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U.S. Department of Transportation
Docket Operations M-30
West Building Ground Floor, Room W12-140
1200 New Jersey Avenue SE
Washington, DC 20590

**ATTN**: FAA-2015-0150; Notice No. 15-01
**Operation and Certification of Small Unmanned Aircraft Systems**

Ladies and Gentlemen:

The Air Line Pilots Association, International (ALPA), representing the safety interests of over 51,000 professional airline pilots flying for 30 airlines in the United States and Canada, has reviewed the referenced Notice of Proposed Rulemaking. We commend the FAA for the level of detail in the proposal and the clear intent to maintain the safety of the National Airspace System (NAS). This is consistent with ALPA's long-held position that all aircraft in the National Airspace System (NAS) must operate to the same high level of safety.

In general, we believe the proposed rules, with some modification and with appropriate supplementary material (e.g. training documents, advisory circulars), could be effective in ensuring that the introduction of non-hobby sUAS into the NAS does not pose significant unmitigated risk. However, we feel there are several areas in which additional standards and guidance must be developed to achieve the desired level of safety for the NAS.

**General Comments on the Proposal**

ALPA is concerned that the proposal is strictly limited to operating regulations, with no consideration given to design standards. We note the lateral and vertical restrictions to operations and infer a clear intent to restrict sUAS from operating in areas in which manned aircraft are likely to be flown. However, nearly all of the aircraft that are the focus of the proposed regulations are now, and may reasonably be expected to continue to be, capable of performance that would allow them to climb to altitudes well above 500 feet above the surface as well as range, speed and endurance that would allow them to quickly fly significant distances, well beyond the operator's sight. Yet there is no requirement for any means of measuring altitude, speed, or control station transmitter range, and there is no requirement that any technology be employed to prevent operation above 500 feet above the surface or encroach on the airspace in which sUAS operations are prohibited. This is a significant shortcoming in the proposal and we urge the FAA to consider means, other than the operator's skill and intentions, to ensure the aircraft cannot be operated outside the "confined area" required to mitigate the collision risk. In fact, the vast majority of our concerns outlined below trace to the fact that

under the proposal, sUAS may, due to malfunction, lack of operator awareness or deliberate disregard for safety regulations be flown at altitudes, speeds and geographic areas, regardless of operating restrictions to the contrary, that would make the sUAS a hazard with a significant risk of collision with other aircraft in the NAS. Design-based mitigations of that hazard would substantially reduce the risk. Similarly, FAA has requested comments on whether use of technology to mitigate risks in sUAS operations should be used as a justification for relaxing the operating limitations. We feel the safety technology issues discussed in our comments are of paramount importance and are needed simply to assure the risk mitigation embodied in those operating restrictions, so no relaxation of those standards based on technology is appropriate without further data to support additional risk analysis.

We are also concerned at the absence of any required demonstration of proficiency prior to being issued an airman certificate, and the absence of any experiential criteria to ensure proficiency is maintained. While many current sUAS may be simple and relatively easy to operate, there is no requirement that makes that a standard. We would point out that if the NPRM is adopted exactly as proposed, an individual could be granted the sUAS airman's certificate without ever seeing, touching or owning any device, then nearly two years later, irrespective of design and technology changes, be allowed to operate a sUAS without any additional training or knowledge testing.

We note that the general description of small UAS (sUAS) is consistent with the Aviation Rulemaking Committee (ARC) chartered to develop recommendations regarding safe operation of sUAS. ALPA participated fully in the sUAS ARC and is familiar with those recommendations. ALPA concurs that a sUAS should be limited to maximum takeoff weight of 55 Lbs. and operations only during daylight hours and within visual line of sight of the operator/pilot. We concur that "visual line of sight" (VLOS), defined as vision unaided by devices other than corrective lenses, is a key safety element. The overall state of understanding of sUAS operations, failures and potentially unidentified hazards is simply too immature to allow commercial operation beyond VLOS. The use of an on-board camera cannot replace the awareness provided by direct observation by the operator/pilot or designated visual observer, and operating a sUAS in this manner would add unacceptable risk that is completely avoidable.

We also note that the aircraft intended to be covered by the proposed regulations are now, and likely to be in the future, of a wide variety of sizes and shapes. Many models available today are monochromatic or nearly so, either all black or all white. Unlike manned aircraft, whose physical size typically makes them visible regardless of the paint scheme, sUAS may be extremely difficult to see against a non-contrasting background (e.g. a white aircraft, less than 24 inches across, with a very narrow profile, viewed against a white or light grey sky). This lack of conspicuity may significantly impact the ability of the operator to maintain visual contact and we urge the FAA to develop either conspicuity standards, advisory material discussing the factors influencing the ability to maintain visual contact, or both. FAA requested comments on whether a specific distance limit should be imposed. The variety of sizes, shapes and colors noted above would all impact the distance at which the sUAS can be seen, so we do not feel a single specific distance is appropriate if the factors above are well discussed in advisory material. We also suggest that a requirement, either design, operational or a combination of both, be developed such that in the event the operator/pilot loses visual contact with the sUAS, it can be commanded to land or "return home." ALPA fully agrees with the NPRM when it states, "The FAA has not identified an acceptable technological substitute for the safety protections provided by direct human vision in small UAS operations at this time".

Further, we agree that all operations must take place in visual meteorological contentions (VMC) with the identified cloud clearances. In that regard, since the proposal could allow sUAS to be flown by individuals with no practical aeronautical experience, we would recommend that it be made clear to any reader of proposed Part 107 that the 3 mile visibility requirement for VMC cannot be interpreted to suggest that the visual line-of-sight (VLOS) required elsewhere in the proposed regulation can necessarily be maintained at 3 miles. It must be clear to anyone flying a sUAS that keeping it in sight is a requirement in and of itself, is affected by a wide variety of factors and that "prevailing visibility" is a meteorological term measured independently of the ability to see objects of random size, shape and level of conspicuity in varying environmental conditions.

The proposal would keep sUAS operations below 500 feet above the surface, which is appropriate to minimize the risk of interference with other users of the NAS. However, the proposal repeatedly states a primary mitigation against such interference is a "confined area of operation". The proposal does not define "confined area of operation" nor does it offer a practical means for the operator/pilot to control the airspace or areas of operations. This again points to the need for a design solution.

This "confined area" is also used as a mitigation specifically in operational hazards including "loss of positive control" and pilot risk factors (107.19 (b) and 107.39). The NPRM uses an illustration of this mitigation that in a loss-of-positive-control situation, "a rotorcraft that loses operator inputs or power to its control systems would tend to descend straight down or at a slight angle while a fixed wing aircraft would glide for a greater distance before landing". This example may be true for some sUAS currently available commercially, but the NPRM is again silent on any design requirement to ensure that the flight profile of each aircraft remains stable following a loss-of-positive-control. ALPA believes that many sUAS, particularly those with multiple propulsion units, may in fact be highly unstable when they enter a state of "lost link" or "loss of positive control". Notwithstanding the comment above about sUAS flight characteristics following loss of positive control, the NPRM also points out quite clearly that loss of control poses a risk of collision. This is a known hazard that must be adequately mitigated. C2 link failures are one of the most common failures on a UAS (both small and large), lost link mitigations should require safe modes to prevent fly-aways or other scenarios. If lost link occurs, mitigations to safely perform auto-hover, auto-land, return-to-home maneuvers and geo-fencing protection must be incorporated into the navigation and control systems for a sUAS to safely land (without harm to persons or property) or re-establish C2. ALPA believes strongly that design standards must be developed both to ensure that the sUAS remains within the defined airspace when operating normally and to ensure that the hazard of operation in the absence of control commands is mitigated.

Additionally, the radio frequency spectrum that is commonly used for sUAS is unprotected. In addition, as is recommended by the sUAS ARC, ALPA supports the idea that mitigations for spectrum interference, weather, terrain and obstacles (man-made or natural) should be developed to ensure safe operations. We note that amateur radio operators using the spectrum are required to be licensed by the Federal Communications Commission, clearly indicating that controls are appropriate for use of the spectrum and raising the question of whether UAS operations should be similarly licensed and regulated.

We recognize that oversight of the population of sUAS is a formidable task, and we commend the FAA's efforts. Given the variety of aircraft, the number of aircraft, the possible operating

locations and the number of new airmen potentially affected by this proposal, we strongly suggest the FAA make liberal use of additional advisory material. In addition, we recognize that Internet-based communication of safety material, training resources, databases of airport locations and airspace restrictions, best practices, in-service irregularity reports and the like is very possibly the only practical means of reaching the target population and we urge FAA to make the maximum possible use of online resources to reach the sUAS pilot population.

**Comments on specific proposed regulations in the NPRM**
**Subpart A—General**
**107.3.** ALPA does not agree with the proposed definition of the person manipulating the controls of a sUAS. It is ALPA's view that the person manipulating the controls of an aircraft in the NAS is a pilot. We do not agree that the term operator is "somewhat analogous" to the position of a pilot who controls the flight of a manned aircraft. To the contrary, the term "operator" is almost universally used in the context of the definition of "operate" in 14 CFR part 1.1 meaning the owner of an aircraft (irrespective of who manipulates the controls), or the airline company in the case of airline operations. The NPRM proposes to assign the final authority and responsibility for safe operation to the person manipulating the controls of the sUAS, which ALPA fully supports, and which is completely consistent with the existing definition of Pilot in Command in 14 CFR part 1.1

We further note that the International Civil Aviation Organization (ICAO) definition of piloting as, "To manipulate the flight controls of an aircraft during flight", as well as the Remote pilot: "The person who manipulates the flight controls of a remotely-piloted aircraft during flight time."

We recognize that identifying the sUAS pilot as a pilot with PIC authority implies the same emergency authority as the PIC of a manned aircraft. We agree that the pilot of a sUAS need not necessarily react in a manner identical to that of the PIC of a manned aircraft, but the NPRM goes into considerable detail about the need to train a sUAS pilot on emergency procedures. We concur with the need for such training but strongly recommend the training include considerations in the exercise of emergency authority, however remote the likelihood of that may be.

**107.9** We agree that injury and damage to property merit attention, but ALPA also suggests that damage to a sUAS above a certain level should be included. The purpose in reporting and investigating aircraft accidents is to identify lessons learned that improve the safety of the overall operation in the NAS. We understand that given the wide variety of sUAS, the safety "return on investment" of collecting data on or investigating every accident varies widely. There are thousands of sUAS on the market for relatively modest costs, typically within the "micro" definition in the NPRM, but within the range of 55 lbs. and under there are aircraft available (some already flying under FAA's grant of exemption) costing over $10,000 and some over one million. The value of these aircraft imply a level of sophistication in the aircraft itself and the operation such that there may be valuable lessons learned from a detailed analysis of factors leading to an accident even if no other property is involved.

We also believe that events of "lost link," meaning failure of the system that allows the operator/pilot to maintain positive control, should all be reported. This will allow FAA to develop hard data on reliability of these systems and therefore more accurately evaluate the risk.

In addition to whatever events are required to be reported, we suggest there would be potential safety benefit in the establishment of a process for sUAS owners to report malfunctions, identified defects and other in-service problems. This would allow accumulation of operational data that could be used in subsequent risk evaluation.

**Subpart ---B Operating Rules**

**107.13, 107.15 and 107.49**. While we understand the rationale outlined in the NPRM to use the provisions of section 333(b) (2) of Public Law 112-95, to exempt sUAS from the aircraft airworthiness process in 14 CFR 21.1 and 14 CFR 91.203 we do not believe that a simple preflight inspection, with no defined criteria on which the owner/operator can base a decision about airworthiness, is sufficient to ensure safe operation. The sUAS ARC report similarly reflects the need for a means to apply design and manufacturing standards to assure a safe, reliable aircraft. The FAA has stated that any UAS manufacturer may submit to and undergo certification evaluation of their aircraft. Furthermore the NPRM states that there are several other certification options available to small UAS would allow a manufacturers and operators to obtaining a Type Certificate (TC) and standard airworthiness certificate. Thus there are procedures and process in place that would ensure the airworthiness of a sUAS conforming to the type certificate and prior to entrances into the National Airspace System (NAS). By not requiring this process, or one tailored to sUAS design and production, to be followed there is no assurance that a sUAS built by an operator or purchased from a manufacturer would be safe and reliable so as not to create a hazard to users of the national airspace system or the public. Elsewhere in our comments we have noted that there should be a means, other than the operator, to positively contain the sUAS both vertically and geographically in the intended airspace. With current technology, this, as well as the means of operating the sUAS in all phases of flight, is likely to involve software and firmware. We therefore point out that any process to assure the airworthiness of the sUAS should include a provision for tamper-proof or tamper evident software and firmware in addition to any altitude and geographic limiting functions.

**107.13**. ALPA believes a means of identifying a sUAS with an owner or operator through registration and marking is important for accountability in the operation of the sUAS and to facilitate reporting of defects and operational difficulties. We understand the FAA's interest, outlined in the NPRM, in balancing the advantages of registration with the difficulty of strict compliance with 14 CFR Part 49 (i.e. registering not only the aircraft but component parts). ALPA believes the aircraft should be registered and a fire proof plate should be attached to the sUAS as a permanent identification of the registration of the sUAS. In addition, we note that there appears to be an ambiguity in the proposed amendment to 14 CFR Part 47.15 and the proposed 14 CFR Part 107.89. One appears to require registration of all sUAS, which is consistent with the language in the preamble outlining a registration procedure, while the other appears to exempt nearly all sUAS from that requirement. We suggest the FAA develop clarifying language for the final rule in that regard.

**107.17**. We fully concur with the intent of the requirement for an operator/pilot or VO "not to act as such if he or she knows or has reason to know that he or she has a physical or mental condition that would interfere with the safe operation of a [sUAS]."However, we do not believe the operator himself or herself is necessarily in a position to make that determination without defined medical criteria appropriate to the operation of the sUAS. In addition, while it is true that current regulations allow for some aeronautical activity without a formal FAA medical evaluation (e.g. sport pilot, student pilot, ground instructors and balloon and glider pilots), none of these individuals is authorized to operate an aircraft in the NAS for compensation or hire. The

standards set forth in 14 CFR Part 67 (Medical Standards and Certification) include, along with specific criteria, include a comment for every class of FAA medical certificate that ensures the airman can "safely perform the duties or exercise the privileges of the airman certificate applied for or held." ALPA therefore believes a current 2nd Class FAA Medical certificate should be required for a sUAS pilot operating an aircraft for compensation or hire as is required in the NAS today, recognizing that some accommodations due to UAS-unique circumstances may be appropriate without compromising safety.

**107.21.** The NPRM identifies "performing the manufacturer's recommended maintenance" as a means to comply with this paragraph, but there is no companion requirement on manufacturers to develop a maintenance schedule. ALPA believes that if a sUAS is to be flown "for compensation or hire" it is incumbent on the manufacturer to define parameters for maintenance and inspection, and such a requirement should be developed.

**107.25** We understand the rationale presented in the proposal but since the intent is clearly to avoid operation in the vicinity of large groups of people, we suggest that the limitation on operating from a watercraft include a limitation for the sUAS to remain over water. In addition, we feel it should be specified that the operator/pilot of the sUAS may not simultaneously be the operator of a moving watercraft.

**107.33** ALPA supports the sUAS ARC recommendation that there *must* be at least one qualified visual observer (VO) in addition to the PIC. Due to the nature of a sUAS being difficult to observe given it size and speed capabilities combined with a number of differing control station requiring the operator/pilot to "look down" to get additional information about the sUAS or monitor the camera/sensors, the visual observer become a critical crewmember for the safe operation of a sUAS. As such, we recommend development of guidance material outlining appropriate background and training for the VO and outlining appropriate subjects for the operator/pilot to discuss with the VO prior to flight. For example, any certificated airman likely has enough basic understanding of the need for coordination, communication, obstacles, traffic or other threats to safe operation, to be an effective VO.

Language in the preamble of the NPRM makes reference to the VO being able to maintain visual contact with the sUAS "in place of" the operator. This division of responsibility should be further clarified if the operator/pilot remains responsible for the safe operation of the sUAS. It is also easy to imagine an operator/pilot becoming accustomed to the presence of a VO and learning to operate the sUAS in that context. If the VO may or may not be present for subsequent flights, the ability of the operator/pilot to maintain constant visual contact may be significantly compromised.

Of equal importance, as noted in FAA N8900.227, is that the visual observer and the operator/pilot can verbally communicate with each other. The NPRM discusses the value of pilot-observer communication, comments that a communications plan should be developed, and provides for the use of communication-assisting devices. We agree with those comments but also feel it should be explicitly mentioned (in the preamble and in advisory material) that the ability to maintain communications using any device is necessarily complicated by the fact that the pilot/operator typically uses both hands to control the sUAS. This human factors consideration limits the possibilities of using assisting devices considerably, essentially to two-way radiotelephony with a constant (i.e. "hot") transmit-receive capability.

We also recommend development of guidance material for the VO and operator/pilot on what actually constitutes visual observation in the context of safe UAS operation. The preamble alludes to this need with a discussion of the possibility of the sUAS briefly going behind an obstruction. Given the relatively low training and experience envisioned for the sUAS operator/pilot, guidelines should be developed that outline scenarios when it might be acceptable to allow the sUAS to, for example, fly behind a tree where the operator/pilot may reasonably be able to see hazards but not behind a building where the operator/pilot cannot know if there are people, additional obstacle, or even if the control signals will be received.

The same visual observation discussion in the preamble correctly points out that a person's vision must be adequate to determine position, flight parameters and the presence of obstacles or other hazards. We concur but point out that without some sort of practical evaluation of proficiency and/or a defined visual acuity standard, there is no way for the FAA to know if the prospective airman has the required vision. ALPA further supports limiting sUAS operations to only one sUAS to an operator/pilot as stated in 107.35 and as recommended by the sUAS ARC.

**107.41** The NPRM proposes operations in Class B, C, D and E airspace. As noted elsewhere in our comments, as recommended by the sUAS ARC and as proposed in the UAS America Fund petition encompassed in the NPRM, sUAS should remain in Class G airspace. We do not believe there is sufficient information on which to base a sound safety case for allowing sUAS into controlled airspace at this time. We urge the FAA to use the established UAS test sites to evaluate how effective communication can be established and maintained between an ATC facility and a sUAS which is unlikely to have two-way communications capability incorporated into its design. In addition, as noted earlier, there is not currently a means to positively restrict the operation of sUAS to below 500 feet AGL, highlighting the hazard of a flyaway in the event of lost link. Should a sUAS with an altitude capability of several thousand feet stop responding to commands from the pilot/operator in, for example, Class B airspace occupied by dozens of commercial airline aircraft, the collision potential is both unacceptable and completely avoidable by prohibiting sUAS operations near such airports. These areas are controlled by Air Traffic Control (ATC) to ensure the safe and orderly flow of air traffic at the some of the nation's busiest airports. ATC controllers are already working at or near capacity to maintain the current level of safety in the NAS. Current surveillance technology is not designed to detect, track or display low flying (below 500 AGL) sUAS. Thus it will be of limited assistance to a controller in monitoring sUAS. Additionally, due to the size and altitude of sUAS operations the controller is unlikely to be able to continuously observe a sUAS throughout the airspace that he or she controls.

As a practical matter, we feel the most prudent means of reducing the collision potential with other aircraft in the NAS is simply to restrict sUAS from operating within a fixed distance of airports (e.g. 5 miles). We are concerned about the ability of a sUAS pilot/operator to correctly identify specific airspace areas and make the correct determination of whether operations are permitted or must be coordinated with ATC. The training envisioned by the NPRM could occur one time as much as two years prior to a sUAS operation that might be envisioned near an airport.

**107.49.** We concur with the need to ensure that all links between ground station and the small unmanned aircraft are working properly. In addition, ALPA recommends a requirement be implemented to verify the useable range of the transmitter in the control station before a flight.

Given that the transmitters are typically battery powered, there is no assurance that the available power is the same on each flight without a practical check.

Similarly, we concur with the need to ensure that there is enough available power for the small unmanned aircraft system to operate for the intended operational time and to operate after that for at least five minutes. However, ALPA has concerns, for electrically powered sUAS regarding how battery life may be measured. Batteries degrade over time and with different environmental conditions, so simply using a manufacturer's statement of battery life (if one exists) would almost always be wrong. There is no proposed requirement for either the control station or the sUAS itself to display available battery power, and indeed, with advancements in batter technology, there is frequently no useable relationship between available power and remaining battery life. ALPA suggests that there must be a means for the operator/pilot to know the remaining time of power remaining i.e. a "life-meter".

**Subpart C: Operator Certification**

**107.61.** The NPRM is proposing commercial operations of aircraft in the NAS that will be for "compensation or hire," ALPA believes that the pilot must hold at least a current FAA Commercial Pilot Certificate requiring a pilot to be at least 18 years of age for an appropriate category and class for the type of aircraft being flown as well as specific and adequate training on the UAS make and model intended to be used. The FAA requested comment on lowering the required age for sUAS certification to 16, citing the existing balloon and glider rating standards. We do not concur. Those standards are to enable an airman to operate a balloon or glider for recreational purposes only whereas the proposed Part 107 is focused on operations for compensation or hire.

ALPA also believes a current 2nd Class FAA Medical certificate should be required for a UAS pilot operating an aircraft for compensation or hire commercial operations as is required in the NAS today. Both of these requirements are reflected in the recommendations of the sUAS ARC, although we recognize that some modifications to medical requirements may be appropriate to account for UAS-unique issues such as the pilot not being physically in the aircraft.

**107.63 through 107.71** ALPA supports the use of an airman knowledge test and a report showing that the applicant passed an initial aeronautical knowledge test or recurrent aeronautical knowledge test as appropriate.

ALPA also believes, as recommended by the sUAS ARC, that there must be a practical demonstration of flight proficiency (both on initial certification and periodically thereafter) of the skill necessary to manipulate the controls of the sUAS and safely maneuver it in the intended airspace. Thus there should be training, experience and evaluation of skills for initial certification and a revalidation of those skills periodically (e.g. biennial review) such as is required for other airman certificates. The NPRM makes the assumption that "small unmanned aircraft is generally: (1) relatively easy to control; (2) highly maneuverable; and (3) much easier to terminate flight than a manned aircraft", this is not currently always the case, and in fact a clear objective of FAA's considerable efforts is to provide a framework to enable growth of a sUAS industry, which will undoubtedly result in innovation in designs and manufacturing, so absent any codified design standards, there can be no assurances that future designs will be easy to control, stable, maneuverable and easy to terminate.

**107.75.** ALPA concurs that pilots with military experience flying UAS may well have satisfied most if not all of the conditions FAA has set out for civilian sUAS pilots (and those additional qualifications recommended elsewhere in our comments). However, we would point out that, unlike for manned aircraft, military training for UAS has not necessarily taken place in the NAS, and therefore military or former military pilots cannot all be assumed to have familiarity with the list of required knowledge items outlined in the NPRM for initial certification. We therefore suggest that the initial knowledge test, rather than the recurrent test, may be more appropriate.

Of perhaps greater concern is the wide variety of military UAS in operation. These aircraft range in size from hand held, hand launched aircraft weighing a few ounces to an aircraft of a size comparable to some commercial aircraft. In addition, some are controlled by keyboard and mouse, have high levels of automation, operate far beyond visual line of sight, at high altitude and with endurance measured in days, not minutes, all in contrast to many typical sUAS. A military UAS pilot's skill, training and experience, while considerable, might have very little direct application to sUAS. Given our position that proficiency must be demonstrated to earn the requisite airman certificate for sUAS, we would recommend that FAA review the specific training and experience of a military pilot prior to determining what supplemental training, knowledge testing, or skills demonstration might be appropriate.

**14 CFR Part 61**

ALPA concurs with the amendment to authorize a manned flight instructor to accept applications for unmanned aircraft operator with small UAS rating by an applicant. We also suggest that it is appropriate to develop requirements for qualified sUAS flight instructors to teach sUAS curricula and appropriately evaluate applicants with knowledge tests, practical flight evaluations and examinations as well. The FAA should develop this path forward to accomplish a unified approach concomitantly with sUAS airman certificates.

**Comments on specific areas requested by FAA and not otherwise addressed herein**

ALPA believes discussion of any form of "UAS Air Carrier" is premature and is therefore opposed to the development of any class of air carrier for UAS. Because there is an expectation of safe transportation when payment is exchanged, air carriers are subject to more stringent regulations to mitigate the risks posed to persons or non-operator-owned property on the aircraft. Until such time that the safety record of UAS can prove the same level of safety as air carriers are held to they should not be authorized to conduct such operations.

ALPA agrees with the FAA and the logic in the NPRM that operations involving external-load carriage or towing involving sUAS should not be permitted under the proposed part 107 since they involve a greater level of public risk due to the dynamic nature of external-load configurations and inherent risks involved in towing operations. These risks factors include additional aerodynamic and load stress to the aircraft, as well as a requiring a higher level of piloting experience and skills.

ALPA has no objection to the use of two classes of sUAS per se, but establishment of a micro (less than 4.4 pounds) and sUAS from 4.4 pounds to no more than 55 pounds should not be used as the rationale for allowing unregulated aircraft into the NAS. We suggest that it may be appropriate to gain operational and practical experience with all sUAS operating under the proposed rules before promulgating an additional body of regulations covering a subset of small UAS. We note that this comment is in the context of the overall body of requirements either in the NPRM or recommended elsewhere in these comments.

ALPA agrees that all micro UAS should be made out of frangible material, noting that the propulsion systems (usually electric) are not frangible. However, we also note that many such aircraft are designed to carry non-frangible payloads (e.g. cameras) many of which are in fact designed to be extremely rugged and therefore quite non-frangible. Absent any restriction on payload, this would appear to defeat the purpose of requiring frangibility as a precondition of flying over people on the ground.

As noted above, ALPA believes a prudent course of action regarding the inclusion of a micro classification is to develop regulations applicable to all aircraft operating in the NAS until such time as operating experience provides firm data on failure rates, accident/incident history, hazards encountered, near mid-air collisions and various other pertinent operational difficulties that may be encountered. We note that this comment is in the context of the overall body of requirements either in the NPRM or recommended elsewhere in these comments.

ALPA is in general concurrence with most of the concepts outlined in the UAS America Fund petition with the caveat that we do not feel the outlined provisions could comprise the entire set of regulations necessary to ensure the safe operation of micro/sUAS in the NAS. In particular, we have no objection to the proposed altitude and speed operational restrictions and we support the proposed requirement for practical experience. We specifically support the proposed limitation to operation in uncontrolled airspace and concur with the petitioner's comment that operation in controlled airspace should not be allowed without further study. We concur with the establishment of a specific distance limit from the operator regardless of visual acuity considerations, but recommend further study to determine the appropriate specific limit to be used. We do not concur with the proposed operation outside the hours of sunrise to sunset. We further note, as also noted in our comments to the NPRM elsewhere in this document, the absence of any design considerations to ensure operation within the proposed operating area and the absence of any requirement for the pilot to demonstrate practical skills operating the sUAS.

**Administrative and Editorial Comments**

The NPRM states on page 33 that the FAA has used the small UAS ARC recommendation from 2005 and has thus referenced those recommendations within the NPRM. The sUAS ARC recommendations were in fact completed and submitted to the FAA in the spring of 2009.

The NPRM states in the table on page 55 (COMPARISON OF CANADIAN RULES GOVERNING micro UAS CLASS) that "autonomous operations" are included (YES) in the NPRM Part 107. ALPA notes that no such operations are discussed within this NPRM, nor does ALPA support the concept of "autonomous operations" by a UAS.

The NPRM state on page 78 "…this proposed rule would not allow small UAS to travel higher than 500 feet AGL" ALPA suggest changing "travel" to fly or operate, so the correct meaning is assured (i.e. not allow small UAS to fly/operate higher than 500 feet AGL).

In the NPRM Section IIIA, there is a comment about "'design' standards" being in contrast to performance based standards. We believe it is the intent of this comment to distinguish between performance standards and prescriptive standards. Design standards are neither prescriptive nor performance based simply by virtue of addressing design criteria.

In the discussion of a micro classification in the preamble, there is a comment that first person view would not be used. It is unclear if this means first person view is prohibited altogether or if first person view is not permitted to be used for see-and-avoid equivalency.

In the same section regarding micro classification, there is a comment about the operator not using any automation. Regardless of the outcome of the micro classification discussion, we think this provision merits clarification. Features like auto-hover, auto-land or return-to-home might be incorporated into any design as a means to enhance safety in the event of a malfunction or operator error or loss of positive control.

In the section on TSA vetting there is a reference made to biographic information of a "student pilot." We believe this may be an administrative error and should refer to a prospective sUAS airman.

The inclusion of provisions for model aircraft in the new proposed 14 CFR 101.1, 101.43 and 101.45 suggests that the title of Part 101 should similarly be changed to add fixed and rotary winged model aircraft. We recognize and support FAA's interest in ensuring that no sUAS, regardless of whether it is flown commercially or for hobby purposes, may be allowed to endanger other aircraft in the NAS. Most if not all sUAS flown commercially might also be flown recreationally, so many of the same concerns expressed above (e.g. mitigations to guard against encroachment on airspace used by manned aircraft, pilot/operator training, need for the VO, ensuring pilot/operator proficiency) represent potential threats to the safety of the NAS and need to be mitigated. We believe these operations should be regulated and urge FAA to continue to explore regulatory means to ensure that sUAS used for any purpose do not threaten other NAS users.

ALPA appreciates the opportunity to comment on this critical safety proposal. We reiterate our support for development of this technology and the potential societal and economic benefits it represents. ALPA stands ready to continue the existing collaborative relationship with FAA and industry to further develop standards necessary to ensure the continuing safety of the NAS.

Sincerely,

Christopher Baum
Manager, Engineering and Operations

CB: lad