions and duties, including the terminology used.Table **1**

condition prior to flight. uAvionix states that this is achieved through adherence to uAvionix's routine preflight and post-flight checklists, regularly scheduled maintenance, and uAvionix's pilot training requirements.

uAvionix states that they have dedicated aircraft and battery logbooks for each aircraft. uAvionix states that the aircraft logbook contains both the Aircraft Logbook Form (ALF) and the Aircraft Status Form (ASF). uAvionix states that the ALF contains a log of dates, times the aircraft flew, and which ASF was associated with each flight. Additionally, uAvionix states that the ALF is completed prior to every flight and upon flight termination, and that the ASF contains all data in reference to the status of the aircraft to include maintenance or configuration change of the aircraft. Finally, uAvionix states that similar forms are completed for aircraft batteries prior to every flight and after flight termination. These forms are tools used to verify that the aircraft is airworthy.

uAvionix requests relief from 14 CFR § 91.9(b)(2) which details the requirements of onboard flight manuals, materials, markings, and placards. uAvionix states that the FAA Office of the Chief Counsel previously provided an interpretation regarding the impracticality of carrying certain documents on a small-unmanned aircraft with no pilot onboard. uAvionix states that the interpretation dated August 8, 2014 from Mark W. Bury, Assistant Chief Counsel For International Law, Legislation and Regulations, AGO-200 [AGC-200], titled, "Interpretation regarding whether certain required documents may be kept at an unmanned aircraft's control station," specifically stated that "the intent of these regulations is met if the pilot of the unmanned aircraft has access to these documents at the control station from which he or she is operating the aircraft."

Additionally, uAvionix states that the uAvionix UAS Flight Operations Manual establishes detailed policies, procedures, and instructions regarding the equipment and information that must be available to the RPIC when operating the UAS, including required documentation. uAvionix states that they require RPICs to comply with the operating limitations specified in the uAvionix UAS Flight Operations Manual, and that the manual be present and available to the RPIC at the ground control station from which the RPIC is controlling the flight. Lastly, uAvionix states that the uAvionix UAS Flight Operations Manual contains, at a minimum, aircraft registration documentation, crewmember training documentation, aircraft and crew operational limitations, aircraft operational characteristics, standard operating procedures, emergency procedures, and equipment maintenance procedures thus providing for an equivalent or greater level of safety as provided by 14 CFR § 91.9(b)(2).

UAS Remote Pilot in Command (RPIC) and Flight Personnel

uAvionix proposes that the uAvionix Flight Crew will consist of an RPIC and Electronic Observer (EO).

uAvionix states that relief is requested from 14 CFR § 61.3(a)(1)(i), which mandates that a person acting as a required flight crewmember or pilot of a civil aircraft must hold a pilot certificate issued under Part 61. uAvionix states that the remote pilot in command (RPIC) for their operation will hold a remote pilot certificate, in addition to completing the uAvionix internal training requirements, which includes RPIC and aircraft training as well as the Vantis training requirements for use of that system.[3] uAvionix states that the uAvionix and Vantis training are unique to the proposed UAS and operational environment. uAvionix states that their UAS Flight Operations Manual and uAvionix BVLOS concept of operations (CONOPS) describe additional operational mitigations that will ensure an equivalent level of safety to operations conducted with a pilot holding a Part 61 pilot certificate.

uAvionix asserts that pilots who operate under this exemption with a RPIC certificate would comply with 49 U.S.C. § 44711(a)(2), which codifies the statutory obligation for an airman certificate, as the FAA described in the Operation and Certification of Small Unmanned Aircraft Systems final rule. uAvionix states that the general requirements for all airmen include eligibility, aeronautical knowledge, and Transportation Security Administration (TSA) vetting, and that the RPIC certificate confirms the petitioner's eligibility, secures TSA vetting, and ensures the RPIC has the requisite aeronautical knowledge for operating the UAS within the NAS.

Additionally, uAvionix states that the operation would occur only after airmen who hold a current RPIC certificate have received specific training, visited the area of operation, become fully capable of using the tools available to prepare for the operation, and conducted comprehensive preflight actions; and that they will conduct the operation only in a limited geographical area. Given these mitigations, uAvionix indicates that the FAA has previously determined that a remote pilot certificate issued under 14 CFR Part 107 provides the FAA with sufficient assurance of the pilots' qualifications and abilities to perform the duties related to the operations authorized under this exemption.

Finally, uAvionix states that remote pilots conducting operations under Part 107 must complete a detailed aeronautical knowledge test, unless they already hold a pilot certificate under 14 CFR Part 61 and meet the flight review requirements specified in § 61.56.[4] uAvionix states that as a result, all such pilots will have the requisite aeronautical knowledge to safely conduct all operations that will occur under this exemption. uAvionix indicates that in this regard, the FAA addressed the applicable parts of Section 61.125, Aeronautical knowledge, in

[3] uAvionix submitted its "UAS Crew Qualifications and Training Manual," which sets forth RPIC training and qualification requirements.

[4] To obtain a part 107 certificate, a person who already holds a part 61 certificate and has a current flight review only must complete training covering certain aeronautical knowledge areas. 14 CFR 107.61(d)(2).

the RPIC certificate requirements which include aerodynamics, meteorology, weight and balance, decision-making, and emergency operations. uAvionix claims that proposed operations under the requested exemption can be conducted without adversely affecting safety based upon the same rationale accepted by the FAA in previously approved exemptions combined with uAvionix proposed safety mitigations.

uAvionix states that the "Electronic Observer" (EO) will use a Flight Crew Human Machine Interface (HMI) (discussed in more detail below) as an airspace awareness tool to meet the intent of § 91.113(b). uAvionix defines "Electronic Observer" as a flight crewmember who uses a human machine interface to monitor the third-party service provider network health status and provide airspace awareness information to the RPIC to fulfill the intent of 14 CFR § 91.113 using the third-party service provider's network.

The RPIC and EO will have a current Part 107 remote pilot certificate and will operate according to uAvionix operating manuals. Additionally, both members of the Flight Crew will be trained and onboarded onto the Vantis Network, including the use of Standard Operating Procedures (SOP), prior to BVLOS operations.

uAvionix requests relief from 14 CFR § 61.3(c)(1) which mandates that Part 61- required pilot flight crewmembers must hold an appropriate medical certificate issued under Part 67.[5] uAvionix asserts that because the RPIC and EO will hold current remote pilot certificates; and as certificate holders, the RPIC and EO must comply with the requirements of Section 107.17 ensuring that operations will not occur if they know, or have reason to know, of a physical or mental condition that would interfere with the safe operation of the UAS. uAvionix further claims that compliance with regulations in Section 107.17 provide for an equivalent level of safety during uAvionix's proposed operations as in Section 61.3(c)(1).

UAS Operating Parameters

In a separate application, uAvionix has requested a waiver to Section 91.113(b), which states that each person operating an aircraft must maintain vigilance, including seeing and avoiding other aircraft to prevent a collision. uAvionix states that it uses the Vantis UTM network both to help it detect cooperative and noncooperative aircraft within defined geographic regions, and to transmit relevant traffic information over a specialized command and control communications link. Based on the information received by the RPIC and EO from the Vantis network, the flight personnel can determine whether any airborne conflicts may exist and maneuver the Rapace to avoid the collision. However, since there is no human pilot aboard the Rapace to see other aircraft with their eyes, uAvionix states that it is not possible to

[5] Because uAvionix flightcrew will be conducting commercial operations, the appropriate medical certificate would be a second-class medical certificate as prescribed in § 61.23(a)(2).

comply with the regulation as it is written. The FAA determined that instead of providing waiver relief from Section 91.113(b) that it would provide that relief in this exemption, as explained further in the analysis.

uAvionix is requesting relief from 14 CFR § 91.119(c) which defines minimum safe altitudes for operations above non-congested areas at an altitude lower than 500 feet, stating that prior to flights, a safety risk assessment (SRA) must be conducted for each intended flight path which determines its suitability and identifies route characteristics. uAvionix states that the purpose of the SRA is to identify hazards, such as obstacles, obstacle heights, high traffic roads, high population densities or large gatherings of people, and other hazards that may present a risk to the public or UAS operation. Additionally, uAvionix states that all operations conducted under this exemption would be in accordance with the following criteria:

- Operations in areas where population density is less than 100 people per square mile.
- Operations in which the UAS is always within 7.8 NM of a landing zone.
- No operations from a moving vehicle or over heavily trafficked roads.

According to uAvionix once a flight path has been deemed acceptable, it will be loaded into Mission Planner software and a lateral and vertical geofence will be established to ensure the aircraft stays within the planned operational area and away from hazards such as towers and farmsteads.

uAvionix requests relief from 14 CFR § 91.121 which requires the operator of an aircraft to maintain its cruising altitude by referring to an altimeter. uAvionix states that the uAvionix Rapace is not equipped with a barometric altimeter and instead utilizes onboard GPS for altitude data. Further, uAvionix explains that each time the aircraft is powered on and obtains a GPS fix, a “Home” location and altitude waypoint is created. uAvionix states that the GPS Home altitude is displayed as 0 ft. above ground level (AGL) on the Ground Control Station Heads Up Display when the aircraft is at that “Home” location, and that all flight altitudes are in AGL using the “Home” location as reference. uAvionix further explains that the RPIC will use the GPS AGL altitude for navigation and that changes in ground elevation throughout the flight area are addressed during the preflight site survey and accommodated for during flight planning. Finally, uAvionix indicates that during each flight, the aircraft’s altitude is constantly monitored and verified by the pilot in command and consistent with previously granted exemptions, and that therefore, these requirements ensure that an equivalent level of safety will be achieved.

uAvionix requests relief from fuel requirements in 14 CFR § 91.151 stating that the Rapace is a fully electric VTOL, fixed wing UAS with a maximum endurance of 120 minutes and that uAvionix preflight planning involves a risk assessment that will ensure, based on the current weather conditions, there is sufficient battery life to complete the flight. Prior to each flight,

uAvionix states that a minimum battery voltage threshold is calculated based on the flight path and environmental conditions on the day of the planned flight and that the flight is planned so that the unmanned aircraft has landed prior to the predetermined threshold being met. uAvionix states that if the battery voltage falls below the predetermined threshold, the aircraft will initiate a failsafe return to land maneuver and the calculated threshold allows ample time for the unmanned aircraft to return home and land safety following the initiation of failsafe return to land maneuver. Additionally, uAvionix states that the RPIC has the ability to command the aircraft to return to home or land immediately should the battery life be depleted at an unexpectedly higher rate. Finally, uAvionix states that in accordance with a standard operating procedure, all flights will be planned so that unmanned aircraft is always within 7.8 NM from a preplanned landing site.

uAvionix requests relief from 14 CFR § 91.203(a) and (b) stating that the FAA Office of the Chief Counsel previously provided an interpretation regarding the impracticality of carrying certain documents on a small unmanned aircraft with no pilot onboard. uAvionix states that the interpretation dated August 8, 2014 from Mark W. Bury, Assistant Chief Counsel For International Law, Legislation and Regulations, AGO-200 [AGC-200], titled, "Interpretation regarding whether certain required documents may be kept at an unmanned aircraft's control station," specifically states that "the intent of these regulations is met if the pilot of the unmanned aircraft has access to these documents at the control station from which he or she is operating the aircraft." uAvionix explains that the Rapace UAS special airworthiness certificate, operating limitations, and registration certificate will be present and available to the RPIC at the ground control station from which the RPIC is controlling the flight and that this provides an equivalent level of safety to the provisions in Section 91.203(a)&(b).

uAvionix also requests relief from 14 CFR §§ 91.403(a), 91.403 (b), 91.405(a), 91.407(a)(1), 91.407(a)(2), 91.409(a)(1), 91.409(a)(2), 91.417(a), and 91.417(b) stating that Part 43 and these subparts only apply to aircraft with an airworthiness certificate, and that in the operation of UAS, certain regulations are not feasible due to its unique design aspects and operational characteristics. uAvionix explains that they will maintain the UAS in accordance with manufacturer’s maintenance, replacement, inspection, safety bulletins, and life-limit requirements for the aircraft and aircraft components and will not operate the aircraft until it has been determined that any discrepancies have been repaired. uAvionix further states that they retain a maintenance and inspection manual for the Rapace UAS and maintain detailed maintenance records in logbooks specific to each aircraft, including Aircraft Status Forms. uAvionix indicates that the Aircraft Status Forms contain all data in reference to the status of the aircraft to include maintenance or configuration change of the aircraft and that these forms detail time-cycle and event-based inspection schedules and aircraft condition. In addition to inspections, uAvionix explains that the forms outline specific procedures for maintenance and repair and that a designated crew member is responsible for aircraft maintenance and

associated logbook entries. Finally, uAvionix states that they track the completion of a maintenance test flight after completed maintenance and repairs in Aircraft Status Forms.

Public Interest

uAvionix states that Congress continues to direct the FAA to prioritize and enable the safe integration of routine BVLOS drone operations in the NAS. Granting this petition would allow uAvionix to support this same mission. uAvionix states that they are part of the Vantis Team, whose mission is to design and deploy the UAS infrastructure necessary to support safe, routine BVLOS drone operations in the NAS. Additionally, uAvionix states that granting this petition will allow uAvionix to continue to support research and development of the Vantis Network - the UAS network that will benefit local communities, UAS industry, and FAA by working in collaboration to achieve mutual goals.

Other Information Provided

As part of its petition, uAvionix provided materials marked as "proprietary." The FAA relied on this information marked as "proprietary" in the FAA's safety risk analysis to make determinations about uAvionix's capabilities. Accordingly, while the entirety of these materials have not been released, they have been identified in the docket for this exemption. *See*, Attachment 1.

Federal Register Notice

A summary of the petition was published in the *Federal Register* on May 25, 2023 (88 FR 2023–11025). Seven comments were received.

Elsight Ltd. (Elsight) commented stating that when operating in BVLOS, the advantages and limitations of every available network individually should be taken into consideration and managed correctly to support the necessity of a C2 link and transmission of data to and from the unmanned aircraft system. Elsight argues that while flying long distances, communications of a single link could adversely affect the unmanned aircraft systems operation. Elsight proposed that C2 communication links should utilize all available network infrastructures. Using "Bonding Technology" substantially enhances the links' safety and the connectivity between the operator and the UA. Elsight also proposed that as regulation rightly focuses on the safety of operations, any communication platform should demonstrate reliability over time, long distances, and harsh environmental conditions to ensure the C2 communication stability and the resulting safety coming from a secure and unbreakable C2 link. Lastly, Elsight proposed that any communication hardware and/or software must have the flexibility to interchange and operate through different IP links. This flexibility and interchangeability will allow for solutions that can adhere to regulatory requirements as technological advancements in network infrastructure continue to evolve in the coming years. Elsight states that they believe that only communication solutions that can adapt over time

present a viable method of operations for BVLOS commercial flights across the industry, for any sized UAS.

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The FAA agrees in concept that such a solution may be appropriate for operators in environments where a single C2 link method is known to be insufficient due to interference, coverage limitations, or other factors. In addition, the FAA believes another layer of mitigations is necessary to achieve an equivalent level of safety as that of compliance with 14 CFR § 91.113. In particular, the FAA finds that a robust contingency procedure is needed. The standard response to contingencies must be one that avoids compounding the risk to other aircraft and persons, vehicles and vessels. Therefore, in Condition and Limitation No. 41, the FAA requires the RPIC to prepare for a lost C2 link by programing lost link procedures so that the UA will remain within the operational corridor and proceed to a pre-determined landing area. This contingency procedure must avoid unexpected turn-around and altitude changes and must provide the PIC with sufficient time to communicate with Air Traffic Control (ATC) if necessary.

Elsight expressed concern about C2 link failures. Elsight proposed that communication platforms should demonstrate reliability over time, long distances, and in harsh environmental conditions to ensure the C2 communication stability and the resulting safety coming from a secure and unbreakable C2 link.

The FAA agrees that there is great value in secure and unbreakable C2 links, but recognizes that there are issues regarding capacity, technological development, and access to this technology. Therefore, the FAA has determined that a combination of UA features, operational procedures, and the application of Conditions and Limitation Nos. 8, 21, and 41 of this exemption, ensures that the C2 link is sufficiently robust for the intended operations, and that the operator's associated contingency plans are suitable in the event of a failure.

Lastly, Elsight proposed that any communication hardware and/or software must have the flexibility to interchange and operate through different IP links. This flexibility and interchangeability will allow for solutions that can adhere to regulatory requirements as technological advancements in network infrastructure continue to evolve in the coming years. Elsight states that they believe that only communication solutions that can adapt over time

present a viable method of operations for BVLOS commercial flights across the industry, for any sized UAS.

While the FAA believes there is benefit to the flexibility and interchangeability of hardware and software, issues related to the evolution of C2 hardware and software are beyond the scope of the uAvionix exemption.

The National Agricultural Aviation Association (NAAA) commented stating that permitting BVLOS operations, as proposed in this docket, will markedly compromise safety for low-altitude manned aircraft. The NAAA states that the Part 137 manned aircraft industry is arguably the segment of manned aviation most affected by the proposed BVLOS operations with operations occurring from 500 feet above ground level (AGL) down to 10 feet AGL and turns occurring at an average of 38 feet AGL with an average horizontal turn-around distance of 1750 feet. The NAAA also asserts that UAS would cause more damage to manned aircraft than a typical airborne wildlife strike. The NAAA states that extensive research has concluded that the pilot of a manned aircraft would have great difficulty in visually locating a much smaller unmanned aircraft and that giving the right-of-way to an unmanned aircraft operating BVLOS could cause a disastrous collision. The NAAA states that uAvionix's use of an Electronic Observer (EO) and airspace awareness tool is not supported within the request to be an acceptable mechanism of compliance. The NAAA argues that pilots of UAS operating BVLOS should have a commercial pilot license, as operations BVLOS are more complicated than other operations and that pilots operating BVLOS will be operating more frequently and for longer periods. The NAAA asserts that the higher-grade certificate is justified as it would increase the safety of BVLOS operations in the NAS. The NAAA also comments that at least a third-class medical certificate should be required to demonstrate physical capability to operate a UA safely and reliably for BVLOS operations. The NAAA states that UA operated BVLOS should be held to a high airworthiness standard and be certified airworthy by the FAA as well as be equipped with visible strobe lighting, painted in visually distinguishable colors, operate with ADS-B-In technology, have incorporated DAA systems, and operate broadcasting Remote ID. The NAAA comments that the UA should have a reliable means of computing altitude equivalent to an altimeter. The NAAA comments that FAA needs to establish a standard flight time the UA needs to have in its power reserve to safely land (e.g., 5 minutes, 10 minutes, etc.), and enforce that flight time as a requirement for any petitions granted. Finally, the NAAA comments that standards should be established and complied with for ensuring that UA are adequately maintained and inspected.

The FAA recognizes the NAAA's concerns with low altitude manned aircraft operations and the challenges manned aircraft may have with seeing an unmanned aircraft; however, as discussed in further detail below, the FAA has determined that the requirements and mitigations for detecting and avoiding all other aircraft imposed by Conditions and Limitation Nos. 41, 42 and 43 in this exemption as well as uAvionix's proposed mitigations for detecting and avoiding all other aircraft such as use of a dedicated EO and airspace awareness tool with

the use of the Vantis Network, do not cause an adverse effect on safety with concern to right-of-way and avoiding other aircraft.

Regarding the NAAA's comments on pilot certification and medical requirements, as discussed in further detail in the analysis section of this exemption, the FAA agrees that safety should not be compromised. Because training and certification must be relevant to an operation, the FAA has long granted relief to UAS pilots from holding a commercial pilot certificate. Much of the aeronautical experience and flight training for a commercial pilot certificate is not applicable to UAS operations, whether VLOS or BVLOS, since UAS are operated differently than manned aircraft. In addition, the aeronautical experience currently necessary to obtain a pilot certificate under Part 61 does not equip the certificate holder with all of the tools necessary to pilot a UAS safely. Therefore, for the reasons discussed in the FAA's analysis below, and consistent with recently issued exemptions, the FAA is granting uAvionix relief to 14 CFR § 61.3(a)(1) subject to the conditions and limitations of this exemption, including requiring pilots to hold a Part 107 remote pilot certificate; meet the aeronautical knowledge recency requirements of 14 CFR § 107.65; and to either complete a Part 61 knowledge within the previous 24 months to ensure retention of the necessary knowledge to operate safely in the NAS under Part 91 or hold a sport pilot or higher-grade pilot certificate and meet the flight review requirements of 14 CFR § 61.56.

Regarding the NAAA's comments concerning airworthiness standards, as discussed in further detail below, uAvionix will be operating a UAS with a special airworthiness certificate. Further, uAvionix will maintain the UAS in accordance with all manufacturer's maintenance, replacement, inspection, safety bulletins, and life limit requirements for the aircraft and aircraft components as well as conduct a preflight inspection prior to operating the UAS and will not operate the UAS until any identified discrepancies are repaired. The FAA determined that with mitigations such as these, an equivalent level of safety could be maintained with respect to 14 CFR Part 91 airworthiness and maintenance standards. Finally, the FAA agrees that regulatory standards frame, guide, and normalize operations. They provide a common language to measure and evaluate performance and protect consumers by ensuring a level of safety and durability. They take time, understanding, experience and consensus to develop. The FAA is striving to develop airworthiness standards that are appropriate to UAS operations and the associated risk. In the meantime, there is significant benefit to both FAA and industry to be able to learn from existing operations and adopt best practices.

Regarding the NAAA's comment of the unmanned aircraft being equipped with visible strobe lighting, as discussed later in the FAA analysis, the FAA agrees and determined that equipping an unmanned aircraft during BVLOS operations with an anticollision lighting system may be an important source for manned aircraft to identify an unmanned aircraft in flight. Regarding the NAAA's comment concerning painting the unmanned aircraft in visually distinguishable colors, the FAA determined that while painting the UA in visually distinguishable colors may aid non-participants in identifying an active UA aircraft operation,

the FAA has determined that anti-collision lighting is sufficient mitigation for this purpose and defers to the operator for incorporation of any additional visual mitigation measures such as painting unmanned aircraft.

Regarding the NAAA's comments that UA should operate with ADS-B-in, DAA systems, and Remote ID, the FAA agrees and as discussed later in the FAA analysis, during BVLOS operations under this exemption, the operator must utilize a DAA or third-party system capable of detecting both ADS-B cooperative and ADS-B non-cooperative aircraft. The FAA supports the use of Remote ID but recognizes that equipage involving new or retrofitted technology takes time. As such, the FAA has not granted relief to 14 CFR Part 89 in this exemption because deviation authority is available. Ultimately, the decision to authorize the use of this UA without remote identification will be dealt with outside this exemption.

The Air Line Pilots Association, International (ALPA) commented stating that uAvionix's petition for exemption does not clearly identify the airspace where operations will take place and there is concern that "research and development" operations as stated in the petition would be conducted in controlled airspace near manned aircraft. ALPA also expresses concern stating that the petition does not state any mitigation strategy for BVLOS operations in the case of a "fly-away" protection or sufficient information furnished to determine whether uAvionix has provided the necessary risk mitigations for an equivalent level of safety. Additionally, ALPA commented that the FAA should investigate whether each unique eVTOL aircraft should possess a specific type rating associated with it under the powered-lift category in order to ensure that every pilot can operate each unique aircraft safely. This will help provide and bring standardization for new entrants in the NAS. Finally, ALPA shares similar concerns with the NAAA with regard to the BVLOS ARC's proposed right-of-way recommendation.

Regarding ALPA's comments with concern to the areas of operations, the FAA has discussed in further detail in the FAA analysis section that areas of operations will be limited to Class G airspace at altitudes at and below 400 feet above ground level (AGL), sparsely populated areas and areas of low population density. Regarding ALPA's comment with concerns that the petition does not state any mitigation strategy for BVLOS operations in the case of a "fly-away" protection, the FAA has reviewed the petitioner's concept of operations (CONOPS) manual and determined that acceptable mitigations regarding a system capable of disarming the unmanned aircraft in the event of a "fly-away" exist. Additionally, the FAA requires the petitioner to comply with the procedures outlined in the CONOPS manual in Condition and Limitation No. 2 and has also addressed separate requirements as a mitigation in Condition and Limitation No. 11 below. Regarding ALPA's comment about specific type ratings associated with unique eVTOL aircraft, as discussed later in the FAA analysis, the FAA determined that, for this specific exemption, the petitioners training manual includes sufficient training for the qualification of the RPIC for the operation of the unmanned aircraft.

DroneUp, LLC and the Association for Uncrewed Vehicle Systems International (AUVSI) commented in support of uAvionix's petition. DroneUp comments that there is substantial value that will be enabled by uAvionix's BVLOS operation and that the growing use of drones and ground-based communications and support systems will allow others to build on the valuable experience being gained by the Northern Plains UAS Test Site and the North Dakota Vantis network. DroneUp comments that performance-based mitigations and training will allow for novel solutions to traditional risk conversations. Finally, DroneUp comments that proof of these operations will allow for future complex airspace BVLOS operations and will increase the overall safety of the NAS. The FAA agrees with DroneUp's supporting comments.

The Small UAV Coalition (SUAVC) commented in support of uAvionix' petition. The SUAVC commented that drones offer a safe and efficient means of conducting a variety of operations and the SUAVC shares an interest in advancing regulatory and policy changes that will permit BVLOS operations for commercial and other civil purposes. SUAVC supports allowing pilots who are adequately trained in the drone model and the drone operations to conduct commercial operations, without holding a commercial Part 61 certificate. As discussed in the FAA analysis section of this exemption, the FAA agrees with the SUAVC regarding operations of unmanned aircraft with a RPIC who does not possess a Part 61 certificate.

Additionally, the FAA received comments on a Federal Register Notice (2023 FR 11024) published May 25, 2023, on BVLOS operations, which provided the FAA with additional technical input on key concepts and potential approaches in this exemption, as well as the development of future policy.

In the Notice, the FAA proposed that one avenue would require all BVLOS operations in controlled airspace or within the lateral limits of a Mode C Veil under an exemption to use a strategic deconfliction and conformance monitoring capability (both terms as described in FAA's UTM Concept of Operations v2.0). This could be fulfilled if the operator provisions their own capability that meets the requirements of a published standard; or by using a UTM service.

Regarding this proposal, forty-one respondents agree that FAA should separate the approval of UTM service provider from the exemption. Respondents expressed their agreement to a separate and independent evaluation and approval of third-party services for various reasons. First, separate approvals will lead to more efficient and streamlined process that will enable expedited approval of succeeding exemption applications. Respondents, including Airbus, ANRA, CAL, Wing, and AIA, reasoned that this would eliminate redundancy of re-evaluating the same service provider, used by multiple operators seeking exemptions. Northern Plains UAS Test Site noted that this separate approval is in alignment with UTM CONOPS v2 and in compliance for Section 377 [of the FAA Reauthorization Act 2018]. Second, separate

approval allows for repeatability and scalability in areas where approved systems are deployed. AUVSI, DroneUp, and ResilienX, among others, stated that this effort is supportive of competitive business practices that will lead to market growth and economic viability of UTM services. ANRA reasoned that this separation of approval will give the operator flexibility by not being "locked-in" to a specific third-party service. NBAA also noted that this will allow UAS manufacturers to specify which UTM solutions are compatible with their system. Third, separate approval will serve as a differentiator and enabler, as outlined in the BVLOS ARC[6]. ALPA expressed their concern for BVLOS operations in all classes of airspace, particularly in controlled airspace, without air traffic surveillance and communications. Lastly, respondents highlighted an opportunity for FAA to have oversight on third-party services, "in-line with current FAA business functions." CAL Analytics noted that no additional safety risk is introduce by separating the approvals.

The FAA agrees with the forty-one respondents that separate approval would expedite the process of a petitioner's proposal as approvals of these systems and would help to eliminate redundant evaluations of the same systems. The FAA also agrees that a separate process for approval of UTM and third-party service providers would allow for more flexibility with operators using these services as one area may not be covered by the same system. The FAA also agrees that no additional safety risk would be incurred by separating the approval process of the operational exemption and review and approval of the third-party service provider in the future. For this exemption, as long as the operator complies with the conditions and limitations in this exemption and the FAA determined that the third-party service provider meets the applicable requirements of industry consensus standards, or an alternative set of requirements proposed by the third-party service provider and accepted by the FAA, the FAA has determined there will not be an adverse impact on safety. Prior to commencing operations under this exemption that rely on a function provided by the third-party service provider, the petitioner must be in receipt of a copy of a Letter of Acceptance (LOA) issued by the FAA to the petitioner and the third-party service provider, as set forth in Condition and Limitation No. 41(b). The petitioner is responsible for ensuring that the third-party service is used in accordance with any limitations stipulated in the LOA, including discontinuing use of the service when the petitioner becomes aware that the third-party service provider is no longer meeting the petitioner's expected quality-of-service. The petitioner is responsible for reporting failures, degradations and malfunctions of the service as described in Conditions and Limitation Nos. 50 and 51. Either the petitioner or the third-party service provider may request a copy of the LOA The FAA intends to publish follow-on guidance which sets further detail regarding how a third-party service provider can enhance their safety case to obtain a LOA for use in a petitioner's operations.

[6] UAS Beyond Visual Line-of-Sight (BVLOS) Operations Aviation Rulemaking Committee (ARC) Report issued March 10, 2022

Several comments point to the FAA publishing a guidance material that define safety targets and performance-based requirements for approving third-party service providers (e.g., TSO, MOC – DOC, etc.). Virginia Tech MAAP also noted that the approval process must be "distinct and separable" from the overall performance targets of the operations. SARA, Inc. stated that the evaluation and approval must be done on the system and not its individual components.

Regarding publishing guidance materials that define safety targets and performance-based requirements, the FAA agrees that this approach would allow for a streamlined process for petitioners to submit, and for the FAA to review, proposals with consistency. As such and as noted previously, the FAA intends to publish guidance associated with third-party service providers to inform the exemption process and further policy work in this area.

Seven comments disagree with separating the approval of the third-party service with the exemption, stating that the complexity of the NAS makes independent approval difficult and risky and that expanding ATM, while trained ATC provides separation services to include UAS operations, ensures safety. HAI noted that the current exemption process will need to be replaced, to accommodate separate approval. HAI, Praxis, and Verizon both suggested the FAA define a minimum performance standard (e.g., TSO) for third-party services that an operator can declare compliance to, prior to issuance of exemption.

Regarding the seven commenters in disagreement, the FAA recognizes that the complexity of the NAS poses challenges for integration of novel technological solutions. However, the FAA has found that because each petition for exemption receives review and analysis on individual areas of operations, as well as a particularized set of conditions and limitations, this enables the FAA to incrementally authorize operations on a case-by-case basis, and continually assess whether adjustments are needed to ensure no adverse impact to safety. Additionally, the mitigations contained in the conditions and limitations of this exemption, such as restricting operations to Class G airspace, restricting operations to sparsely populated areas and requiring stand-off distances from airports while operating BVLOS and limiting operations to specific mission purposes all while utilizing a third-party system will tie the separate standardized process of evaluating the third-party system to the exemption at hand provide assurance that there is no adverse impact to safety.

Streamline Designs, LLC, neither agreed nor disagreed to the separate approval, stated that a Declaration of Compliance (DOC) approach should be considered and not limited to single exemptions.

Regarding Streamline Designs, LLC's comment, the FAA agrees that a declaration of compliance in accordance with published standards or an alternative means of compliance would be the most expedient means and consistent means of approving a third-party service system.

Helicopter Association International on behalf of other Associations requested that the comment period be extended. The FAA denied this request on June 8, 2023, and its response can be found at Docket No. FAA-2022-0921-0004 at www.regulations.gov.

The FAA's Analysis

Unmanned Aircraft Systems (UAS)

The Rapace Air Vehicle UAS is a fully electric vertical takeoff and land (VTOL) UA. The Rapace UA is capable of vertical takeoff, hover, and forward flight using a combination of four (4) vertical lift motors, and one (1) rear-facing pusher motor. uAvionix states that the Rapace UA has a maximum takeoff weight of under 55 pounds. The ground control station (GCS) for the Rapace UA is a self-contained mobile command vehicle that contains a primary and back-up computer system which is capable of connecting to the ground radio system through either direct LAN or an LTE network. The GCS is self-powered with provisions for connection to an APU or auxiliary 12V power source. Mission Planner is displayed within the GCS for the PIC to operate. The C2 portion of the system is a configurable network of ground and airborne radios. The Ground Radio Stations are networkable to allow a limitless range of connectivity between the GCS and AV.

Regarding 14 CFR § 91.7(a), the FAA finds that relief is unnecessary because uAvionix's UAS will hold a special airworthiness certificate for experimental purposes, which is a type of airworthiness certificate. uAvionix's UAS must hold a special airworthiness certificate in the experimental category to meet the airworthiness certification requirements to conduct operations under Part 91, and uAvionix must comply with 14 CFR § 91.7 in its entirety. The FAA has determined that for the purposes of this exemption, the pilot's determination prior to each flight that the unmanned aircraft is in a condition for safe operation is a principal component of the risk mitigation scheme that ensures safety of the operations under this exemption. Therefore, Condition and Limitation No. 13 requires that prior to each flight the PIC conduct a pre-flight inspection and determine the aircraft is in a condition for safe flight, and prohibits the aircraft from operating until the necessary maintenance has been performed and the aircraft is found to be in a condition for safe flight. Finally, with regard to uAvionix's petition which states, "as stated in 14 CFR § 3.5(a), the term "airworthy" means that the aircraft conforms to its type design and is in a condition for safe operation." Part 3.5 also states "*Definitions.* The following terms will have the stated meanings when used in this section." Therefore, the definition "airworthy" is only applicable to Part 3.5 and is not applied to Part 91.

Regarding 14 CFR § 91.9(b)(2), the FAA reviewed the petitioner's request for relief from Section 91.9(b)(2) and agrees with the petitioner that carrying manuals on the UA is impractical when there is no PIC on board. This issue was also addressed in the FAA Office

of the Chief Counsel's interpretation letter, which determined that the relief is not required.[7] The FAA also explained in Exemption No. 18163 that this relief was unnecessary. For this reason, this petitioner's request for relief from Section 91.9(b)(2) is denied.

Regarding 14 CFR § 91.203(a) and 91.203(b), uAvionix states that the Rapace UAS special airworthiness certificate, operating limitations, and registration certificate will be present and available to the PIC at the ground control station from which they are controlling the flight. The FAA has previously determined through legal interpretation that if airworthiness certificates, aircraft manuals, and aircraft registration certificates are maintained at an unmanned aircraft's ground control station, and the pilot of the unmanned aircraft has access to those documents, the intent of these regulations is met. Additionally, as discussed above, the FAA has previously determined that relief from these sections is not necessary.[8] For this reason, the petitioner's request for relief from Section 91.203(a) and 91.203(b) is denied.

Additionally, regarding uAvionix's request for relief from Section 91.403(a), the FAA recognizes that the Rapace UAS does not hold a type certificate and will not have associated airworthiness directives in accordance with Part 39. Rather, uAvionix states that they will maintain the Rapace UAS in accordance with the manufacturer's maintenance, replacement, inspection, safety bulletins, and life-limit requirements for the aircraft components, and will not operate the aircraft until it has been determined that any discrepancies have been repaired. The FAA has determined that an equivalent level of safety can be maintained with regard to Section 91.403(a) and has therefore determined that relief from Section 91.403(a) is appropriate to permit operations of the Rapace UAS in the absence of an airworthiness certificate, so long as the petitioner maintains the unmanned aircraft in accordance with the manufacturer's requirements, per Condition and Limitation No. 17.

uAvionix requested relief from 14 CFR § 91.403(b) which prescribes, in pertinent part, that no person may perform preventive maintenance or alterations on an aircraft other than as prescribed in subpart E of Part 91 and other applicable regulations, including Part 43. uAvionix states that a designated crew member is responsible for aircraft maintenance and associated logbook entries and that they will maintain the UAS in accordance with the manufacturer's maintenance, replacement, inspection, safety bulletins, and life-limit requirements for the unmanned aircraft and its components and will not operate the aircraft until it has been determined that any discrepancies have been repaired. The FAA has

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[7] FAA legal interpretation dated August 8, 2014 "Interpretation regarding whether certain required documents may be kept at an unmanned aircraft's control station."

[8] See Exemption No. 11062.

previously determined that 14 CFR Part 91, subpart E ("Maintenance, Preventative Maintenance, and Alterations") applies to UAS operations conducted under the general operating and flight rules of Part 91.[9] This is consistent with FAA's determination in Exemption No. 18596, issued to Overwatch Aero, LLC.

Since the petitioner is unable to comply with the requirements of subpart E, including Section 91.403(b), relief is necessary. The relief from Section 91.403(b), addressed in the exemption, is limited only to how to perform maintenance, preventive maintenance, or alterations on an aircraft other than as prescribed in that subpart and other applicable regulations, including part 43 of Title 14. To ensure that the proposed operation would not adversely affect safety, the FAA is requiring, as part of this exemption, that the operator follow the UAS manufacturers' operating limitations, maintenance instructions, service bulletins, overhaul, replacement, inspection, and life limit requirements for the UAS and its components. Additionally, each UAS operated under this exemption must comply with all manufacturers' safety bulletins. This requirement is set forth in Condition and Limitation No. 17. Although uAvionix did not state whether the person performing maintenance on the UA would be trained to perform such functions, as previously determined, the FAA is requiring that maintenance, preventative maintenance, rebuilding, and alterations be performed by individuals who have been trained by the operator in proper techniques and procedures for these UAS, per Condition and Limitation No. 18. Finally, all maintenance must be recorded in the aircraft records; including a brief description of the work performed, date of completion, and the name of the person performing the work, as set forth in Condition and Limitation No. 18. Based on the information provided by the petitioner and the petitioner's compliance with the conditions and limitations provided in this exemption, relief from the referenced portion of Section 91.403(b) would not adversely affect safety.

Regarding 14 CFR §§ 91.405(a), 91.407(a)(1), 91.409(a)(1), 91.409(a)(2), 91.417(a), and 91.417(b), the FAA has determined relief is appropriate as these regulations are applicable to operations of aircraft that have been issued an experimental airworthiness certificate. uAvionix states that they will maintain the UAS in accordance with all manufacturer's maintenance, replacement, inspection, safety bulletins, and life limit requirements for the aircraft and aircraft components. In addition, uAvionix indicates that the PIC will ensure the aircraft is in an airworthy condition prior to flight through pre-flight and postflight checklist, regularly scheduled maintenance and pilot training requirements. As previously stated, uAvionix will not operate the aircraft until any discrepancies identified during inspections have been repaired. The FAA sets forth these requirements in Condition and Limitation No. 13. Given these proposed procedures, FAA finds after careful review of uAvionix operating documents, that compliance with uAvionix's maintenance, inspection, and preflight

[9] DroneXum, LLC Exemption No. 18413A

procedures, in conjunction with the Condition and Limitation Nos. 13, 17, 18 and 19 of this exemption discussed above, ensure that an equivalent level of safety can be achieved with regard to Sections 91.405(a), 91.407(a)(1), 91.409(a)(1), 91.409(a)(2), 91.417(a), and 91.417(b). Additionally, regarding 14 CFR § 91.407(a)(2), the FAA has determined that relief is appropriate as well, as this regulation is applicable to operations of aircraft that have been issued an experimental airworthiness certificate. Due to uAvionix's proposed record entry and documentation procedures, and the requirements for maintenance records as set forth in Condition and Limitation No. 18, the FAA finds that relief would not adversely affect safety.

Moreover, to ensure the aircraft is in proper working condition before using the aircraft for commercial purposes, any maintenance or alterations that affect the UAS operation or flight characteristics, such as replacement of a flight critical component, must undergo a functional operational check test flight prior to conducting further operations under this exemption. Functional operational check flights must be conducted in VLOS by a PIC, and other personnel required to conduct the functional operational check test (such as a mechanic or technician) and must remain at least 500 ft. from all other people. The functional operational check flight must be conducted in such a manner to not pose an undue hazard to persons and property. And for oversight purposes, the operator must permit the FAA Administrator and their representative to observe functional test flights upon the request. These requirements are included in Condition and Limitation No. 19.

UAS Remote Pilot in Command (RPIC) and Flight Personnel

As previously discussed, uAvionix requested relief from 14 CFR § 61.3(a)(1)(i) which requires in part that a required pilot flight crewmember of a civil aircraft of the United States hold a pilot certificate under Part 61. uAvionix instead proposes to use a PIC for the operation who holds a remote pilot certificate under Part 107 and who has completed the uAvionix internal training requirements, which includes PIC and aircraft training as well as Vantis training requirements for BVLOS operations, which are both unique to the UAS and operating environment. Additionally, uAvionix states that operations would occur only after airmen who hold a current RPIC certificate have received the uAvionix specific training, visited the area of operation, become fully capable of using the tools available to prepare for the operation, conducted comprehensive preflight actions, and will conduct the operation only in a limited geographical area.

uAvionix states that the FAA has previously determined that a remote pilot certificate issued under 14 CFR Part 107 provides the FAA with sufficient assurance of the pilots' qualifications and abilities to perform the duties related to the authorized operations. uAvionix

does not make reference to any specific FAA determination and rather proposes wording similar to a determination previously made in Exemption No. 17936 to Droneseed.[10]

In Droneseed, the FAA granted relief for the purposes of agricultural aircraft operations under 14 CFR Part 137. Specifically, the FAA granted relief to the requirements of 14 CFR § 61.3(a)(1)(i) rationalizing that operations could be conducted safely given that the proposed training course which was tailored for operations and included theory and practical components, a pilot theory exam, a knowledge and skill test required under Part 137, and supervised operational familiarization training on accompanied by a low altitude environment. Further, in another exemption for Wing Aviation, LLC, Exemption No. 18163A, the FAA granted the petitioner relief from Section 61.3(a) rationalizing that the petitioner's FAA approved training program incorporated the essential areas of knowledge for the proposed operations, including operational simulations, required FAA checking, and observation events. Recently, in Exemption No. 17992C[11], issued to Avitas, Inc., the FAA found that given the operational limitations, minimum pilot experience requirements, and the operator's training program; a remote pilot certificate issued under 14 CFR Part 107 provides the FAA with sufficient assurance of the pilots' qualifications and abilities to perform the duties related to the operations authorized by that exemption. The FAA finds that the same rationale for providing relief to Avitas in Exemption No. 17992C is applicable to uAvionix, and therefore, grants uAvionix's request for relief from 14 CFR § 61.3(a)(1) subject to the conditions and limitations discussed below. As in Exemption No. 17992C, the FAA finds that a 14 CFR Part 107 certificate ensures the PIC is qualified to perform duties that are unique to UAS, such as aspects of "see-and-avoid" and loss-of-positive-control, safety issues; and that compliance with 14 CFR § 107.65 ensures the certificate holder's knowledge is current and remains so. Accordingly, as set forth in Condition and Limitation No. 21, uAvionix's PICs must hold a 14 CFR Part 107 certificate and be in compliance with 14 CFR § 107.65.

Additionally, with the relief granted in this exemption, uAvionix would be conducting the proposed operations under 14 CFR Part 91, not 14 CFR Part 107. The FAA previously has determined that the aeronautical knowledge of a Part 107 remote pilot certificate holder is not alone sufficient for operations conducted under Part 91 operating rules because it does not adequately cover all the knowledge areas required to operate safely under Part 91.[12] Part 61

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[10] Droneseed Co. Exemption No. 17936 issued August 13, 2018. Available at https://www.regulations.gov/document/FAA-2017-1157-0012.

[11] Issued May 19, 2023. Available at https://www.regulations.gov/document/FAA-2018-0263-0034.

[12] In A-Cam Aerials, Exemption No. 18966, the FAA granted relief from 14 CFR § 61.3(a)(1)(i) but required the petitioner to hold a part 107 remote pilot certificate, meet the aeronautical knowledge recency requirements of 14 CFR § 107.65, and to successfully complete a part 61 knowledge test every 24 months to ensure that A-Cam's pilots retain the necessary knowledge to operate safely in the NAS under Part 91.

aeronautical knowledge tests, on the other hand, include additional knowledge specific to pilot privileges, limitations, and flight operations under Part 91, NTSB accident reporting requirements, recognition of critical weather situations, and use of the Aeronautical Information Manual, thereby ensuring that a pilot has knowledge of the full scope of operations conducted under Part 91 and the associated risks. Therefore, as set forth in Condition and Limitation No. 21, the FAA has determined that, in addition to the PIC holding and maintaining a Part 107 certificate and complying with 14 CFR § 107.65, successful completion of a Part 61 aeronautical knowledge test within the previous 24 months is necessary to verify that the PIC understands the full scope of flight operations conducted under Part 91 and the associated risk of those operations. This will ensure the pilot still possesses the current aeronautical knowledge required for the proposed Part 91 operation. Alternatively, persons who hold a sport pilot or higher-grade certificate and meet the flight review requirements of 14 CFR § 61.56 need not comply with this exemption's requirement of completing a Part 61 airman knowledge test within the preceding 24 months, given that such persons have demonstrated they possess the requisite knowledge by receiving an endorsement from a certificated flight instructor under Section 61.56.

In addition to the requirements above, the FAA has determined uAvionix's training and qualification program for PICs is critical to safe operations. The FAA has carefully analyzed the training curriculum and has reviewed both the UAS-specific and the operator-specific training for BVLOS operations since generally applicable rules for BVLOS operations under 14 CFR Part 91 do not exist. Based on this review, the FAA determined that both the UAS-specific and operator-specific training contain all the elements needed to enable the 14 CFR Part 107 certified pilot to safely conduct the BVLOS operation.

The FAA finds that the uAvionix training program consists of academic and practical instruction and evaluation. The program focuses on fundamental aviation concepts as well as aircraft-specific systems and operations. In addition, uAvionix indicates in its petition that a pilot must successfully complete the uAvionix internal training requirements as well as the Vantis training requirements both of which are unique to the UAS and operational environment. The FAA agrees that these qualifications are fundamental to safe operations. Therefore, in Condition and Limitation No. 21, the FAA requires PIC to successfully complete uAvionix's and the Vantis training program prior to operations under this exemption as it ensures the PIC knows how to fly the aircraft, program the routes, plan for contingencies, and do all the things required of the to operate the UAS safely. Training must be provided as described in the uAvionix UAS Flight Operations Manual, per Condition and Limitation Nos. 21 and 24.

Further, to ensure their training is effective, the PIC must be able to demonstrate to the operator that they are able to operate the UA safely, including fluency in conducting evasive and emergency maneuvers and maintaining appropriate distances from people, vessels, vehicles, and structures, per Condition and Limitation No. 26. To ensure the crew is focused

on learning and building confidence and familiarity with the UAS and its operations, all training operations must be conducted during dedicated training sessions, as set forth in Condition and Limitation No. 24. To ensure the quality of the training does not erode, the FAA is requiring that crew training be conducted in accordance with the operating training program described in uAvionix's training program, as established in Condition and Limitation No. 21.

Finally, the FAA finds that for BVLOS operations, EOs used by uAvionix are monitoring the airspace through electronic means to provide airspace awareness information to the PIC in lieu of the PIC meeting the requirements in Section 91.113 to maintain vigilance to "see" and avoid other aircraft. This changes the role of the EO from an operational mitigation to that of a person performing duties that influence the PIC's navigation of the aircraft. As such, the FAA has determined that the EOs must hold a 14 CFR Part 107 remote pilot certificate and comply with 14 CFR § 107.65 to ensure the safety of the operation because the EOs are responsible for monitoring the airspace for the PIC. The FAA also finds that the aeronautical knowledge covered in the Vantis Electronic Observer Qualifications and Training Manual, is appropriate and necessary to prepare uAvionix's EOs to perform their job under the operating parameters allowed under this exemption. Therefore, as set forth in Condition and Limitation No. 31 and 32, the FAA is requiring the uAvionix's EOs to hold a 14 CFR Part 107 remote pilot certificate and comply with 14 CFR § 107.65 and complete the uAvionix training and qualification program before conducting operations under this exemption.

To the extent that uAvionix requests relief from 14 CFR § 61.3(c)(1), which requires a person to hold an appropriate medical certificate under 14 CFR Part 67, the FAA has determined that, consistent with prior determinations, a medical certificate is necessary and, as discussed below, is requiring uAvionix to hold a third-class medical certificate.[13]

While uAvionix did not specifically request relief from 14 CFR § 61.23(a)(2) on behalf of its PICs, the FAA construes uAvionix's request for relief from Section 61.3(c) as requested relief from the requirements of Section 61.23(a)(2). Under 14 CFR Part 61, a pilot must hold a commercial pilot certificate and at least a second-class medical certificate when conducting operations for compensation or hire. Under 14 CFR Part 61, a pilot must hold a commercial pilot certificate and at least a second-class medical certificate when conducting operations for compensation or hire. The uAvionix CONOPS states that the RPIC is directly responsible for, and is the final authority on, the operation of the aircraft. Additionally, the CONOPS

[13] The FAA notes that a person granted relief to 14 CFR § 61.23(a)(2) and required to hold a third-class medical certificate by a condition and limitation of an issued exemption may not be holding the regulatorily appropriate medical certificate as required by 14 CFR § 61.3(c)(1). Therefore, the FAA grants relief to 14 CFR § 61.3(c)(1) to the extent that it is necessary to allow the PIC to hold a third-class medical certificate instead of the regulatorily required second-class medical certificate.

document provides that its RPICs are responsible for monitoring the aircraft telemetry such as altitude, location, and system health, such as link and GPS status and considers contingency plans given the current environment during an operation. The FAA has previously required UAS pilots exercising commercial privileges to hold a second-class medical certificate because requiring a second-class medical certificate provided a reasonable assurance that the pilot did not have any physical or mental condition that would interfere with the safe operation of the UAS. However, the FAA recently conducted an additional safety analysis with respect to the medical certificate requirements for commercial UAS operations and reconsidered this position in Exemption No. 18601B. In Exemption No. 18601B, Amazon Prime Air, the FAA found that the use of pilots holding the minimum of a valid third-class medical certificate would not adversely affect the safety of the petitioner's operation and granted relief to 14 CFR § 61.23(a)(2). The same rationale applies to this exemption. Therefore, the FAA finds that requiring that uAvionix's PICs hold at least a third-class medical certificate provides reasonable assurance that the pilot does not have any physical or mental condition that would interfere with the safe operation of the UAS, as set forth in Condition and Limitation No. 22. Additionally, the FAA is also requiring that no uAvionix employee may act as PIC or EO[14] if: (1) the PIC knows or has reason to know of any identified physical, medical or other condition that would render them unable to meet the requirements for at least a second-class medical certificate; or (2) the EO knows or has reason to know of any identified physical, mental or other condition that would render them unable to conduct the mission safely. This requirement is set forth in Condition and Limitation No. 33.

[14] The FAA is not requiring EOs to hold a medical certificate because uAvionix's EOs do not have the ability to control or issue a direct command to the aircraft during flight operations. As a result, the risks associated with the medical episodes are lower for them. Accordingly, the FAA is granting relief from 14 CFR § 61.23(a)(2) for petitioner's EOs, thereby relieving them of the requirement to hold a medical certificate.

Table 1 – Duty Positions, Functions, and Qualifications

Position	Duties	Qualifications
PIC	The PIC has the final authority and responsibility for the operation and safety of an sUAS operation conducted under 14 CFR Part 91. The PIC uses the Flight Crew HMI to check the Vantis Network's health status before the flight. The PIC must ensure the UA remains well clear and gives way to all other aviation operations and activities at all times. Well clear means 2000 ft. horizontally and 250 ft. vertically from other aircraft. Operations must not cause hazard to persons or property on the surface or in the air. If at any time safety of human beings or property on the surface or in the air is in jeopardy, the PIC must cease operations.	• Successful completion of the operator's training program for PICs. • Hold a remote Pilot Certificate with a small UAS rating issued in accordance with 14 CFR Part 107 and be in compliance with Section 107.65. • Pass either a sport, recreational, or private pilot FAA airman knowledge test before acting as PIC, or, in the alternative, hold any 14 CFR Part 61 pilot certificate (other than a student pilot certificate) and meet the flight review requirements of 14 CFR § 61.56. • Hold at least a third-class medical certificate. • The PIC must demonstrate to the operator that they are able to operate the UA safely, including fluency in conducting evasive and emergency maneuvers and maintaining appropriate distances from people, vessels, vehicles, and structures.
VO	N/A	N/A
EO	The EO uses the Flight Crew HMI to monitor the Vantis Network's health status and to provide airspace awareness information to the PIC to fulfill the intent of 14 CFR § 91.113 using the Vantis System.	• Each EO must hold a valid remote pilot certificate with a small UAS rating issued under 14 CFR Part 107 and be in compliance with Section 107.65. • Each EO must satisfactorily complete the operator's training and qualification program before conducting operations under this exemption. • The EO and any other direct participant may not participate in the operation if the EO and/or direct participant knows or has reason to know of any physical or mental condition that would interfere with the safe operation of the aircraft.

Finally, for oversight purposes, the FAA is requiring that the PIC and EO present their credentials upon request from: an authorized representative of the Administrator; an

authorized representative of the National Transportation Safety Board; any Federal, State, or local law enforcement officer; and any authorized representative of the Transportation Security Administration, as set forth in Condition and Limitation No. 4.

UAS Operating Parameters

The FAA is providing relief from 14 CFR §§ 91.119(c), 91.121, and 91.151. The FAA has previously provided similar relief to other UAS operations (*See*, Exemption No. 17783[15]). The FAA has determined that the proposed operations will not have an adverse effect on safety because these conditions and limitations narrowly restrict the operation to specific locations. uAvionix must operate in sparsely populated, low population density areas in Class G airspace unless prior authorization from the Administrator is obtained for operations in other than Class G airspace and may not conduct operations over open-air assemblies of persons. This requirement is set forth in Condition and Limitation Nos. 35 and 36. Because the FAA does not have data to support a full approval for operations anywhere using the Vantis network, and operations will be conducted for research and development, the FAA is limiting areas of operations to sparsely populated, low density population of 100 persons per square mile or less and Class G airspace so that uAvionix can support the research and development of the use of the Vantis system for future proposals. To ensure safe operations, uAvionix PICs must operate the UA in accordance with the applicable operations and maintenance manuals, and the UA must hold a special airworthiness certificate for experimental purposes. The FAA finds after careful review of uAvionix operating documents, that compliance with: (1) procedures outlined in the documents referenced in Attachment 1; (2) Condition and Limitation Nos. 2, 6, 35 and 36 of this exemption; and (3) the special airworthiness process the unmanned aircraft will go through by the FAA (e.g., additional review of operating and maintenance documents and added conditions and limitations to the special airworthiness certificate) will ensure that an equivalent level of safety can be achieved. Additionally, the FAA is requiring in Condition and Limitation No. 9 that all operations under this exemption utilize geofencing which will contain the UA to specific flight paths and prevent any lateral and vertical excursions.

In Condition and Limitation No. 36, the FAA notes that it does not authorize flight within UAS flight restricted areas. As such the exemption does not authorize flight within UAS flight restricted areas. Since FAA authorization of operations in the NAS does not extend to these types of areas, the FAA informs the operator of the proper procedure for obtaining authorization for flight in UAS flight restricted areas.

The FAA notes that uAvionix's petition does not request night operation and its procedures do not include night operations. Further, the FAA did not contemplate night operations in its

[15] Issued April 2, 2018. Available at https://www.regulations.gov/document/FAA-2017-0604-0004.

analysis and has therefore prohibited operations at night as specified in Condition and Limitation No. 40.

uAvionix requested relief from 14 CFR § 91.119(c) Minimum safe altitudes to the extent necessary to allow UAS operations over areas other than congested areas at altitudes lower than those permitted by the regulation. Section 91.119(c) requires an altitude of 500 ft. above the surface, except over open water or sparsely populated areas, in which case the aircraft may not be operated closer than 500 ft. to any person, vessel, vehicle, or structure. The FAA finds that relief from 14 CFR § 91.119(c) is necessary because the Rapace unmanned aircraft would be operated at altitudes below 500 ft. AGL, and within 500 ft. of people, vessels, vehicles, and structures. Although uAvionix did not specify a maximum operating altitude in their petition, they do request relief from 14 CFR § 91.119(c) for operations above non-congested areas. Pursuant to 14 CFR § 91.119, manned aircraft are commonly flown at altitudes of at least 500 feet AGL in areas over other than congested areas. The FAA typically limits operating altitudes of unmanned aircraft to 400 feet AGL and below. *See,* e.g., 81 Fed. Reg. 42109-42110 (June 28, 2016) (describing the reduction in risk when UAS operate only at 400 feet AGL or below) and Exemption No. 11448[16] (May 1, 2015). Because uAvionix operations under this exemption will be for the purposes of research and development with an unmanned aircraft holding a special airworthiness certificate for experimental purposes, the FAA will not permit operations higher than 400 feet AGL as specified in Condition and Limitation No. 35. The FAA considers that the Rapace unmanned aircraft is significantly smaller, lighter, slower, less noisy and more maneuverable than manned aircraft; the UAS is programed with a flight path that is deemed acceptable by the PIC; a lateral and vertical geofence will be established to ensure the aircraft stays within the planned operational area and away from hazards such as towers and farmsteads; operations will occur in sparsely populated areas with a population density of less than 100 persons per square mile; operations will always be within 7.8 nautical miles of a landing zone; no operations will occur from a moving vehicle or over heavily trafficked roads; the level of safety of this aircraft is not enhanced by greater distances above the ground; and, flying below most air traffic increases the safety margin without posing an increased risk to people or property. The FAA finds there is no change to the level of safety. Therefore, the FAA grants relief from 14 CFR § 91.119(c) to allow the aircraft to be operated at altitudes below 500 ft. AGL.

Regarding uAvionix's requested relief from 14 CFR § 91.121, the FAA has determined that an accurate altitude reading is a critical safety component of uAvionix's proposed operation. Although uAvionix will not have a typical barometric altimeter, uAvionix has stated that their UA altitude information will be provided by on-board global position system (GPS) data, and that this data is constantly monitored and verified by the pilot in command throughout the

[16] Available at https://www.regulations.gov/document/FAA-2014-0397-0014.

UA's flight. Prior to each flight, a zero-altitude initiation point will be established and confirmed for accuracy by the PIC. The FAA has previously determined that an equivalent level of safety to the requirements of 14 CFR § 91.121 can be achieved in circumstances where the PIC uses an alternative means for measuring and reporting UA altitude, such as global positioning system (GPS), which the FAA has previously found GPS as a reliable way of determining the altitude of the aircraft. Additionally, the FAA notes that 14 CFR § 91.121 is written in reference to MSL. Altitude values expressed in MSL are measured against the sea level, which makes the measurement inconstant and not obvious if the operation itself is not at sea level. Despite MSL being considered the "true" altitude; for operations close to the ground as this one is, AGL is more useful for providing a sense of awareness for the PIC as a gauge of how far away the UA is from the ground. AGL readings will account for extreme changes in the topography. Therefore, the FAA requires reporting to be in ft. AGL in Condition and Limitation No. 20. Considering the limited altitude of the proposed operations, relief from 14 CFR § 91.121 is granted, subject to compliance with the conditions and limitations contained in this document. Because the UA's altitude will be displayed to the PIC in real time, the FAA finds that granting relief from Section 91.121 will not adversely affect safety. The FAA finds that similar relief has been provided in Exemption No. 17783 to Bell Textron, Inc. (*See*, Docket No. FAA-2017-0604).

Regarding uAvionix's requested relief from 14 CFR § 91.151, similar relief has been granted in Exemption No. 19398 to Phoenix Air Unmanned, LLC (see Docket No. FAA-2022-0124). The FAA granted relief from 14 CFR § 91.151 in Exemption No. 19398 to Phoenix Air Unmanned, LLC requiring that before beginning a flight, there is enough battery power or fuel reserve to fly to the first point of intended landing and, assuming normal cruising speed, to fly after that for a minimum of either 5 minutes or the minimum battery/fuel reserve power recommended by the manufacturer if greater. uAvionix will conduct operations with the Rapace UA which relies on battery power to power the UA's propulsion and systems. The Rapace UA has an endurance of 120 minutes. uAvionix states that prior to each flight, a minimum battery voltage threshold is calculated based on the flight path and environmental conditions and that the flight is planned so that the unmanned aircraft lands before the predetermined threshold is met. uAvionix states that if the battery voltage falls below the predetermined threshold, the UA will initiate a failsafe return-to-land maneuver. Because uAvionix has procedures in place that allow the Rapace UA to complete the mission with the calculated reserve power as designated by the manufacturer, with additional contingencies for power failure such as return-to-home and land immediately with use of the vertical takeoff and land features, the FAA finds that granting relief from Section 91.151 will not adversely affect safety. Similar to Exemption No. 19398, this exemption will, prohibit the PIC from beginning a flight unless, considering wind and forecast weather conditions, there is enough available fuel for the UA to conduct the intended operation with sufficient reserves such that the PIC can land the UA without posing an undue risk to aircraft or people and property on the ground, or the reserve power recommended by the manufacturer, if greater, is satisfied.

This requirement is set forth in Condition and Limitation No. 10. Finally, the reserve power will ensure that in the event of an emergency, the PIC can land the aircraft in a known area without posing an undue risk to aircraft or people and property on the ground. Because this exemption requires such a comprehensive preflight verification as well as in-flight checks, the FAA finds that compliance with this condition and limitation will ensure the operations uAvionix conducts under this exemption will not adversely affect safety. Relief from 14 CFR Section 91.151(b) is, therefore, granted.

Operations under this exemption must occur in weather conditions and limitations as outlined in the uAvionix UAS Flight Operations Manual. The FAA recognizes that the unmanned aircraft manufacturer provides specific weather conditions and limitations associated with the UA and that those limitations were developed by the manufacturer with safety of operations in mind. Additionally, because uAvionix operations are conducted at altitudes lower than prescribed for FAA instrument flight rules (IFR) routes; operations will not occur on procedures associated with IFR departures, arrivals, or approaches and uAvionix missions with the Rapace UAS are fully autonomous, the FAA does not see the need to limit the weather requirements for operations. Therefore, the FAA does not impose a specific limitation on atmospheric conditions, and instead will require that all weather-related planning and briefings prior to and during operations be obtained from a U.S. Government National Weather Service (NWS) source. As discussed in FAA Order 8900.1,[17] the development of new aviation weather products is an evolutionary process with distinct stages of product maturity. The growing demand for new weather products and the corresponding increase in research and development to meet that demand has led to the availability of a wide variety of weather information, some of which may be experimental in nature and may not meet the same quality control standards as those set forth by the NWS and NWS-approved sources. In addition, the Federal Government is the only approval authority for sources of weather observations, and the FAA and NWS collect raw weather data, analyze the observations, and produce forecasts. The FAA and NWS disseminate meteorological observations, analyses, and forecasts through a variety of systems. For these reasons, the FAA is requiring that prior to each flight, the PIC obtain a weather report applicable to the area of operation from NWS or an NWS-approved source, as set forth in Condition and Limitation Nos. 6 and 30. The FAA anticipates that operators may supplement weather reports obtained from the NWS or an NWS-approved source with weather data from non-NWS approved sources; however, those would not be the primary source of an operator's weather information. Additionally, although uAvionix did not request relief from Section 91.155 which describes basic visual flight rules (VFR) weather minimums with respect to flight visibility and cloud distances within specific airspaces for flight operations conducted under VFR, the FAA has determined relief to Section 91.155 is necessary in order to defer minimum

[17] FAA Order 8900.1, Volume 3, Chapter 26, Section 2, paragraph 3-2071B.

weather requirements to the aircraft manufacturer for safe operating limitations and practices in specific weather conditions.

uAvionix must report all accidents and incidents to the following authorities: the Flight Standards District Office with jurisdiction over the area of the demonstration, law enforcement as required by local law, and the National Transportation Safety Board if the occurrence meets the criteria stated in 49 CFR Part 830. All documentation and equipment associated with the operation must be preserved and presented to the examining authorities at their request. This requirement is set forth in Condition and Limitation No. 53. Because operations require the use of a ground control station with an electronic observer, the FAA determined that operations from a moving device or vehicle may further distract the PIC or any other crewmember from required duties. Therefore, as set forth in Condition and Limitation No. 12, the FAA is prohibiting the UAS from being operated by the PIC from any moving vehicle.

In Condition and Limitation No. 27, the FAA requires that prior to beginning flight operations, the PIC must ensure that a briefing is conducted so that any additional crew member(s) being used is/are aware of the operational requirements and associated limitations of the flight plan. Requiring a briefing will ensure that the operation achieves the necessary level of safety by having all additional crewmembers knowledgeable of the entirety of the flight operation.

In Condition and Limitation No. 39, the FAA prohibits BVLOS operations closer than prescribed distances from the airport reference point (ARP) of a public use airport, heliport, gliderport, or seaport listed in the Digital - Chart Supplement (d-CS) or the Chart Supplement of the U.S. Government Flight Information Publications. This ensures there is an appropriate buffer between manned aircraft during takeoff and landing and the UA.

Finally, operations under this exemption must not cause hazard to persons or property on the surface or in the air. If at any time safety of human beings or property on the surface or in the air is in jeopardy, the PIC must cease operations. This requirement is outlined in Condition and Limitation No. 38.

<u>BVLOS and Detect and Avoid Systems</u>

Regarding uAvionix's request to operate BVLOS using the Vantis Network, the FAA considers the Vantis Network a third-party service provider (also referred to as "3PSP" in this

exemption)[18] which provides information, guidance, or support that affects national airspace system (NAS) safety to one or many UAS operators before, during, or after a flight.[19] In considering the use of the Vantis Network, the FAA recognizes that the integration of UAS BVLOS operations and detect and avoid (DAA) technologies concepts would be in the public interest, because industry is making rapid advancements with respect to UAS technology and operational capabilities, that assists with the safe integration of UAS into the NAS for more complex operation. Additionally, the FAA must ensure that operators conducting BVLOS operations using DAA technologies do not create a hazard to persons or property in the air or on the surface and that the overall safety and efficiency of the NAS is maintained.

Scanning the sky for other aircraft is a key factor in collision avoidance.[20] When operating in the NAS, operators of unmanned aircraft must have a means to ensure that they do not pose a threat to safety to the human on-board pilot regarding 14 CFR §§ 91.111 and 91.113.

Manned aircraft rely on procedures to ensure separation from other aircraft such as flying at even and odd altitudes when on specific compass headings and flying a certain traffic pattern at airports. Unmanned aircraft have no on-board pilot to perform see-and-avoid responsibilities and operate below 400 feet which does not lend much room for differential altitudes. The FAA does however recognize the potential that DAA systems could provide better traffic advisories than the human eye.

When considering uAvionix's proposal for use of the Vantis Network during UAS operations, the FAA accounts for the ways that the petitioner will detect and avoid manned and

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[18] An entity other than the drone operator or the FAA that provides a distributed service that affects NAS safety. The two types of third-party service providers envisioned for UTM are UAS Service Suppliers (USS)and Supplemental Data Service Providers (SDSP). These service providers could include companies, state/local/tribal government entities, or other organizations.

[19] For the purposes of this exemption, the following definitions will apply:

Conformance Monitoring for Situational Awareness: A USS role and service that determines whether a UA is in conformance with its operational intent on behalf of the operator or accepts self-reported conformance data from the UAS or operator. The service also initiates the sharing of situational awareness data with relevant USSs when nonconforming or contingent situations occur. (ASTM F3548-21)

Strategic Conflict Detection: A USS service that determines if an operational intent conflicts with other operational intents. The process of detecting conflicts by comparing operational intents. In contrast, tactical conflict detection generally relies on nonstrategic information such as current location, heading, and speed. (ASTMF3548-21)

[20] FAA Aeronautical Information Manual, Section 4-4-14.

unmanned aircraft that are both ADS-B equipped, and non-ADS-B equipped as well as the petitioner's means to detect and avoid obstacles, obstructions, structures, and un-forecast weather. Because uAvionix proposes that operations under this exemption would occur BVLOS with an unmanned aircraft, uAvionix must prove and the FAA must determine that relief from Section 91.113 would not adversely affect safety, which necessarily means that the operator would be able to avoid other aircraft. uAvionix proposes in their petition that operations under this exemption would be conducted pursuant to an already FAA approved waiver to 14 CFR §91.113. uAvionix states in its petition that operations under this exemption would also be in support of their application for a Certificate of Waiver or Authorization (COA). While the FAA may issue a certificate of waiver for 14 CFR § 91.113, the FAA may also choose to issue an exemption instead provided the requirements for an exemption have been met. For the reasons discussed below, the FAA is granting uAvionix relief from 14 CFR § 91.113(b) and has determined that the proposed operations would not adversely affect safety, provided uAvionix complies with conditions and limitations set forth in this exemption. Additionally, the FAA has determined that based on the materials presented by uAvionix in their waiver request that it may exempt the petitioner from 14 CFR § 91.113(b) because FAA has enough information to make a determination that there is no adverse impact, and that doing so would be in the public interest. The effect of this relief is that uAvionix will not need to apply for COAs to fly in Class G airspace. This is expressed in Condition and Limitation No. 35, which authorizes the operations conducted under this exemption in the NAS.

When reviewing an operator's proposal for BVLOS operations, operators typically rely on DAA technology as an alternate means of compliance with 14 CFR § 91.113. DAA technology comes in various forms such as third-party service providers, on-board DAA systems capable of detecting other aircraft by means of acoustics or radar and ground based DAA systems that provide live feeds directly to a UA. The FAA recognizes that these examples are not all-encompassing, and that industry will continue to develop different ways for UA to detect and avoid other aircraft during BVLOS operations. Some DAA systems may be more beneficial for certain types of operation. For example, an operator conducting a linear infrastructure inspection may choose to use an on-board DAA system, as opposed to a third-party service provider, as that type of operation would account for more limited airborne traffic in the proximity to the infrastructure in which is the only airspace that those operations will occur. Conversely, a package delivery operator may choose to utilize a third-party service provider which could provide a larger scale airborne traffic layout along multiple routes of flight. The FAA does not intend to specify which DAA system is applicable to which type of operation; rather, the FAA is requiring the operator to use a system that is able to detect ADS-B equipped and non-ADS-B equipped (cooperative and non-cooperative) aircraft in order to remain "well clear" of other detected aircraft. For the purposes of this exemption, "well clear" means maintaining a horizontal distance of 2,000 feet and 250 feet above and below a detected aircraft, or an alternative metric that is determined in a manner acceptable to the

Administrator. Because UAS are typically smaller than manned aircraft and operate at a lower altitude, manned aircraft may find it harder to see and avoid a UA operation. Although Section 91.113(b) requires the pilot in command of an aircraft to maintain vigilance so as to see and avoid other aircraft when weather conditions permit, the FAA determined that petitioner's proposed use of the Vantis Network, including FAA's analysis of the performance and capabilities of the Vantis Network, provides the PIC with the information necessary to always remain well clear and give way to all other aircraft and avoid creating a collision hazard.

The FAA developed a systematic review process based on material provided by the petitioner specific to the Vantis system, as well as how the petitioner intends to use the Vantis system. This review also considered the effects of other strategic mitigations in the petitioner's concept of operations and used a decision support tool to estimate the likelihood of a collision with a manned aircraft based on performance data provided by the petitioner, as well as assumptions about how effective other mitigations would be. The FAA will memorialize its review of this system with a Letter of Acceptance, provided to the operator and to Vantis, as set forth in condition and limitation 41.

The FAA has determined, based on documents provided by the petitioner, that the respective roles and responsibilities of the Vantis network and the petitioner in relation to the DAA system are documented and mutually understood. By way of example, the Vantis Human Machine Interface (HMI) includes visual indicators to identify whether the Vantis surveillance equipment, communications equipment, or network capabilities are working correctly. In the event of a malfunction or degradation of the Vantis network or equipment, the HMI visual indicators change, and the petitioner's procedures describe how to identify and respond to such a change.

In the review process, the FAA found that the Vantis system would be able to detect aircraft for the proposed operation in a way that does not adversely affect safety. This difference is due to specific limitations of the radar sensor and installation that limit its ability to detect some non-cooperative aircraft and may limit the ability of the Electronic Observer to distinguish false targets from actual aircraft.

Based on the above considerations, FAA found that the avoidance strategy would have no adverse impact on safety for the proposed operation. This finding also reflects the multiple dependencies and possible latencies between the Vantis system (including the Vantis-managed C2 link) and the required time for both the Electronic Observer and the PIC to react and execute the avoidance maneuver.

Additionally, in reviewing the documents submitted by the petitioner and Vantis, the FAA identified 13 other mitigations that would each provide credit in reducing the risk of collision with a manned aircraft. Two of those mitigations are based on distinct capabilities of the Vantis Mission and Network Operations Center (MNOC), including the ability of the MNOC

to assist in determining local weather conditions, which enables the operator to avoid flying in instrument meteorological conditions; and the provisions in the Concept of Operations by why the MNOC separately verifies the availability of surveillance and communications equipment prior to each takeoff. The remaining 11 mitigations relate to petitioner's aircraft and operating provisions. The Rapace has lighting that is visible for at least 3 statute miles, consistent with condition and limitation number 16. Operations are restricted to specific, defined geographic regions based on Vantis surveillance and communications network coverage, and the operator must file a NOTAM prior to operations consistent with Condition and Limitation No. 23; both factors give advance notice to nearby manned aircraft, and provide a degree of predictability to other airspace users about where and when the operator may conduct flights. uAvionix provides advance coordination to affected air traffic control facilities and conducts outreach with locally based pilots; both of these mitigations provide greater information and awareness to other airspace users. The Rapace has been issued a SAC-EC, and the aircraft flies within a geofence region defined by the PIC prior to takeoff. There are defined operating limitations related to weather, wind and other environmental factors. These three factors provided certainty about the overall robustness and reliability of the aircraft's navigational performance to stay within its defined operating area, navigate in relation to a predefined route, and avoid situations in which environmental conditions may either degrade the aircraft's navigation accuracy, or cause it to blunder outside of its operating area. In the event of an emergency situation, the Rapace has the ability to automatically land or return to home, and uAvionix has documented emergency procedures for the PIC to follow to assist in identifying and responding to an abnormal situation; both factors ensure that the aircraft navigates in a predictable way in the event of an emergency, rather than entering a flyaway condition. Finally, uAvionix's demonstrated organization experience, including being the holder of multiple TSOs and being issued multiple STCs and STC-PMAs, indicates a degree of operational maturity that is expected to help the operator proactively and generatively identify and mitigate risks prior to an unsafe condition occurring.

The FAA found that the DAA system, considering both the Vantis detection capabilities and the petitioner's DAA response procedures, maintains the well-clear boundary as defined in ASTM F3442/F3442M–23, Standard Specification for Detect and Avoid System Performance Requirements, dated February 28, 2023. The FAA also found that the DAA system performs at or exceeds the logic risk ratios published in ASTM F3442/F3442M-23. Additionally, the FAA found that the Vantis sensor coverage was defined and verified based on the applicable requirements in RTCA DO-381, Minimum Operational Performance Standards (MOPS) for Ground Based Surveillance Systems (GBSS) for Traffic Surveillance, dated March 26, 2020. The petitioner's DAA alerting functions meet the applicable alert timing requirements in RTCA DO-365C, Minimum Operational Performance Standards (MOPS) for Detect and Avoid (DAA) Systems, dated September 15, 2022.

Finally, based on the foregoing analysis, the FAA assessed that use of this system will not cause an adverse impact to safety. Approval of this system explicitly includes approval of the

Vantis surveillance and communications link capabilities as a third-party service provider when the Vantis network is used by the Operator in accordance with the conditions and limitations set forth in this exemption.

Prior to any flight, as set forth in Condition and Limitation No. 7, the FAA is requiring that the PIC complete a site survey and consider all launch and recovery areas, flight planning, and waypoints for any obstacles, structures, and obstruction avoidance. Because uAvionix did not propose an on-board obstacle detection system, the FAA is requiring that, prior to operations, the PIC complete a site survey in order to locate all obstacles, structures, and obstructions that may cause hazard to flight. A site survey will help to ensure the area is free of industrial hazards, recreational activities, or dwellings, or any other obstacle that may affect safety of flight.

Additionally, as set forth in Condition and Limitation No. 8, prior to any flight, the FAA is requiring that uAvionix PICs ensure, that the DAA system is properly and adequately functional as it relates to the operation in accordance with the uAvionix and the DAA system manual(s). Requiring the PIC to complete aircraft checks and ensuring the functionality and adequacy of the DAA system will allow for the PIC to follow the specific manufacturers' and service providers' best practices for operation of the UA and DAA system and keep consistency and standardization during operations.

Additionally, as an added mitigation, as set forth in Condition and Limitation No. 16, the FAA will require that the unmanned aircraft, when operated BVLOS, be equipped with anticollision lighting. An anticollision light is designed to minimize the risk of collision with other aircraft while airborne. Anticollision lighting consists of lights that are intended to aid in collision avoidance while on the ground and in the air and are typically of a white pulsating strobe type. The bright flash of an anticollision light is typically the first encounter a manned aircraft has at night with another aircraft, allowing pilots to take appropriate actions to avoid collisions and is also visible to manned pilots during the day. By requiring anticollision lights, this will help to alert persons on the ground of active aircraft operations and other aircraft inflight of another airborne aircraft and help to reduce the risks of ground incidents and inflight collisions. The FAA also recognizes the importance of requiring an unmanned aircraft to be visible to other aircraft and anticipates that the presence of anticollision lighting systems would provide other aircraft with an awareness of an unmanned aircraft's presence, and to aid the ability to "see-and-avoid." The use of the anticollision lights would provide for awareness to non-participants of an aircraft operation prior to and during flight. Because an PIC may not always be on site during BVLOS operations, a non-participant may otherwise not have any indication that an unmanned aircraft operation is beginning or in an active phase. Anticollision lights operated during the day would aid non-participants in identifying an active aircraft operation.

Timely reporting on accidents, incidents and major deviations provides the FAA with a way to monitor potential problems and root causes as they occur. The documentation of these problems and root causes increases the likelihood that repeating failures will be noticed and corrected before they develop into more serious incidents or accidents. Reporting requirements also support the FAA's data collection efforts, including verifying that standards, services, and operational concepts function as intended and without adverse impact. Moreover, accumulating data on accidents, incidents and deviations provides the FAA with a needed opportunity to validate assumptions, develop best practices to share with industry, and to inform regulatory actions. Therefore, as set forth in Condition and Limitation No. 53, the FAA is requiring operators using DAA technology to make the reports as outlined in the Conditions and limitations below.

The FAA determined that outreach through a Notice to Air Mission (NOTAM) is a critical element for reducing the likelihood of encountering other aircraft traffic during operations. Therefore, the FAA requires that the PIC file a NOTAM in order to ensure that local airports, Fixed Base Operators, and aircraft operating in the same area are aware of intended BVLOS operations. The FAA determined that the submission of a NOTAM, to inform other airspace users of the location of uAvionix's operations will also contribute to a low-risk environment and thus requires it in Condition and Limitation No. 23.

Finally, because of the complexity and scope of uAvionix's operation and to support ongoing integration activities, the FAA has determined that this grant of exemption is contingent on monthly reporting. In this manner, the FAA will have access to data to support a more thorough understanding of BVLOS operations. Therefore, the operator must report operational data to the FAA by the 10th of each month, including the number of times the UA transgresses the lateral or vertical boundaries of the flight corridor. These reports must be made on Unmanned Aircraft System (UAS) Monthly Flight Report, Unmanned Aircraft System (UAS) Basic Specifications Report, Unmanned Aircraft System (UAS) Corrective Maintenance Report, and Unmanned Aircraft System (UAS) Flight Anomaly Report (OMB Form No. pending). The FAA is requiring in Condition and Limitation No. 55 that forms must be submitted to the FAA via Aeronautical Data Exchange at https://adx.faa.gov.

Public Interest

Regarding uAvionix's proposal of public interest, the FAA agrees that granting this petition would allow uAvionix to support the FAA's mission to enable the safe integration of routine BVLOS UAS operations in the NAS by conducting research and development of the Vantis system gathering critical data for future uses. Additionally, the FAA agrees with uAvionix in that third-party service providers can benefit local communities, UAS industry, and the FAA by collaborating to achieve mutual goals. For these reasons, the FAA finds that granting this exemption is in the public interest.

The FAA's Decision

In consideration of the foregoing, I find that a grant of an 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, uAvionix Corporation is granted an exemption from 14 CFR §§ 61.3(a)(1)(i), 61.3(c)(1), 91.7(a), 91.9(b)(2), 91.113(b), 91.119(c), 91.121, 91.151, 91.203(a), 91.203(b), 91.403(a), 91.403(b), 91.405(a), 91.407(a)(1), 91.407(a)(2), 91.409(a)(1), 91.409(a)(2), 91.417(a), and 91.417(b) to the extent necessary to allow uAvionix to conduct beyond visual line of sight operations with the Rapace UA for the purposes of research and development, subject to the conditions and limitations listed below.

Conditions and Limitations

In this grant of exemption, uAvionix Corporation is hereinafter referred to as "the Operator" or "Exemption Holder."

General:

1. Operations authorized by this exemption are limited to the uAvionix Rapace UAS conducted by the Operator and are limited to this exemption may only be used for the purpose of conducting research and development flights. The aircraft maximum takeoff weight is 26.5 lbs. Proposed operations of any other UAs require a new petition or a petition to amend this grant.

2. This exemption and all documents needed to operate the UAS and conduct its operations in accordance with the conditions and limitations stated in this grant of exemption, are hereinafter referred to as the operating documents. The Operator must follow the procedures as outlined in its operating documents. The documents listed in Attachment 1 of this grant, the applicable Federal Communications Commission (FCC) license, and a copy of this exemption must be accessible to the PIC at the control station during all UAS operations that occur under this exemption. They must be made available to the Administrator upon request. Where a discrepancy exists between the conditions and limitations in this exemption and the procedures outlined in any of the aforementioned documents, the most restrictive provision must be followed.

3. The Operator may update or revise its operating documents. It is the Operator's responsibility to track such revisions and present updated and revised documents to the Administrator or any law enforcement official upon request. The Operator must also present the most current documents if petitioning for extension of or amendment to this grant of exemption. If the Operator determines that any update or revision would affect the Operator's ability to comply with any requirement of this exemption, then the

Operator must petition for an amendment to its grant of exemption. If questions arise regarding updates or revisions to the operating documents, the Operator may contact the Flight Standards Service General Aviation and Commercial Division (AFS-800), 800 Independence Ave. SW, Washington, DC 20591. Telephone: 202-267-1100, Email: 9-AFS-800-Correspondence@faa.gov."

4. The PIC and EO must present his or her remote pilot certificate, 14 CFR part 61 certificate or 14 CFR part 61 pilot knowledge test results (as applicable), proof of current flight review (as applicable), and photo identification if requested from: an authorized representative of the Administrator; an authorized representative of the National Transportation Safety Board (NTSB); any Federal, State, or local law enforcement officer; and any authorized representative of the Transportation Security Administration (TSA).

UAS:

5. This exemption may only be used for operations of the Rapace unmanned aircraft under a special airworthiness certificate for the following purposes:

   a. Conducting experimental research and development.

6. The PIC must ensure compliance with the UAS manufacturers and operators weather limitations for each individual flight.

7. Prior to operations, the PIC must complete a site survey to consider all launch and recovery areas and flight planning and waypoints for all obstacles, structures, and obstruction avoidance.

8. Prior to flight, the PIC must ensure, in addition to aircraft checks, proper functionality and adequacy of the DAA system as it relates to the operation in accordance with the operators and the DAA system manual(s).

9. Prior to operations, the PIC must establish a geofence boundary throughout the entirety of the flight.

10. The PIC is prohibited from beginning a flight unless, considering wind and forecast weather conditions, there is enough available fuel for the UA to conduct the intended operation with sufficient reserves such that the PIC can land the UA without posing an undue risk to aircraft or people and property on the ground, or the reserve power recommended by the manufacturer, if greater, is satisfied.

11. Prior to conducting operations, the PIC must verify that the flight termination system associated with "Disarm" capability is available to the PIC and is operating properly.

12. The UAS may not be operated by the PIC from any moving vehicle.

13. Prior to each flight, the PIC must conduct an inspection and determine the aircraft is in a condition for safe flight. The pre-flight inspection must account for all potential discrepancies, such as inoperable components, items, or equipment. If the inspection reveals a condition that affects the safe operation of the UAS, the aircraft is prohibited from operating until the necessary maintenance has been performed and the aircraft is found to be in a condition for safe flight.

14. The Operator is responsible for maintaining and inspecting all aircraft to be used in the operation and ensuring that they are all in a condition for safe operation.

15. Documents used by the operator to ensure the safe operation and flight of the UAS, and any documents required under Sections 91.9 and 91.203 must be available to the PIC at the ground control station of the UAS any time any aircraft operates in accordance with this exemption. These documents must be made available to FAA Administrator or any law enforcement official upon request.

16. For all BVLOS operations, the UA must be equipped and operated with an anti-collision light. While BVLOS operations are limited to daytime operations under this exemption, the anti-collision light must meet the standard of visibility for at least 3 statute miles between the beginning of evening civil twilight and the end of morning civil twilight.

17. Each unmanned aircraft under this exemption must be maintained in accordance with the manufacturer's maintenance, replacement, inspection, safety bulletins, and life-limit requirements for the unmanned aircrafts components. The PIC may not operate the unmanned aircraft until it has been determined that any discrepancies have been repaired.

18. Maintenance must be performed by qualified individuals who have been trained by the manufacturer in proper techniques and procedures for each UAS and all maintenance must be recorded in the aircraft records including a brief description of the work performed, date of completion and the name of the person performing the work.

19. Any maintenance or alterations that affect the UAS operation or flight characteristics, such as replacement of a flight critical component, must undergo a functional operational check test flight prior to conducting further operations under this exemption. Functional operational check flights must be conducted in visual line of sight by a PIC, and other personnel required to conduct the functional operational check test (such as a mechanic or technician) and must remain at least 500 ft. from all other people. The functional operational check flight must be conducted in such a manner to not pose an undue hazard to persons and property. The operator must permit the FAA Administrator and his representative to observe functional test flights upon the request.

20. All altitude must be reported in ft. AGL.

Qualifications, certifications and training:

21. The PIC has final responsibility and authority for the safe operation and flight of the aircraft in accordance with relevant regulations and company policies and procedures, executes vehicle commands through the ground control station and monitors system health status information, and is responsible for flight conduct and contingency management. Their qualifications must include:
    a) Successful completion of the uAvionix and Vantis training program for PICs;
    b) Hold a remote Pilot Certificate with a small UAS rating issued in accordance with 14 CFR Part 107 and be in compliance with Section 107.65;
    c) Pass either a sport, recreational, or private pilot FAA airman knowledge test before acting as PIC, or, in the alternative, hold any 14 CFR Part 61 pilot certificate (other than a student pilot certificate) and meet the flight review requirements of 14 CFR § 61.56; and
    d) Hold at least a third-class medical certificate.

22. Prior to beginning flight operations, the PIC must review NOTAMs and, if the NOTAMS indicate other UA activity or any other aviation activity in the intended operating area, ensure that operator contacts the other operator(s) to deconflict the activities.

23. The operator must request that a distant NOTAM (D) be issued by contacting the Flight Services NOTAM line at 1-877-4-US-NTMS (1-877-487-6867) not more than 72 hours in advance, but not less than 24 hours prior to the operation. The area of operation defined in the NOTAM must only be for the actual area to be flown for each day and defined by either a point and the minimum radius, or the vertices of a polygon, required to conduct the operation.

24. All training operations must be conducted only during dedicated training sessions for the petitioner's employees and must be conducted in accordance with the operating training program described in operator's training program.

25. The PIC may not conduct the operation if the PIC knows or has reason to know of any medical condition that would make the PIC unable to meet the requirements for at least a third-class medical certificate or is taking medicine or receiving treatment for a medical condition that results in the PIC being unable to meet the requirements for at least a third-class medical certificate.

26. The PIC must demonstrate to the operator that they are able to operate the UA safely, including fluency in conducting evasive and emergency maneuvers and maintaining appropriate distances from people, vessels, vehicles, and structures.

27. Prior to beginning flight operations, the PIC must ensure that a briefing is conducted so that any additional crew member(s) being used is/are aware of the operational requirements and associated limitations of the flight plan.

28. The PIC must operate the aircraft in accordance with the applicable Unmanned Aircraft Flight Manual.

29. The PIC is prohibited from beginning a flight unless, considering wind and forecast weather conditions, there is enough available fuel for the UA to conduct the intended operation with sufficient reserves such that the PIC can land the UA without posing an undue risk to aircraft or people and property on the ground, or the reserve power recommended by the manufacturer, if greater, is satisfied.

30. Prior to each flight, the PIC must obtain a weather report applicable to the area of operation from NWS or an NWS-approved source.

Electronic Observer:

31. Each EO must hold a valid remote pilot certificate with a small UAS rating issued under 14 CFR Part 107 and be in compliance with Section 107.65.

32. Each EO must satisfactorily complete the Vantis Electronic Observer Qualifications and Training Manual before conducting operations under this exemption.

33. The EO and any other direct participant may not participate in the operation if the EO and/or direct participant knows or has reason to know of any physical or mental condition that would interfere with the safe operation of the aircraft.

Operating Environment:

34. Operations conducted under this exemption are limited to sparsely populated areas, areas of population density of less than 100 persons per square mile, no operations being conducted over open air assemblies and no sustained flight over non-participating persons.

35. Operations conducted under this exemption must be conducted at an altitude of no higher than 400 feet AGL in Class G airspace, unless the person has prior authorization from the Administrator to operate an unmanned aircraft at an altitude above 400 feet AGL or in Class B, Class C, or Class D airspace, or within the lateral boundaries of the surface area of Class E airspace designated for an airport.

36. This exemption does not authorize flight within UAS flight restricted areas. It is the Operator’s responsibility to ensure that proposed UAS operating area does not enter a UAS flight restricted areas as described under CFR 14 Part 99.7, Temporary Flight

Restriction (TFR), Special Security Instruction (SSI) Location and contact information for the TFR SSI is provided in the relevant NOTAM and depicted on the FAA website: https://udds-faa.opendata.arcgis.com. Anyone seeking to enter a TFR SSI must request permission and receive advance authorization via the contacts listed on the website (https://udds-faa.opendata.arcgis.com).

37. The UA must remain well clear and give way to all other detected manned aircraft operations and activities at all times so as not to create a collision hazard. When using a detect and avoid system, well clear is defined as 2000 feet horizontal or 250 feet above and below any other detected manned aircraft.

38. Operations must not cause hazard to persons or property on the surface or in the air. If at any time safety of human beings or property on the surface or in the air is in jeopardy, the PIC must cease operations.

39. BVLOS operations must be beyond the following distances from the airport reference point (ARP) of a public use airport, heliport, gliderport, or seaport listed in the Digital - Chart Supplement (d-CS), Chart Supplement of the U.S. Government Flight Information Publications:
    a) 5 nautical miles (NM) from an airport having an operational control tower; or
    b) 3 NM from an airport having a published instrument flight procedure, but not having an operational control tower; or
    c) 2 NM from an airport not having a published instrument flight procedure or an operational control tower; or
    d) 2 NM from a heliport.

40. Operations at night are prohibited.

Other:

41. For all current operations areas, and prior to conducting operations in a new area, the operator must prepare a collision avoidance plan and submit the plan to the FAA for acceptance. Submit the plan to the Flight Standards Service General Aviation and Commercial Division (AFS-800), 800 Independence Ave. SW, Washington, DC 20591. Telephone: 202-267-1100, Email: 9-AFS-800-Correspondence@faa.gov for acceptance. The plan must specify whether DAA will be used, to what extent VOs are needed, and how the operator will manage conflicts with other UA. If a third-party service provider (3PSP) is used, the plan must ensure that the 3PSP's level of service is sufficient to meet its operational requirements, including the time required to respond to 3PSP information and guidance and the impact of UAS system latencies and latencies in the C2 link. The operator must include a declaration of compliance in accordance with published standards or an alternative means of compliance. The FAA will determine whether validation of the

operation in the area is required.

a. Prior to commencing operations under this exemption that rely on a function provided by the third-party service provider, the petitioner must be in receipt of a copy of a Letter of Acceptance issued by the FAA to the petitioner and the third-party service provider. The petitioner is responsible for ensuring that the third-party service is used in accordance with any limitations stipulated in the LOA, including discontinuing use of the service when the petitioner becomes aware that the third-party service provider is no longer meeting the petitioner's expected quality of service. The petitioner is responsible for reporting failures, degradations and malfunctions of the service as described in Condition and Limitation Nos. 50 and 51. Either the petitioner or the third-party service provider may request a copy of the LOA from the Flight Standards Service General Aviation and Commercial Division (AFS-800) using the contact information in Condition and Limitation No. 41.
b. At a minimum, for the petitioner and the third-party service provider to be issued an LOA, the petitioner must ensure that a service level agreement (SLA) or comparable document between the service provider and the petitioner is provided to the FAA and that the document describes the functions performed by the service, the consensus standards instantiated by the service, the quality of service metrics that the service provider fulfills, the roles and responsibilities of the service provider and the operator, the operational limits of the service, and the version control/software update practices of the service. Additionally, the petitioner must provide results of testing showing that the service provides the stated functionality to the quality-of-service metrics identified in the SLA.

42. The operator must maintain a conflict management capability to ensure that the PIC is able to keep the UA well clear of any manned aircraft and clear of other UA.

43. For management of conflict with manned aircraft, this capability may include use of a DAA system if evaluated and approved by the FAA. In operating locations where DAA is not used or is not available, use of VOs is required to maintain the capability.

44. For management of conflict with other UA, the operator may use technical means of strategic deconfliction and conformance monitoring, including those provided by a 3PSP.

Reporting:

45. The operator is responsible for maintaining the following data and providing the data to the FAA upon request:
    a) Date, name, and certificate number of the designated PIC responsible for each flight;

b) Date, name, and certificate numbers of all other personnel required for each flight;
c) Duration of each flight;
d) The length of the rest period prior to each duty period for each of the required personnel;
e) Total hours on duty per calendar day for each of the required personnel;
f) Total duty time the designated PIC spent operating more than one aircraft, at the same time per calendar day, if authorized; and
g) Total duty time the designated PIC spent operating the maximum authorized number of aircraft, at one time per calendar day, if authorized.

46. In the event of near-midair collision (NMAC) with a manned aircraft, the operator must immediately notify the responsible FSDO of the event and provide the closest point of approach, date, time, location, altitude of the encounter, and avoidance maneuver taken, if any.

47. In the event of midair collision (MAC) with a manned aircraft, the operator must immediately notify the responsible FSDO of the event and provide the date, time, location, altitude of the encounter, and avoidance maneuver taken, if any.

48. For flights that involved any well-clear violation with a manned aircraft, other than an NMAC or a MAC, within 24 hours of the occurrence the operator must send a report to the responsible Flight Standards Office including closest point of approach, date, time, location and altitude of the encounter, and avoidance maneuver taken, if any.

49. For flights that involved any horizontal or vertical excursion from an authorized cell in the UAS Facility Map, within 24 hours of the occurrence the operator must send a report to the responsible Flight Standards Office including the maximum distance and duration of the excursion and the resolution of the excursion.

50. In the event of an unscheduled outage of a third-party service, within 24 hours of the outage the operator must send a report to the responsible Flight Standards Office indicating the loss of the service and the time to restore.

51. In the event of a malfunction of a third-party service, within 24 hours of the malfunction the operator must send a report to the responsible Flight Standards Office indicating the nature of the malfunction and the time to restore normal operation of the service.

52. The PIC must report all accidents and incidents to the Flight Standards District Office (FSDO) having jurisdiction over the area of the demonstration operation, to law enforcement as required by local law, and National Transportation Safety Board (NTSB) if the occurrence meets the criteria stated in 49 CFR Part 830. All documentation and equipment associated with the operation shall be preserved and presented to the

examining authorities at their request.

53. In the event of any intervention, incident, or accident, the operator must submit an initial event report within 24 hours of the event. This report must be submitted to the responsible Flight Standards office, or as otherwise directed by the FAA, and provide the information listed below:
    a) Description of the event, including operational and environmental factors;
    b) Description of the initial, known contributing factors for the event; and
    c) Names of the crewmembers involved in the operation and their respective roles.

54. Following an intervention, incident, or accident, the operator must perform an investigation and submit a final event report with the results of the investigation to responsible Flight Standards Office, or as otherwise directed by the FAA. This report must address:
    a) Causal factors for the intervention, incident, or accident; and
    b) Planned corrective actions to prevent recurrence of the event, including a timeline for implementation of the corrective actions.

55. The operator must report operational data to the FAA by the 10th of each month, including the number of times the UA transgresses the lateral or vertical boundaries of the flight corridor. These reports must be made on the form entitled, Unmanned Aircraft System (UAS) Monthly Flight Report, Unmanned Aircraft System (UAS) Basic Specifications Report, Unmanned Aircraft System (UAS) Corrective Maintenance Report, and Unmanned Aircraft System (UAS) Flight Anomaly Report (OMB Form No. pending). Forms must be submitted to the FAA via Aeronautical Data Exchange at https://adx.faa.gov.

Failure to comply with any of the above conditions and limitations may result in the immediate suspension or rescission of this exemption.

The Effect of the FAA's Decision

This exemption terminates on September 30, 2025, unless sooner superseded or rescinded.

To request an extension or amendment to this exemption, please submit your request by using the Regulatory Docket No. FAA-2022-0921 (*http://www.regulations.gov*). In addition, you should submit your request for extension or amendment no later than 120 days prior to the expiration listed above, or the date you need the amendment, respectively.

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

Issued in Washington, D.C., on September 6, 2023.

David H. Boulter
Associate Administrator for Aviation Safety
Federal Aviation Administration

Attachment 1

Supplemental Document(s)	Information Received
uAvionix UAS Flight Operations Manual	This document describes procedures for the operations of the Rapace UAS
uAvionix UAS Maintenance Inspection Manual	This document describes procedures for the maintenance and inspection of the Rapace UAS
uAvionix UAS Qualifications Training Manual	This document describes the qualification and training of Rapace UAS crewmembers
Vantis Electronic Observer Qualifications and Training Manual	This document describes the qualification and training of the Electronic Observer
uAvionix BVLOS CONOPS Manual	Concept of Operations. This document describes how uAvionix will conduct their unmanned aircraft operations