



February 24, 2021

U.S. Department of Transportation
Docket Operations M-30
West Building Ground Floor
Room W12-140
1200 New Jersey Avenue SE
Washington, DC 20590-0001

ATTN: Docket No.: FAA-2020-0386
Petition for Exemption: Google Research Climate and Energy Group

IN OPPOSITION

Dear Sir or Madam:

The Air Line Pilots Association, International (ALPA), represents the safety interests of over 59,000 professional airline pilots flying for 35 airlines in the United States and Canada. ALPA's long-held position is that all aircraft in the national airspace system (NAS) must operate to the same high level of safety.

ALPA has reviewed the petition and has the following remarks and comments:

To ensure that the safety of the NAS is maintained, ALPA cannot support the petition without further understanding and assurances of mitigating measures for Google Research Climate and Energy Group's proposed operations. Using the HSE-UAV M8A Pro unmanned aircraft system (UAS), which has a maximum takeoff weight of 98.8 lbs, mitigations must be in place to achieve an equivalent level of safety or target level of safety for UAS operations as required by Section 44807 Special Authority, for certain UAS in PUBLIC LAW 115-254.

The significance of this petition, both, by the number of 14 CFR parts affected, as well as the scope requested for relief, is also of concern. It appears to be a de facto rulemaking activity. By intending to grant a comprehensive set of exemptions to 14 CFR Parts 61, 91, and 137, the Federal Aviation Administration (FAA) is side-stepping the normal rulemaking process to authorize nationwide, commercial UAS engagement in agricultural surveillance to detect and provide wildfire suppression (i.e. Part 137 operations).

As required under 14 CFR, Part 11.35 (b), the FAA has withheld proprietary company manuals and related material (listed below) which includes the petitioner's safety case justification. Therefore, many of the exemptions requested cannot be thoroughly evaluated by industry stakeholders. Without access to the safety justification, it is unclear how ALPA and other industry representatives can appropriately review and comment on the Petition for Exemption.

- Google Research has submitted the following UAS operating documents under 14 CFR, Part 11.35(b) and thus can not be reviewed by stakeholders:
 - Google Research Pilot and Aircrew Training Program
 - Google Research Flight Operations and Procedures Manual
 - Google Research Operational Risk and Safety Manual
 - AG-VA Manual
 - AG Brochure
 - Google Research Preflight Checklists
 - Google Research Test Plan

In particular, we note the following areas that must be addressed in order to ensure safe operations:

1. **Reliability, Safety, and Operation of the UAS:** The petition states that the “*initial*” area of operation will be confined to private property known as “Eagle Field” in Firebaugh, CA and will be used for firefighting and monitoring. It is imperative that the UAS have a pre-approved and defined flight path with technology (i.e. geofencing) to stay a safe distance away from personnel and facilities. There must be means both, to ensure that the UAS(s) remains within the defined airspace and that the hazard of other aircraft intruding on the area of operation is mitigated.
 - a. ALPA recommends that the FAA establish a performance-based rule and supporting standards for Geo-Fencing. Currently, the term “Geo-Fencing” is without an accepted definition and supporting standards yet is being accepted by the FAA as a suitable mitigation to the risk of a UAS flying outside of its authorized area.
2. **Minimum Qualifications and Requirements:** The petition requests that the PIC be exempted from being a professionally trained commercial pilot with an instrument rating and instead only have a 107 certificate and be over the minimum age of 18.
 - a. **ALPA has long advocated** for the FAA to establish remote pilot certification standards for commercial UAS pilots. These regulations are needed to ensure there is an equivalent level of knowledge and proficiencies for manned and unmanned commercial pilots.

- b. Google requests that the UAS that will be operating in the NAS should be exempt from an airworthiness certificate.
 - c. **ALPA recommends** that all UAS go through the airworthy certification qualifications, as outlined in the newly released 14 CFR, Part 21.17(b) for UAS, as a “special class” of aircraft (FAA-2020-1086). Additionally, there must be an electronic remote identification, and lighting, for all UAS as required by 14 CFR, Part 89.
3. **Biohazard Procedures:** The petition states that Google plans on using their UAS for aerial surveillance and fire suppression. The petitioner must state what type of chemical fire suppression, along with the corresponding safety data sheet (SDS) detailing the chemical properties of the substance, they are carrying in their payload. There needs to be procedures in place in an event of a spill out or misapplication, especially when dealing with biohazard materials. Weather can play an inherent part in where or how these services take place and must be taken into consideration. The petition also requests relief from requiring a flight manifest in the aircraft, which is highly unacceptable when dealing with biohazard materials. All flights should require a paper manifest on the UAS as a way to ensure that proper handling of the cargo is adhered to.
- a. All hazardous material events must be reported by Google under the current Hazardous Materials Regulations (HMR). These requirements are outlined for the reporting of incidents/accidents involving Dangerous Goods (DG): 49 CFR § 171.15; Immediate notice of certain hazardous materials incidents and 171.16; Detailed hazardous materials incident reports, as well as for EPA regulatory reporting; under 40 CFR § 302.6 Notification requirements.
4. **See and Avoid:** The petition states the PIC and VO will ensure that the requirements to see and avoid (14 CFR 91.113) are met, without offering any capabilities, such as detect and avoid (DAA), to achieve this critical safety function.
5. **Pilot and Observer(s) Communication:** The petition does not clearly state how it is possible, for one pilot and one visual observer, to safely observe the UAS at all times, nor how the pilot will be able to communicate with multiple VOs by voice, simultaneously. Text messaging, either by mobile phone or other means, could have an unknown latency that could extend to several minutes. This latency issue renders text messaging unsuitable for timely and effective transmission of critical safety information. When voice communication is used, both the pilot and observer(s) should be able to maintain a visual observation of both the aircraft and the area of operation per FAA N 8900.227.
6. **Flammability Assessment of Lithium-Ion and Lithium-Ion Polymer Battery Cell Designed for Aircraft Power Usage:** The lithium polymer batteries that serve as the

power supply have numerous associated fire and explosion hazards as outlined in DOT/FAA/AR-09/55, "Flammability Assessment of Lithium-Ion and Lithium-Ion Polymer Battery Cell Designed for Aircraft Power Usage (January 2010)." The safe carriage of the batteries and the mitigations in place for known risks, should be addressed.

7. **Command and Control (C2) Link Failure Modes, Strategies and Mitigations:** C2 link failures are one of the most common failures on a UAS; lost-link mitigations should require safe modes to prevent fly-a-ways or other scenarios. If lost link occurs, mitigations like auto-hover, auto-land, return-to-home, and geo-fencing boundary protection must be incorporated into the navigation and control systems for a UAS to safely land (without harm to person or property) or re-establish C2. Redundancies and procedures should be put in place in case the pilot monitoring is unable to take control when an issue arises, for example weather, bird strike or system failure. Without GPS or pilot in command to assume flight controls, it does not seem plausible that this function could be safely accomplished. Additionally, the radio frequency spectrum that is commonly accessed for UAS is unprotected. Mitigations for spectrum interference, weather, terrain, and obstacles (man-made or natural) should be developed to ensure safe operations and not solely rely on GPS as this can be a single point failure.
8. **14 CFR 21 and 14 CFR 91.7(a):** ALPA's long-held position is that all aircraft in the NAS must operate to the same high level of safety. Thus, UAS likewise must be in airworthy condition. The petition seeks an exemption from the aircraft airworthiness process. The FAA has stated that any UAS manufacturer may submit to and undergo certification evaluation of their aircraft.
 - a. **ALPA** opposes this attempt to avoid certifying the airworthiness of this UAS. This UAS should be certified to the same level of safety as other aircraft operated commercially in the NAS.
9. **14 CFR 61.133(a):** The petition is proposing commercial operations that will be for "compensation or hire." ALPA maintains that the pilot must hold at least the equivalent of a current FAA commercial pilot certificate for an appropriate category and class for the type of aircraft being flown, as well as, specific and adequate training on the UAS make and model intended to be used. Similarly, a current, second-class, FAA medical certificate should be required for a UAS pilot and VO operating an aircraft for compensation or hire, in commercial operations, as is required for other pilots operating in the NAS today.

- 10. 14 CFR 91.119 Minimum Safe Altitudes, General:** ALPA's long-held position is that all aircraft in the NAS must operate to the same high level of safety; this includes maintaining a safe altitude for both airplanes and helicopters.
- 11. 14 CFR 91.121 Altimeter Setting:** According to the petition, the aircraft will not have a barometric altimeter as required by 14 CFR 91.121, so the ability to accurately maintain altitude must be addressed. Processes or mitigations such as redundant control capability, fail-safe systems, backups, and specific validated procedures for system and equipment failures must be in place. These processes or mitigations must cover engineering processes, software development and control, electronic hardware development and control, configuration management, and quality assurance to ensure the aircraft and its control system(s) operate to the same level of safety as other aircraft operated commercially in the NAS.
- 12. 14 CFR 91.151 Fuel Requirements for Flight in VFR Conditions:** The use of batteries as the only source of power for an aircraft in the NAS is a substantial shift from traditional propulsion methods on which current safety margins are based and requires more regulator exploration to determine best safety practices. The FAA will need to analyze the aircraft performance and operational environments to determine whether the safety baseline of this technological functionality can be performed reliably and repeatedly to an equivalent level of safety.
- 13. 14 CFR 91.405(a), .407(a) (1), .409(a) (2), .417(a) & (b) Maintenance Inspections:** The foundation of check-and-balance maintenance is the safety methodology that provides accountability and is precisely the reason why FAA-certificated maintenance professionals should perform all required inspections. Additionally, owner/operators must be required to keep records verifying that certain maintenance complies with required inspections.
- a. **ALPA** opposes this attempt to avoid compliance with established aircraft maintenance and record-keeping, and thus, UAS should comply with the same level of safety as other aircraft operated commercially in the NAS.
- 14. 14 CFR 137.19(b), (c) & (e)(2)(ii), (iii), & (iv); 137.31(b); 137.41(c); and 137.42.:** As previously stated in these comments, ALPA believes that pilots operating under § 137.19(b) and (c), as well as 61.113 and 61.133, should be knowledgeable of operations in the airspace system, including licensing of pilots of an unmanned aircraft used for commercial purposes. UAS pilots with recreational licenses should not be exempt from the prohibition of recreational pilots piloting aircraft for compensation or in furtherance of a business. The additional hours required to earn an advanced pilot license, required

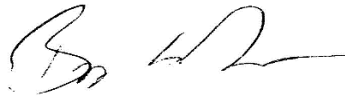
for commercial operations, are justified since commercial operations are more complicated than pleasure flights. A higher class of license is justified because this requirement increases safety in the NAS, and safety should not be compromised.

Finally, ALPA has recently reviewed and commented on countless petitions for exemptions like the one outlined in this letter. Time and time again, ALPA has stated that there is a need for performance-based regulations to be put in place to reduce the amount of individual petitions for exemptions. The FAA's limited resources, especially in light of the COVID-19 pandemic, has been significantly taxed by the continuing use of waiver requests until such time as the UAS rules have been implemented. ALPA urges the FAA to take this opportunity to implement performance-based regulations. This will ensure that correct mitigations will be put in place and not allow for single link failures. The overall outcome will result in the current level of safety being maintained for all NAS users.

In summary, at this time ALPA believes that to comply with the safety intent of the regulations for which waivers and exemptions are sought, and to achieve an equivalent level of safety for the operation of UAS in the NAS, specific mitigations, in at least the areas outlined above, must be in place.

ALPA appreciates the opportunity to comment on the subject document.

Sincerely,

A handwritten signature in black ink, appearing to read 'Bryan Lesko', with a stylized flourish at the end.

First Officer, Bryan Lesko
Aircraft Design/Operations (ADO) Group Chair
Air Line Pilots Association, Int'l