July 13, 2020

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Docket number FAA-2020-0316
Federal Aviation Administration, DOT
Office of Environment and Energy

RE: Comments on the Federal Aviation Administration's Notice of Proposed Rule-Making "Noise Certification of Supersonic Airplanes"

Dear Sir or Madam:

On behalf of the members of Airports Council International – North America (ACI-NA), I appreciate the opportunity to submit these comments regarding the Federal Aviation Administration's (FAA) Notice of Proposed Rule Making (NPRM) for Noise Certification of Supersonic Airplanes; Docket ID No. FAA-2020-0316.

I. AIRPORTS COUNCIL INTERNATIONAL – NORTH AMERICA

Airports Council International – North American (ACI-NA) represents local, regional and state governing bodies that own and operate commercial airports in the United States and Canada. ACI-NA's members operate more than 300 airports in the United States, accounting for over 95 percent of the domestic passenger traffic and virtually all of the international airline passenger and cargo traffic. Over 400 aviation-related businesses are also members of ACI-NA, providing goods and services to airports.

These comments include information provided by ACI-NA member airports, members of ACI-NA's Environmental Affairs Committee and ACI-NA staff. We look forward to meeting soon with FAA staff to discuss the potential impacts that a new noise standard could have on the industry.

ACI-NA members have a wide variety of experiences related to noise. Many U.S. airports do not have noise issues with their communities. However, others are facing significant challenges responding to community concerns related to existing aircraft noise. Thus airports can expect to have a range of perspectives with the new entrant supersonic aircraft for which this NPRM proposes to set noise certification levels. Some will benefit directly from the economic impacts provided by the new manufacturing jobs, as well as the economic stimulus that may accompany service from the new aircraft. At the same time, a number of ACI-NA member airports are worried that subsonic operations by aircraft that do not meet the Stage 5 noise standards will significantly increase their costs of addressing noise in their communities.

In addition, FAA must recognize that the aviation industry has been particularly hard hit from the COVID-19 pandemic and resulting economic crisis, and no one can predict when the industry will return to pre-pandemic levels and economic stability. Operational funds will be limited for several years without further federal financial support; thus airports will be challenged to absorb additional costs.

FAA must fully balance the benefits and costs of the noise certification proposed under this NPRM. At this time, it is not clear that FAA has fully accounted for and considered the costs that will fall to many U.S. airports with noise sensitive communities. ACI-NA requests that FAA publish the cost information and analyses, to allow the industry to understand the basis of FAA's conclusion.

II. GENERAL COMMENTS

ACI-NA's comments fall into three categories.

The first, as noted previously, is that there are both benefits and costs to airports that will likely arise from these new supersonic entrants. We have included information on the benefits that some of our members are anticipating. We also detail the economic cost to other airports and communities related to managing aircraft noise.

Second, many ACI-NA member airports oppose FAA's proposed SSL1 noise certification standard because it is lower than the current Stage 5 noise certification standard for subsonic aircraft, allowing new aircraft types to operate that would be among the loudest aircraft type in operation at most commercial airports. These airports believe the approach taken in this NPRM reverses FAA's historic approach to Supersonic Noise Certification Standards, which has been that while in subsonic operations future supersonic should meet the same certification levels applicable to subsonic aircraft.[1] However, other ACI-NA member airports that support the opportunity to develop these advanced technologies and manufacture supersonic aircraft support the proposed noise certification standard. It is important to note that not all airports have noise issues with their communities. Those airports do not believe that the use and operation of these next generation supersonic aircraft will impose hindrances or hardships to locations where they are being designed, tested, manufactured, maintained and operated.

Additionally, while we understand Section 181 of the FAA Reauthorization Bill of 2018 required FAA to issue an NPRM by March 31, 2020, some members are concerned that FAA has issued the NPRM before the International Civil Aviation Organization (ICAO) has completed its development of aircraft standards through the Civil Aviation Environmental Programme (CAEP). Some airports believe that it is important that the Final Rule takes into account these forthcoming international standards. Other airports believe ICAO should move forward and establish standards that are equivalent to FAA regulations.

Third, FAA needs to provide additional information related to the proposed testing and certification approach to understand the potential noise impact. We appreciate that FAA has included technologies in the NPRM that may reduce noise impacts such as the Variable Noise Reduction Systems (VNRS). However there is a need to further address the definition of thrust as well as provide a clear definition of VNRS.

[1] *Aircraft Noise Standards*, 43 Fed. Reg. 28,406 (June 29, 1978).

III. EXPECTED BENEFITS AND COSTS

BENEFITS

Several ACI-NA airport members expect significant economic benefits from the development and manufacture of new supersonic aircraft. One of these airports is Orlando Melbourne International Airport where Aerion Supersonic plans to locate its global headquarters, production, and maintenance facilities. The company is building a $300 million facility and creating 675 new jobs. Another is Savannah/Hilton Head International Airport, home to Gulfstream Aerospace Corporation, an aircraft manufacturer with an interest in supersonic technologies. All of Gulfstream's research and development engineers and labs, virtually all of its flight testing and the majority of its maintenance and manufacturing takes place at their facilities at and adjacent to the airport. Gulfstream employs almost 10,000 employees at or adjacent to the airport. Additionally they support a vast supplier network throughout the State of Georgia and the region. The aerospace industry in Georgia currently represents a $57.5 billion economic impact for the State, but this could increase with the addition of supersonic aircraft manufactured by Gulfstream.

It is also important to recognize the benefits for the U.S. aerospace manufacturing industry in developing advanced technology and manufacturing supersonic aircraft.

COSTS

Many ACI-NA member airports are concerned because the information in the NPRM does not appear to have completely analyzed the costs. For example, is it possible for supersonic aircraft to meet Stage 5 levels during subsonic operations? If so, what are the trade-offs, both in terms of emissions and aircraft development costs?

Additionally, a number of airports believe that increased noise exposure levels from the SSL1 Standard will likely have a number of negative, and potentially costly, impacts:

- Larger DNL 65 dB contours could increase the number of homes and other property eligible for acoustic treatment under Part 150 and similar programs
- Increased operations by loud aircraft typically leads to litigation by property owners seeking compensation for noise-related damages. Even if unsuccessful, the litigation imposes substantial costs on airports
- Public opposition to the new operations could also lead to litigation and administrative claims against the FAA seeking new flight procedures, challenging environmental review procedures, or asserting other claims
- Public controversy also limits the ability of airports, aircraft operators, and the FAA to implement other projects, such as airport capital improvements, increased air service, and changed flight procedures due to concerns about increased noise
- Public controversy over noise could also lead to calls for operational restrictions, such as curfews, alternative flight paths, and similar measures
- Airport noise-management costs will likely rise, as single events generate numerous complaints. This will result in increased expenditures of airport resources, including staff and possibly contract support. Airports will be under pressure to prepare new or updated Part 150 studies, Part 161 studies, or otherwise pursue noise restrictions. Those efforts impose considerable costs on airports, airport users, and the FAA.

Examples of the potential consequences of allowing noisier aircraft to enter the fleet are illustrated by the recent experience with new NextGen and Metroplex flight procedures.

Changes that the FAA considered modest and of little or no significance have resulted in substantial controversy in communities across the country. The FAA, as well as airports, have become embroiled in expensive litigation, and the resulting controversy has hampered a variety of efforts by the FAA and airports to implement other changes in airports and airspace procedures.

Before proceeding with any noise certification standard for supersonic aircraft, the FAA should carefully, and accurately, reassess and evaluate the costs and impacts of such a rule, including the costs to airports.

IV. SEPARATE NOISE CERTIFICATION LEVEL THAT ALLOWS FOR INCREASED NOISE CERTIFICATION LEVELS

Some ACI-NA members that support the opportunity to develop these advanced technologies and manufacture supersonic aircraft favor the proposed noise certification standard. They do not believe that it should be assumed that the new generation of supersonic aircraft will impose significant noise and environmental impacts. Other airports believe that a new noise category specific to supersonic aircraft should be developed as this emerging technology entails unique characteristics beyond conventional aircraft including altitude, speed, environmental sustainability, and flight profile.

If FAA were to adopt the proposed separate noise certification level, it was also suggested that airports without noise issues in their community that are capable of handling supersonic aircraft and that have appropriate infrastructure such as long runways, conducive airspace and engine run-up facilities, could be further designated as “supersonic certified”.

However, many other ACI-NA airport members oppose FAA’s proposed SSL1 noise certification standard, which allows a lower noise standard than the current Stage 5 noise certification standard for subsonic aircraft. This would have a negative impact at many U.S. airports and potentially undermine the progress that has been made over the past 30 years in reducing noise. Some airports question why FAA is departing from that approach and potentially introducing a new noise problem for airports. Assuming an aircraft close to the 150,000 lbs. MTOW limit proposed by the NPRM, the aircraft meeting the SSL1 standard could be approximately as loud as the MD87 and 737-300. These are among the loudest aircraft in the commercial fleet. They are also among the oldest and are being phased out by airlines due to age and other factors, a process accelerated by the impacts from the COVID-19 pandemic.

Noise sensitive airports believe the expected impact of allowing those nosier operations could be substantial, and the NPRM may underestimate the impact. The analysis contained in the NPRM and in the accompanying Preliminary Regulatory Impact Analysis compared the supersonic aircraft covered by the NPRM to the estimated average U.S. fleet of all aircraft in 2034. In doing so, the FAA assumes that supersonic aircraft operations will be distributed evenly across the National Airspace System. However, because new supersonic aircraft can only operate at subsonic speeds over the United States, it should be assumed that new operations will be concentrated at airports on the coasts and within flight range of distant or foreign destinations, such as Europe, Hawaii, and parts of Latin America. Further, there are likely relatively few airports from which these aircraft will operate based on location, demographics, and facilities.

This is significant because it is well understood that at noise sensitive airports the loudest aircraft often drives and determines the ultimate level and area of noise exposure. A relatively few operations by loud aircraft can have a disproportionate, and often determinative, effect on

noise exposure levels at airports. The approach taken in the NPRM of looking only at noise levels of aircraft across the entire domestic fleet fails to take that critical reality into account.

V. TECHNICAL CONCERNS WITH THE NPRM

The comments in this section are related to the more technical elements of the NPRM and the potential noise impacts.

Inconsistent uses and definitions of thrust

The NPRM uses inconsistent definitions of maximum thrust, takeoff thrust, climb thrust, and the relationship of all three; particularly in the context of the proposed Programmed Lapse Rate (PLR) and the relationship of takeoff thrust versus maximum thrust in the Standard Reference Profile. We recommend that FAA clarify the definitions. Three specific examples are discussed below.

- Programmed Lapse Rate – point to increase thrust

The proposed regulation should provide additional guidance regarding the airplane's performance goals regarding when thrust can be increased after PLR. There is no analogous text in the existing 14 CFR Part 36 for subsonic jet airplanes because the regulations require these aircraft to perform their lateral certification measurements at full thrust. Additional detailed comments and examples are provided below.

The NPRM's Summary[2] includes the following text:

"The other proposed operating limitation on which the FAA seeks specific comment is in § 36.1581(i)(3) regarding airplanes that incorporate PLR to limit thrust to a programmed level and decrease noise. To exceed PLR thrust after takeoff, the applicant must have demonstrated during testing that ending the programmed thrust does not produce a noise impact on the ground that exceeds the levels measured at the certification measurement points. Until the point at which no effect from increased thrust is determined, the PLR would need to remain in active operation. This point is not specified in these regulations because it is expected to be unique to each airplane design. The point determined for an individual PLR system would become an operating limitation for that airplane."[3]

However, the proposed 36.1581 text does not adequately convey the intentions implied by the Summary. In particular:

§ 36.1581(i)(3) does not mention that "To exceed PLR thrust after takeoff, the applicant must have demonstrated during testing that ending the programmed thrust does not produce a noise impact on the ground that exceeds the levels measured at the certification measurement points.":

- The above quoted text is only in the Summary and is not present in § 36.1581(i)(3) or in other passages of the proposed rule;
- The above quoted text does not specify whether the criteria pertains to the lateral measurement point, the flyover measurement point, some combination of the two, or some other parameter(s); and

[2] Supplemental Information section, subsection III Background, part E (Analysis of Proposed Rule Text)
[3] 85 FR 20436

- The phrase “Until the point at which no effect from the increased thrust is determined…” is not defined in the current or proposed regulation. Increasing the airplane’s thrust will always have an effect on the noise received on the ground.

§ 36.1581(i)(3) does not provide adequate definition of the performance goals of the PLR point and could be interpreted in a variety of ways. For example, as written, it is possible to have the following interpretation, and perhaps other interpretations:

- The PLR ending point be such that no point anywhere on the ground exceeds the measured flyover certification level; and
- The PLR ending point be such that no point anywhere on the ground exceeds the measured lateral certification level.

The proposed § 36.1581(i)(3) contains the phrase “cause any significant noise impact on the ground.”[4] However “significant noise impact on the ground” is not defined in the current version of 14 CFR Part 36 currently nor in the NPRM. FAA has defined significant noise impact in FAA Order 1050.1 with the Yearly Day-Night Average Sound Level (YDNL) metric. The value of YDNL metric depends on several factors, including the Sound Exposure Level (SEL) of individual operations, the number of operations and their time of day. Therefore, the phrase is not applicable to the Effective Perceived Noise Level (EPNL) metric required in the proposed 14 CFR Part 36 Section C36.2 “Noise Evaluation Metric”. We suggest FAA clarify this language.

- Use of programmed lapse rate in reference procedures

The NPRM summary is clear that the PLR is a subset of all VNRS. That clarity of the relationship between PLR and VNRS does not exist in the proposed regulation. The proposed regulation is unclear if it considers PLR being a subset of VNRS options or wholly independent of a VNRS. We recommend that the FAA clarify which parts are applicable to profiles using PLR.

The following text from the NPRM summary describes the PLR and VNRS relationship:

“Proposed § C36.6 specifies the requirements when a VNRS is included in an applicant's design and is used to show compliance with the LTO cycle requirements of part 36. The inclusion of VNRS is intended to enable the incorporation of advanced concepts and systems technologies that reduce noise using fully automated changeable properties or features. ***The two best known of the VNRS concepts are automated configuration changes, and Programmed Lapse Rate (PLR)****,[emphasis added] as defined in proposed in § 36.1. The FAA does not intend to limit the development of automated noise reduction systems, and under this regulatory provision will consider any design features presented at certification that seek to lessen the LTO cycle noise impacts of supersonic airplanes. When a VNRS is presented as part of an airplane design at certification, it must be accounted for in any reference procedures requested by the applicant, demonstrated, and approved by the FAA before the certification tests are conducted.”*[5]

“Section C36.7(b) proposes the minimum cutback height and thrust requirements that are required for subsonic jet airplanes as a standard takeoff reference procedure. When VNRS (including PLR) is used, the takeoff reference procedure to be used prior to reaching minimum

[4] 85 FR 20444
[5] 85 FR 20437

cutback height is presented in § C36.7(d).”[6]

Throughout the proposed 14 CFR Part 36 text, there is no statement that PLR is a subset of VNRS, and that PLR procedures fall under the requirements of VNRS procedures:

- Proposed 36.1 includes separate definitions for PLR and VNRS without discussion of the relationship of the two[7];
- Proposed 36.1581(i)(2) does indicate that PLR may be used with the VNRS procedures in C36.7(d) and C36.7(e);
- Proposed C36.6 mentions VNRS without reference to PLR;
- Proposed C36.7(d) mentions VNRS without reference to PLR; and
- Proposed C36.7(3) mentions VNRS without reference to PLR.

- C36.7 (b)(1) thrust for standard takeoff reference procedure

Section C36.7(b)(1) states:

> *“The takeoff thrust/power used must be the maximum specified by the applicate for normal takeoff operations (and is presumed to be less than maximum thrust/power for supersonic cruise speed) as listed in the performance section of the airplane flight manual under the reference atmospheric conditions given in § C36.7(a)(5).”*[8]

It presumes that takeoff thrust will be less than maximum. However, this section for the Standard takeoff reference procedure makes no direct or implied reference to when thrust can be increased above normal takeoff operations to the maximum thrust/power for supersonic cruise speed.

The only previous reference to when thrust may be increased is in the use of PLR mentioned in Section 36.1581 (i)(3). However, 36.1581 (i)(3) states specifically that it only applies to the procedures in C36.7(d) and C36.7(e). Further, C36.7 (b)(6) does reference the weight limitations of 36.1581 (i) but does not reference the thrust limits of 36.1581 (i).

For comparison, existing 14 CFR Part 36 clearly defines the takeoff reference procedure thrust for jet aircraft as the maximum available for normal operations: *“The takeoff thrust/power used must be the maximum available for normal operations given in the performance section of the airplane flight manual under the reference atmospheric conditions given in section B36.7(a)(5).”*[9]

Further, the general discussion of PLR thrust indicates that the FAA has considered how thrust can increase from takeoff thrust to the higher thrust level need for cruise. However, the proposed regulation text assumes PLR only applies to the proposed C37.7(d) and is not applicable to the Standard takeoff reference procedure in C36.7(b).

We recommend that the proposed Standard reference procedure mention the conditions in which thrust can increase between the thrust used for certification and the higher thrust levels needed for cruise.

[6] 85 FR 20438
[7] 85 FR 20443
[8] 85 FR 20445
[9] 14 CFR Part 36 Section B36.7(b)(1)

Lack of clear definition of Variable Noise Reduction Systems (VNRS)

We appreciate that FAA has included technologies in the NPRM that may reduce noise impacts such as the Variable Noise Reduction Systems (VNRS). However there is a need to further address the definition of thrust as well as provide a clear definition of VNRS.

- Point at which VNRS no longer needed

C37.7(d)(ii) states that the VNRS ends at the point at "*…which VNRS is no longer active."* However, the point at which the VNRS is no longer needed is not clear in other sections of the proposed rule. It could be interpreted that the VNRS could be deactivated after passing the flyover measurement point (or shortly thereafter) and that the deactivation of the VNRS could lead to higher noise levels later in the flight path. There does not appear to be a discussion for when VNRS could be deactivated as there is with PLR.

We request that the FAA provide additional guidance and/or performance-based goals that should be achieved.

- VNRS reference flight profile for flyover measurement

The NPRM C37.7 states that the VNRS flight path is to be used for the lateral measurement but does not clearly mention the flyover. C37.7(a)(4)(i) should be reworded from "takeoff and lateral" to "flyover and lateral" to be consistent with C36.5(a). C37.7(d) on its own is not clear if the VNRS is to be used for the initial climb of the flyover measurement. C37.7(d)(2) clearly states the procedure is to be used for the lateral measurement. We recommend that C37.7 is edited to clarify the FAA's intent.

One interpretation of C36.7 is that the VNRS, and possibly the PLR (assuming PLR is a subset of VNRS for this section), is not activated during the flyover measurement, potentially allowing an initial climb that is faster than if VNRS was activated as directed in the AFM (and climb faster than would be allowed in service), and then cutting back thrust when approaching the flyover measurement location. Forcing the VNRS to be used in service, but not for the flyover, means that the flyover profile could not be replicated in service, even if the ideal conditions specified in 36.7(d)(5) were met. While all other 14 CFR Part 36 measurement profiles are constrained to controlled conditions, they could potentially be replicated in service if the operator chooses and the ideal conditions permit. Allowing the flyover to not use the VNRS profile and mandating the VNRS profile to be used in service, likely implies that the flyover measurement cannot be replicated in service.

There is a concern that the proposed regulations contain are inconsistent as written given that the flight procedures used for certification may not necessarily conform to the AFM or conditions required in normal operations. Because of this, the VNRS (and/or PLR) usage in service will not match the usage during certification. If the FAA's intent is that all elements of the reference profiles match, including VNRS, then the FAA should clearly state so, rather than specifying some elements that need to conform to the AFM and not others.

Lack of referenced documents

We recommend that the FAA provide the documents they cite in the Docket. In particular, the NPRM summary states that in "February 2018, the FAA Office of the Chief Counsel published an interpretation…" and implies that this interpretation document can be found in the Docket.

However, the document is not available in the Docket at https://www.regulations.gov/docket?D=FAA-2020-0316.

Consistency of limits with number of engines

Proposed C36.5 sets the flyover noise limit for a three-engine aircraft to 94.0 EPNdB while the flyover limit for a two-engine aircraft is set at 91.0 EPNdB. However, the lateral and approach measurement limits are the same for two- and three-engine aircraft. Various flyover measurement limits, based on number of engines, were introduced for Stage 3 jet aircraft and prior Stage 2 jet aircraft are held to the same flyover limit regardless of number of engines.[10] Technology and other aspects to the aircraft regulatory environment, have changed in the several decades since. It is unclear if different flyover limits, based on number of engines, is warranted for potential aircraft affected by the proposed rule.

One potential developer of an aircraft affected by the proposed rule has indicated that a three-engine aircraft would have benefits, relative to a two-engine aircraft

"The Aerion AS2 retains a supersonic natural laminar flow wing, the key enabling technology behind practical and efficient supersonic and high-subsonic flight. The aircraft has a larger cabin, with cross-section dimensions roughly equivalent to those of today's long-range business jets. It also has a trijet configuration that confers a number of benefits, especially for a number of benefits, especially for runway performance, external noise properties [emphasis added, and maximum range."[11]

We recommend the FAA consider if different flyover noise limits based on the number of engines are applicable for the aircraft covered by the proposed rule.

VI. CONCLUSION

ACI-NA members appreciate the opportunity to provide comments on FAA's Noise Certification of Supersonic Airplanes. We appreciate the economic development that new supersonics may bring to many airports in the United States, as well as the benefits of the technological advanced with production of new supersonic aircraft. However, it is critical that FAA consider the costs to airports and communities of increasing noise impacts. Additionally, FAA must resolve the technical concerns of testing and certification that we raise in these comments. If you have any questions, please contact Melinda Pagliarello at (202) 861-8092, or via email at mpagliarello@airportscouncil.org.

Sincerely,

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Senior Director, Environmental Affairs
ACI-NA

[10] 14 CFR Part 36 Section B36.5 Maximum Noise Levels

[11] Aerion Corporation, Press Information "Aerion unveils larger, three-engine supersonic business jet tailored to emerging global demand." Geneva, Switzerland, EBACE – May 19, 2014. Currently available at https://web.archive.org/web/20150119012827/http://www.aerionsupersonic.com/pdf/41.pdf