U.S. Department
of Transportation
Federal Aviation Administration

Position Paper

Safety Concerns of Exhaust Plumes

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Airport Obstructions Standards Committee Working Group

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Background:

In 2008, a safety concern was raised to Federal Aviation Administration (FAA) that in some instances exhaust plumes were causing disruption to flights. In addition, California Energy Commission and other organizations were requesting guidance from the FAA on what is the appropriate proximity power plants can be constructed near an airport. The only FAA regulations are on the physical restrictions of the exhaust stack height. There are no FAA regulations protecting for plumes and other emissions from exhaust stacks.

In September 2008, the FAA's Airport Obstruction Standards Committee (AOSC) was tasked to study the impact exhaust plumes may have on flight safety. In 2009, a task was added to an FAA support contract that evaluated the following:

- How much turbulence is created by the Exhaust Plumes?
- Is this turbulence great enough to cause loss of pilot control?
    - If so, what size aircraft are impacted?
- Is there a lack of oxygen causing loss of engine or danger to pilot/passengers?
- Are there harmful health effects to the pilot or passengers in flying through the plume?

In fall 2010, the initial Exhaust Plume Report was completed. After careful review, the AOSC determined that the information in the initial Plume Report needed to be further verified and validated.

In spring 2011, FAA's Federally Funded Research & Development Center operated by the MITRE Corp was tasked to verify and validate the initial study with an agreed upon completion in fall 2012.

MITRE completed their initial task in September 2012 and delivered a study and validated Exhaust Plume model. The study indicates exhaust plumes can create hazards for aircraft in a limited area above the stack in terms of turbulence caused by upward motion of the plume and reduced oxygen content inside the plume. The reduced oxygen is not a danger to pilots, but could cause failure of helicopter engines if hovering over the plume. It also indicated that weather conditions are an important factor in the size of the risk area. The conditions which create the largest risk area are calm winds, low temperatures, and neutral or stable stratification of the atmosphere. The reverse is also true, windy conditions (greater than eight (8) knots) and warmer temperatures, the risk area is minimized.

An industry meeting was hosted by the FAA in January 2013 in which MITRE briefed on the initial study and explained their Exhaust Plume Model. Industry recommended that the Plume Model be updated to include light sport aircraft and when an aircraft crosses over the plume while already in a turn.

The industry group also expressed a desire for the FAA to take affirmative action from the results of the plume model to declare plumes as hazards, as they do with structures under Part 77. The industry group believes preemptive planning is very important for preventing construction of plume emitting facilities in the vicinity of airports. They reiterated a desire for the FAA to declare them hazards as an aid to empower the State's position in that regard.

Final Steps:

1. The FAA Office of Airports will update Advisory Circular (AC)150/5190-4, Airport Land Use Compatibility Planning, to address the compatibility of exhaust plumes near airports; scheduled to be completed by Fall of 2014.
2. The FAA Office of Aviation Safety will further update the Aeronautical Information Manual (AIM) to provide pilots information regarding the potential hazards over exhaust plumes; scheduled to be completed in Fall of 2014.
3. The FAA tasked the MITRE Corporation to update the Exhaust Plume Model to include the industry recommendations, as well as make it a fully executable that can run on a personal computer. The Model will be available the Fall of 2014. How to access the model will be outlined in the AC 150/5190-4.

Conclusion:

After a thorough analysis, the FAA has determined the overall risk associated with thermal exhaust plumes in causing a disruption of flight is very unlikely. However, the FAA determined that thermal exhaust plumes in the vicinity of airports may pose a unique hazard to aircraft in critical phases of flight and therefore are incompatible. We recommend that airport owners, in cooperation with local communities, follow the guidance outlined in Advisory Circular (AC)150/5190-4, Airport Land Use Compatibility Planning.

The information and recommendation provided in this Position Paper supersedes any previous studies or reports on thermal exhaust plumes completed by the FAA.

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