



Supersonic Flight Alliance, LLC.
6100 4th Ave South
Suite 300
Seattle, WA 98108
Phone: (206) 486-1140



Aerospace Testing Engineering & Certification, Inc.
6100 4th Ave South
Suite 300
Seattle, WA 98108
Phone: (206) 763-6087 Fax: (206) 763-6587

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Office of Environment and Energy, AE-100
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Washington, DC 20591

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Subject: FAA Notice of Proposed Rulemaking for Special Flight Authorizations for Supersonic Aircraft (Docket No.: FAA-2019-0451) Notice No. 19-08

FAA Office of Environment and Energy,

AeroTEC Inc. is a turnkey flight test and certification company. AeroTEC helps aerospace companies test, engineer, certify, and bring new products to market quickly, easily and efficiently. AeroTEC services cover the full spectrum of test planning, ground and flight test, data reduction and analysis and supporting development and certification services. AeroTEC also features rapid prototyping, test equipment development, CNC machining, ice shape fabrication and other fabrication services. Furthermore, AeroTEC has secured contracts to assist two Original Equipment Manufacturers (OEM) customers in developing new supersonic aircraft from design, test and certification, to entry into service.

The Supersonic Flight Alliance (SSFA) is a subsidiary of AeroTEC Inc. The SSFA's vision is to provide the infrastructure necessary for the safe, sustainable and effective development of supersonic commercial aircraft in America by representing the interests of the Aerospace Industry to the responsible governments.

The Federal Aviation Administration (FAA) is positioning the USA at the forefront of the global aerospace industry by supporting American commercial supersonic OEMs. The FAA's willingness to adapt and make rule changes that support the aerospace industry cannot be understated. These are exciting times! AeroTEC via the Supersonic Flight Alliance (SSFA) would like to discuss the opportunities on the future of commercial supersonic flight test. The SSFA believes the rule maker's original plan for a designated overland civilian supersonic corridor (CSSC) for flight test purposes is the path forward as it would allow testers to install permanent ground infrastructure to measure supersonic aircraft noise levels, improve flight safety by providing accessible diversion airports, and the means to segregate permanently commercial air traffic from the requirements of flight testers. This letter details the SSFA's vision for how to implement said CSSC and specifically addresses the changes to the current and proposed rules that could assist in accomplishing that vision. In addition, the path to reach a proposed agreement between the Administrator and the aerospace industry is discussed.

The Administrator whilst writing the Notice of Proposed Rulemaking (NPRM) assumed that the aerospace industry would try to use the U.S. military's supersonic corridors. For testing with no intent on gaining commercial certification, the use of a military corridor is marginal, and unsuitable for development and certification programs. Military corridors cannot support concurrent civil certification programs and military programs without undue burden to the civilian OEMs which would always be treated as a secondary priority. Furthermore, the length of all overland corridors is insufficient to support aircraft flying at Mach 1.5 or greater. Scheduling conflicts for the use of airspace would delay or cancel flights which rolls up to a significant cost to the OEM. In addition, there would be an increased volume of flight test traffic in the aerodrome surrounding the military flight test corridors which are near major population centers. The supersonic corridors in these areas cause a non-trivial impact on commercial travel when in use. Historically, the use of military supersonic corridors required test flights to be scheduled between tight blocks of time with the local Air Route Traffic Control Center (ARTCC) to minimize the impact to commercial traffic. The volume of flights required to complete testing for both military and civilian certification programs cannot be sustained in such a constrained environment. In summary, this approach would significantly delay civilian programs, add significant cost to aircraft manufacturers and provide foreign developers an unfair competitive advantage, or cause American OEMs an incentive to test their aircraft outside the USA.

The NPRM backgrounds states that the original rule makers assumed that the aerospace industry would open a civilian supersonic corridor (CSSC). Many years have passed without an application for a CSSC but today, the technology and a business case exists for the development of civilian supersonic aircraft and a need to do supersonic testing in earnest. The SSFA believes the rule maker's original plan for a designated overland civilian supersonic corridor for flight test purposes is the path forward. The SSFA has built a core of support with aircraft OEMs, state and federal legislators, local and state governments, local ARTCC, and other stakeholders. The SSFA has been in contact with the FAA's Department of Environment and Energy over the past year and will continue to work with them as we strive toward launch.

The Administrator has previously seen the benefit of the CSSC. The aerospace industry has found that a CSSC would provide safer and more effective testing via the following:

1. Access to multiple alternate airfields in the event of an in-flight emergency
2. The ability to have multiple telemetry antenna and repeaters will enhance telemetry coverage along the entire flight path and therefore enhance safety
3. Allows for in-flight support of safety chase aircraft that do not have the range capability to ferry to an offshore test area
4. Recovery of an aircraft should an accident occur
5. Airports that are sufficient for flight test support and have limited commercial travel are not near the coast. This will drive a daily transit to and from the coast in addition to the extra distance required to be sufficiently off-shore to mitigate noise from reaching the shore.
6. Can fly more often due to not being underprioritized by the military
7. Current military supersonic testing areas are near high traffic areas and a CSSC has the opportunity to be placed in lower traffic areas
8. Civilian supersonic aircraft have a high sustained speed with limited load factor capability. Supersonic military aircraft cannot sustain speeds greater than Mach 1 for very long. As well,

those same aircraft have a much higher available load factor. These two features allow the military to have shorter supersonic corridors than civilian needs. Ultimately, civilian supersonic aircraft can fly supersonic for longer and take longer to slow down due to the limited available load factor. Slowing down while staying within the confines of a supersonic corridor translates to have less on condition time which will drive more flights. A CSSC can be designed from the beginning to accommodate these design features and allow a test organization to be more effective by having more on condition time.

9. Collection of noise data over ground terrain rather than water will provide better quality data and is more representative of the operational environment where noise matters.

The Administrator can retain control the applicant's supersonic activities more effectively at the local level. Having the execution of the rule at the local level with ARTCC and ATCT (Air Traffic Control Tower) would greatly benefit both the Administrator and the aerospace industry. The lines of communication between flight test organizations and their local ARTCC are already well established and any issue could be resolved quickly. If an operator is using a CSSC, the supersonic flight authorizations would need to be handled much like FAA Special Airworthiness Certificates for Experimental Category (experimental tickets), Reduced Vertical Separation Minima (RVSM) approvals, and flight test airspace designation. Aircraft OEMs would use a letter of agreement with the local ARTCC and ATCT to use the CSSC for testing. Having the execution of the rules controlled by local FAA resources would have limited effect on the Administrators day to day operations and allow for a better working relationship with OEMs.

It is understood that not all aircraft manufactures will choose to use a CSSC and the comments in this letter are not valid for those situations. Those organizations would have to follow the process and procedures the Administrator has laid out in the NPRM. However, it is noted that there is a potential for saving schedule, personnel, and cost on both the aerospace industry and Administrator if multiple OEMs use the same supersonic corridor.

The SSFA proposes a joint industry/FAA research project to establish future appropriate noise levels and characteristics. The current rules would not allow for such a research project to take place to de-risk development for the aerospace industry and to de-risk the Administrator from publishing over constrictive rules. To accomplish the proposed risk mitigation program, there must be allowance for initial testing where the noise is unknown but not necessarily believed to be excessive by design. Furthermore, the FAA could require that if the overpressure and PLdB of an aircraft is unknown, or if it is known that the noise will go over a certain threshold, then there should be a requirement to inform the population that might be affected via a public announcement that should be at least one hour prior to the creation of said booms.

A joint aerospace industry/FAA R&D flight test campaign would gather crucial data for rulemaking activities and the design of modern supersonic aircraft. The primary purpose of such a Research & Development (R&D) campaign would be the gathering of noise characteristics and setting of acceptable regulatory ground noise levels that would allow supersonic flight over the continental US. The FAA could also use the proposed test campaign to help establish new rules specifically regarding supersonic flight. There is imminent need for data on new supersonic aircraft such that aircraft OEMs can maintain their entry into service dates. It is proposed that the aforementioned R&D project be performed where a future civilian supersonic test area would be located. Use of a temporary CSSC for R&D purposes

could facilitate the data, public relations, and rulemaking for the approval of that location as a standing CSSC in the future.

Industrial noise pollution is a given side effect of advancement of technology, and sensible limits on noise is understood and expected. Future supersonic aircraft may be capable of a “boomless” noise profile or may be heard as a “thump” rather than a “boom”, which may be far inferior to other noise sources, both from industrial or natural sources. For example, the “thump” may be far quieter than the noise of thunder from a nearby lightning strike or no louder than a car door closing.

In general, the terms ‘no sonic boom overpressure’ and ‘no measurable sonic boom overpressure’ ignore the fact that it is possible for a sonic boom-related event to occur which, while detectable by pressure measurement, is not an audible “boom” on the ground. National Aeronautics and Space Administration (NASA) has demonstrated, through flight testing, that it is possible to measure overpressure wave remnants at ground level that do not have the sharp-edged characteristic of a sonic boom (NASA Armstrong Fact Sheet: Sonic Booms 8/14/17) and are roughly of similar magnitude to many common ambient noise sources which would not be considered to cause a significant impact on the environment or communities. NASA’s X-59 QueSST program is using 75 PLdB (Perceived Level Decibel) as the target for effectiveness of quiet supersonic technology. PLdB is also the metric the FAA uses to assess noise characteristics for subsonic aircraft. PLdB is a measurement that most closely reflects the human perceivable noise that will be what ultimately impacts citizens who would live under areas where supersonic testing will occur.

The SSFA intends to gather all the CSSC stakeholders and jointly complete the required environmental analysis. After the completion of the analysis the SSFA will apply for the opening of a standing CSSC. The application by a conglomerate would open the corridor for use by all OEMs as long as the environmental analysis is still current and accurate. Unfortunately, there are a few requirements in the application process that would prohibit such a corridor from being established for all. The following section goes into detail about how the effects of each paragraph of the proposed rule would affect such a plan:

1. § 91.818(a)(1) states that the name of the operator must be included in its application for special flight authorization. Requiring the operator’s name on the application is a limiting factor if one wants to open a CSSC to be used by multiple operators. It is suggested that the intent of this rule be handled in a Letter of Authorization (LOA) for use of the CSSC.
2. § 91.818(a)(2) states that the number and model of aircraft to be operated must be included in the application package. Requiring the number and model of test aircraft is a limiting factor if a standing CSSC is to be used by multiple operators. It is suggested that the intent of this rule be handled in the LOA for use of the CSSC.
3. § 91.818(a)(3) requests that the applicant submits the number of proposed flights. The exact number of flights for a flight test campaign for civil certification is a ballpark guess at the beginning of a program. The SSFA is concerned that OEMs would run out of flights before the end of the program. This concern would force OEMs to request a sufficiently large number of flights that they would not be able to run out of flights. Ultimately, this would negate the intent of the administrator. If the intent of the rule is to limit the population’s chance of exposure to sonic booms the Administrator could place limits on the CSSC. For example, the CSSC could have a limit of six sonic events at PLdB levels above 75 but less than 105 PLdB and an unlimited

number of booms at 75 PLdB or less per day. The SSFA is open to discussing how to manage noise level expectations. The SSFA is open to having a third-party non-OEM organization that would be the administrator of the CSSC. They would have the responsibility of doing independent noise audits and sharing that data with the community, the FAA, and the aerospace industry. As well as sharing the data they would be responsible for community engagement and feedback. The above would ease the burden of the administrator in the District of Columbia and enhance their relationship with the local community.

4. § 91.818(a)(4) requests that the applicant submits the date range during which the supersonic flights would be conducted. Flight test program schedules change during the course of a certification program and any date range placed in the application is a best guess. What would happen if the applicant were to run into an issue during development and run out of their date range? This rule would force OEMs to request a sufficiently large date range such that they never ran out of flight test dates. The request of such a large date range would again negate the intent of the administrator. It is suggested that the date range be placed on the LOA with ARTCC such that it can be locally and prudently updated should an issue arise.
5. § 91.818(a)(5) requests that the applicant submits the time of day the flights would be conducted. It also states that night operations would require further justification. The SSFA is of the opinion that the time of day of the flights is not required and is restrictive to a successful certification flight test campaign. The time of day flight test operations are allowed are already restricted via the experimental ticket. Over the course of a certification flight test campaign different take off time varies greatly. It is suggested that time of flight test be unrestricted inside the CSSC and that the allowed times of day of the CSSC be defined. The SSFA proposes from 7AM as defined at the Western end of the Corridor to 1 hour before sunset at the Eastern end. Night operations would be unrestricted under a 75 PLdB while night operations exceeding 75 PLdB should go through the FAA's suggested approval process. It is the SSFA's expectation that the approval process would still be able to be coordinated locally.
6. § 91.818(a)(6) requests a description of the flight test area and any environmental analysis. Continuing the LOA concept, it is expected that a CSSC is detailed with local ARTCC with procedures for entry and usage. When the definition of the CSSC and its procedures for use are completed they would be submitted to the Office of Environment and Energy with a completed environmental analysis. This environmental analysis would be referenced in the LOA that ARTCC would issue for any aircraft manufacturers using the corridor in the future.
7. § 91.818(a)(6) requests the applicant to list all conditions and limitations that would ensure no measurable sonic boom overpressure will reach the surface outside of the proposed flight test area. It is requested that the rule be changed to state that the requirement is for all conditions and limitations that would ensure PLdB levels on ground outside the proposed flight test corridor do not exceed 75 PLdB.
8. The wording in § 91.818(a)(8) sounds very similar to the format that experimental tickets are issued. However, the wording implies that supersonic flight will only be allowed to show compliance to airworthiness and not for R&D. It is requested that § 91.818(a)(8) include another paragraph that would allow supersonic flight for the purpose of research and development. The inclusion of such a paragraph would be aligned with the current verbiage in experimental tickets regarding show compliance and R&D flights. The addition of R&D testing verbiage would allow for test of systems performance during supersonic flight. Engines, avionics, environmental control systems, and more systems will need to be tested in the supersonic regime.

9. § 91.818(a)(9) requests that the applicant indicates why its intended operation cannot be safely or properly accomplished over the oceans at a distance that ensures no sonic boom overpressure reaches any land surface. The need for supersonic flight overland for flight test purposes was made clear in an earlier section of this letter. § 91.818(a)(9) becomes extraneous as the National Environmental Policy Act (NEPA) process and completion of an environmental analysis covers the intent of the paragraph in regards to flight test. § 91.818(a)(9) is seen as necessary for the approval of non-flight test related operations at speeds above Mach 1. Therefore, it is requested that § 91.818(a)(9) be moved under section B for operations outside a test area. As well, if 75 PLdB is implemented as the noise standard, then § 91.818(a)(9) should be updated to remove references to overpressure.
10. § 91.818(e)(1) states that the authorization to exceed Mach 1 will be granted for the time the Administrator determines necessary to conduct the flights for the described purposes. The SSFA is concerned as to how the Administrator will determine such a limit. How will the Administrator deal with follow-on testing after certification? It is suggested that if a CSSC is established that any time limits be issued via the LOA that approves an aircraft manufacturer's use of the corridor and no limits be issued for the corridor itself. The issuance of time limits by a local authority will help speed up reauthorization if an operator's authorization lapses during the course of a certification campaign. As well, issuance of time limits on the operator and not the corridor itself assists in the usage of the corridor by multiple operators.

In summary, the Administrator may have given up on the hopes of the aerospace industry creating a civilian supersonic corridor; right as the aerospace industry prepares to do just that. The proposed rules make it difficult for a corridor to be established and will push the commercial aerospace industry to use military airspace. The NPRM was not all bad news in the eyes of the SSFA. The SSFA is excited that the Administrator was waiting for the aerospace industry to create such a corridor. Comments have been provided on the specific sections of the NPRM that could be adjusted to assist in the establishment of the CSSC that the original rule makers envisioned. As well, the vision for how use of said corridor might work using existing flight test processes was discussed. The SSFA is excited to continue work with the FAA Department of Environment and Energy to bring civilian supersonic flight back to reality. For more information on the pacific northwest civilian supersonic corridor effort contact the SSFA (<https://ssfa.aero>).

The discussion of supersonic flight will always require conversation over the acoustic environment. NASA and aerospace industry have done work to limit the acoustic impact of supersonic flight. There has been significant effort given to quantifying the sonic boom and its effects on people and property. With new aircraft OEMs, reinvigorated aircraft OEMs, a supportive Administrator, and airspace with which to test those concepts the future of commercial supersonic flight is upon us.

Kind Regards,



Kendrick Rice
Principal Engineer, Supersonic Flight Alliance