Comment on Notice of Proposed Rulemaking: Enabling Supersonic Overland Flight

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The Aviation-Impacted Communities Alliance (AICA) appreciates the opportunity to comment on the Federal Aviation Administration's notice of proposed rulemaking, "Enabling Supersonic Overland Flight." AICA is a national coalition, bringing together more than 90 aviation-impacted community organizations across 22 states and the District of Columbia. Through its community-led model, AICA engages with governmental, technical, industry, and community stakeholders to advance informed approaches to aviation noise and its effects on public health and quality of life.

AICA's Overall Position

FAA proposes to carry out Executive Order 14304 through an efficient pathway for testing, innovation, and early civil supersonic operations.[1][2] The proposal would replace the existing prohibition on civil supersonic flight over land with a national authorization framework that does not specify limits on the number or frequency of flights, geographic scope, operating hours, or an expiration date.[1] Because supersonic civil operations are an emerging technology and the record does not quantify the resulting noise and vibration or the related community and environmental effects, the available evidence does not yet support an authorization of unspecified scope and duration.

The proposal uses 0.11 psf as the maximum permitted surface overpressure for covered operations and as a regulatory demarcation for determining whether a covered sonic boom reaches the surface. That quantity measures the change in air pressure relative to surrounding atmospheric pressure; it does not quantify the resulting noise or vibration. Figure 1 depicts the pressure disturbances or acoustic signals that may reach the Earth's surface. Compliance with the ceiling, by itself, does not quantify the corresponding sound level or vibration, characterize indoor or outdoor exposure or annoyance, or explain how those factors relate to FAA's conclusion that environmental impacts are not anticipated.

AICA's analysis begins with a practical criterion: All supersonic surface arrivals that touch the Earth's surface should be evaluated for potential noise, vibration, community, and environmental effects, not only those that fall within the proposal's definition of sonic booms covered by the 0.11 psf ceiling. A surface arrival means any pressure disturbance or acoustic signal that reaches a location on the Earth's surface. Figures 1 through 3 organize the arrival types and pathways found in the cited materials and show that primary-category arrivals occur at multiple locations along the affected route corridor while additional arrival types may occur during the same flight.

The proposal does not cover two arrival types within its 0.11 psf ceiling: Mach cutoff evanescent-wave arrivals and maneuver-related focus booms.[1] FaINT classifies evanescent waves below a Mach cutoff caustic as sonic booms, while FAA treats the remaining signal after Mach cutoff as noise no longer characteristic of a sonic boom.[1][8] Focus booms are discussed and expressly excluded.[1] These classifications do not determine whether the resulting surface arrivals create noise, cause vibration, or affect communities. Figure 4 identifies the source descriptions and the noise and vibration information the proposal does not provide.

FAA's own description of environmental review states that federal agencies must disclose to decision-makers and the interested public a clear and accurate description of the potential environmental impacts of a proposed action.[13] For aviation-impacted communities, those impacts are experienced through what people hear and feel in homes and neighborhoods. The relevant evidence may include, and may not be limited to, the regulatory categories used in the proposal. Characterizing that lived experience would provide information relevant to FAA's evaluation of community effects.

Communities experience the combined acoustic environment, not separate regulatory programs. Depending on location, that environment may include commercial and general aviation, including helicopters, unmanned aircraft systems, advanced air mobility, and supersonic operations.[19][20] Analysis should characterize supersonic exposure on its own and its incremental contribution to that combined environment. Figure 4 shows that the proposal provides no noise metric and corresponding numerical sound level or vibration measure and corresponding value for any depicted category or pathway. Without that information, the proposal does not explain how its environmental review provides the clear and accurate description of potential impacts contemplated by FAA's own explanation of the process.[13]

A single national interim framework with common requirements for all eligible operators can preserve administrative efficiency and advance innovation. Because civil supersonic operations are an emerging technology, monitoring of actual operations is essential to answer the unresolved questions identified in Figures 1 through 4. Scheduled evaluation milestones and a fixed expiration or renewal process would allow new evidence to inform FAA's noise-policy work and future decisions. This approach would support efficient implementation while providing the information needed to fulfill environmental-review responsibilities and carry out FAA's stated objective of safeguarding the public from potential harm caused by sonic-boom impacts.[1][2]

I. Summary of the Proposed Rule and AICA's Recommendations

A. Significance of the Proposed Interim Standard

The proposed rule would replace the longstanding prohibition on civil supersonic flight over the United States with an interim operating standard. FAA could authorize operations without approving each flight or operating area when the covered overpressure does not exceed 0.11 psf, the operator makes the required demonstration, and the aircraft complies with applicable conditions.[1] A showing under selected conditions would establish predicted compliance for that demonstration. It would not establish performance across the full range of trajectories, altitudes, speeds, maneuvers, atmospheric conditions, geography, buildings, and receiving environments that may occur during actual operations.

Executive Order 14304 contemplates later rulemaking informed by operational testing, research, community acceptability, technological feasibility, economic reasonableness, and international standard-setting.[2] The interim period provides an opportunity to develop that evidence through monitoring and reporting of actual operations. Scheduled evaluation milestones would allow the interim authorization to proceed in phases, with the scope and conditions of subsequent operations informed by monitoring results, research, community information, and operational experience. The proposal, however, provides no expiration date, phased structure, or required evaluation schedule.

B. What the Proposed 0.11 psf Ceiling Establishes

1. Overpressure does not describe noise or vibration

For purposes of this comment, AICA understands overpressure to mean the amount by which air pressure at a stated point exceeds the surrounding atmospheric pressure. At the Earth's surface, the proposal expresses that quantity in pounds per square foot and compares it with the proposed 0.11 psf overpressure ceiling.[1] AICA therefore distinguishes this air-pressure measurement from a traveling pressure wave, a surface arrival, a sound metric, and a vibration measure. Appendix A defines the terminology used throughout this comment.

Demonstrating compliance with 0.11 psf would address the overpressure limit. The proposal has not shown how that value corresponds to:

- SEL, Perceived Level, or maximum sound level for an individual arrival;
- DNL or another appropriate measure for repeated operations;
- Number Above Noise Level (NANL), event counts, or time above specified levels;
- Indoor or outdoor vibration;

- Noise from Mach cutoff evanescent waves;
- Maneuver-related focus booms;
- Annoyance or other community effects; or
- The incremental and combined aviation-noise environment.

The purpose of this information is not to make every measured effect a threshold of regulatory significance. Appropriate metrics and corresponding values should first characterize the expected noise, vibration, annoyance, community, and environmental effects. FAA can then make the policy decision about significance.[15] It can also determine what protections are warranted by the evidence. Figure 4 summarizes the noise and vibration information provided for each depicted category and pathway and identifies the corresponding metrics and numerical values that are not provided.

2. Regulatory classification and physical exposure are different

FAA describes qualifying operations as preventing covered sonic booms from reaching the surface even though a pressure disturbance at or below 0.11 psf may physically arrive there.[1] That regulatory classification determines eligibility for authorization. It does not establish whether a surface arrival creates noise, causes vibration, or affects people and communities. The notice of proposed rulemaking (NPRM) permits "measurement, modeling, or other methods" approved by FAA, and it does not identify the modeling method or equate it with AEDT or conventional airport-noise analysis.[1]

3. Noise metrics provide standardized impact information

The proposal's use of a single overpressure value does not provide the acoustic and operational information needed to characterize the resulting community exposure. Monitoring of actual operations, as well as research conducted during the interim period, should preserve the underlying pressure and acoustic waveforms where technically feasible.[5] Those records would allow appropriate single-event measures, such as Perceived Level, Lmax, and SEL, to be calculated and examined without assuming that the metrics are directly interchangeable.[4]

Waveform data should be accompanied by the time, location, duration, and number of events and by the relevant flight and atmospheric conditions. That additional information is needed to calculate event-count measures such as NANL, evaluate cumulative exposure using DNL or another appropriate metric, and distinguish the incremental supersonic contribution from the existing aviation-noise environment. Preserving these data would allow FAA, researchers, and policymakers to apply multiple metrics to the same events as the evidence develops and to select the measures that best describe individual arrivals, repeated exposure, and community effects.[14]

C. Summary Recommendations

- Explain how the cited evidence supporting 0.11 psf as a technical demarcation for sufficiently abated sonic booms also supports using that value as a community-protection measure and as a basis for environmental review.
- Evaluate all surface-arrival types shown in Figures 1 through 3 using appropriate noise metrics and corresponding levels, vibration measures and values, event counts, repeated exposure, community response, and environmental effects.
- Establish one national interim framework designed for an emerging technology, with common operating boundaries and requirements for all eligible operators, monitoring, reporting, scheduled evaluation milestones, and an expiration or renewal process.
- Require monitoring and reporting of actual operations to support environmental review and answer the unresolved questions identified in Figures 1 through 4.
- Use the combined operational, research, policy, and community evidence to inform FAA's noise-policy work and future decisions.

II. What May Reach the Earth's Surface

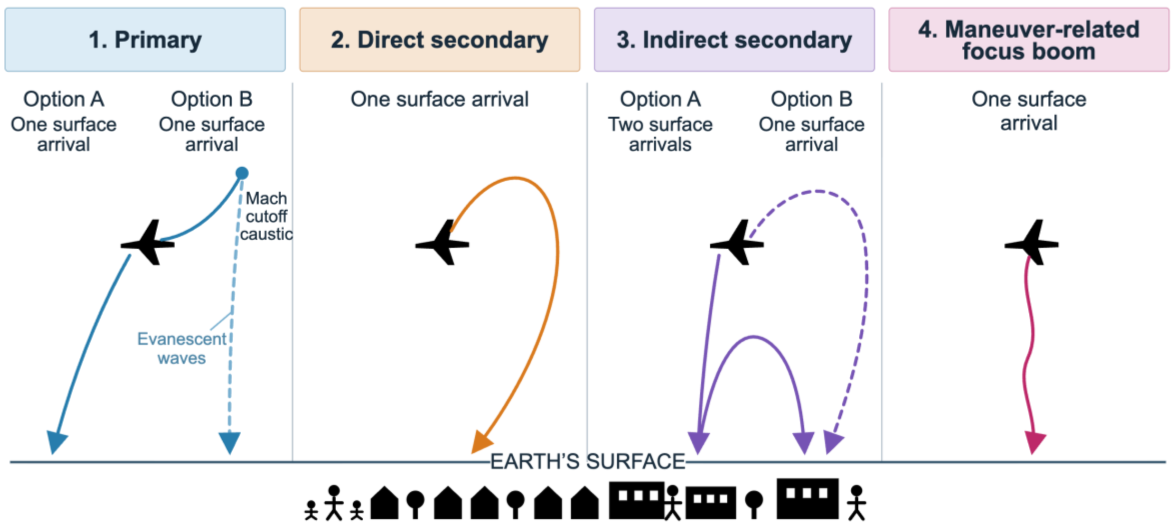
A. Purpose of AICA's Analytical Framework

AICA developed the following analytical framework as a consistent reference for evaluating the proposal. It organizes all pressure disturbances or acoustic signals that may reach the Earth’s surface found in the cited materials, including Mach cutoff evanescent-wave arrivals and maneuver-related focus booms. The proposal does not expressly include Primary Option B, the Mach cutoff evanescent-wave arrival, within the boom categories subject to the 0.11 psf ceiling, and it expressly excludes maneuver-related focus booms. Figure 4 explains the proposal’s treatment of these two arrival types. Figure 1 shows the four categories, alternative pathways, and resulting surface arrivals. The framework is derived from the cited sources and reflects AICA’s analytical organization; it does not alter the proposal’s definitions.

FIGURE 1

What Reaches the Earth’s Surface?

How pressure disturbances or acoustic signals from a supersonic aircraft may reach the Earth’s surface



- Surface arrival: An arrow represents a pressure disturbance or acoustic signal arriving at that Earth-surface location.
- 1. Primary: Option A or Option B, with one surface arrival.
- 3. Indirect secondary: Option A, with two surface arrivals; Option B, with one surface arrival.
- Dashed pathways: Identify the alternative or possible propagation pathways shown in 1. Primary and 3. Indirect secondary.
- Possible surface outcomes: Noise, vibration, both, or neither.

AICA FIGURE DERIVED FROM: FAA [1] (categories and Mach cutoff, evanescent wave, and focus boom descriptions); NASA [6] (secondary pathways). NASA FaINT [8] (Mach cutoff and evanescent waves); U.S. Department of Transportation/NTSC [9] (secondary boom pathways and surface observations). Aviation-Impacted Communities Alliance (AICA) organized the source material for this analytical illustration. The surface icons (homes, buildings, and figures) are AICA's generic illustrative device and are not derived from the cited sources.

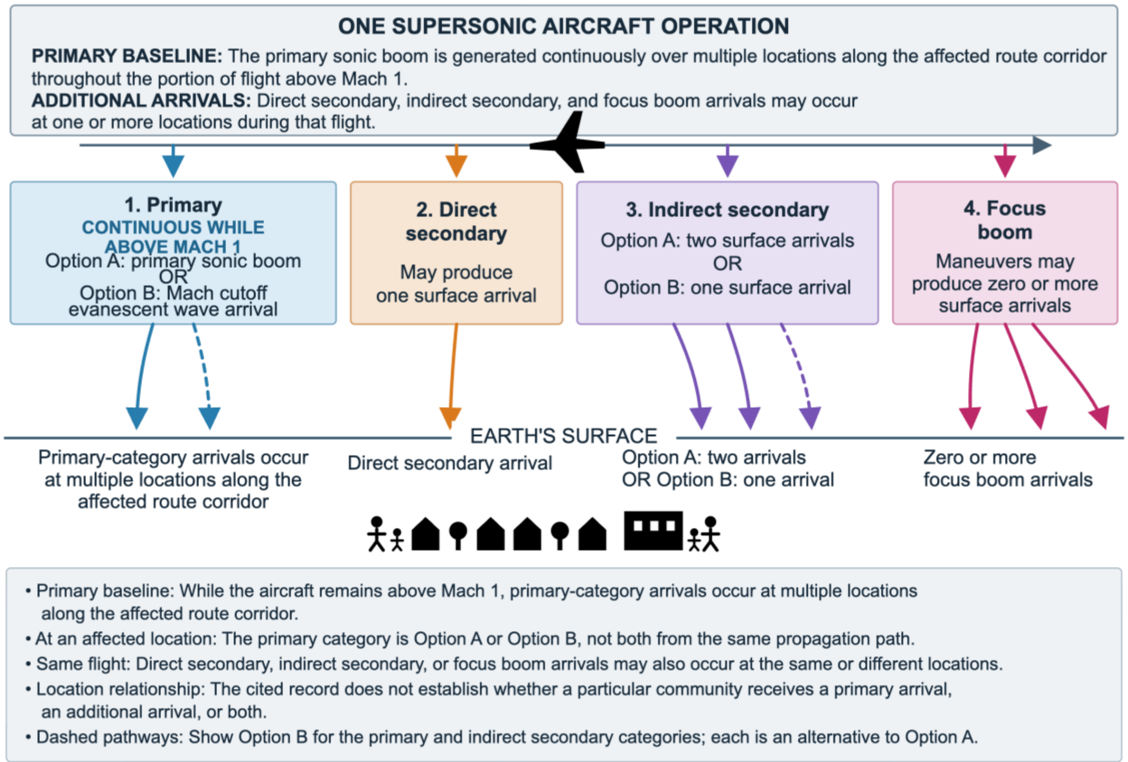
SCOPE: Conceptual and not to scale. Line width, arrow size, spacing, and surface location do not represent loudness, overpressure, distance, frequency, or geographic location.

COVERAGE NOTE: The proposal does not expressly include Mach cutoff evanescent wave arrivals within the boom categories subject to the 0.11 psf ceiling and expressly excludes maneuver-related focus booms.

FIGURE 2

Continuous Primary-Boom Generation and Additional Arrivals During One Supersonic Flight

The primary sonic boom is generated continuously over multiple locations along the affected route corridor throughout the portion of flight above Mach 1. Additional surface-arrival types may occur at one or more locations or times during that flight.



AICA FIGURE DERIVED FROM: FAA [1] (categories and Mach cutoff, evanescent wave, and focus boom descriptions); NASA [6] (secondary pathways). NASA FaINT [8] (Mach cutoff and evanescent waves); U.S. Department of Transportation/NTSC [9] (secondary boom pathways and surface observations). Aviation-Impacted Communities Alliance (AICA) organized the source material for this analytical illustration. The surface icons (homes, buildings, and figures) are AICA's generic illustrative device and are not derived from the cited sources.

SCOPE: Conceptual and not to scale. The cited record does not establish one generally applicable distance between the depicted surface arrival types.

COVERAGE NOTE: The proposal does not expressly include Mach cutoff evanescent wave arrivals within the boom categories subject to the 0.11 psf ceiling and expressly excludes maneuver-related focus booms.

B. Categories, Pathways, and Arrival Counts

Figure 2 explains why the surface-arrival structure matters across one flight. The primary sonic boom is generated continuously over multiple locations along the affected route corridor throughout the portion of flight above Mach 1. At a particular affected location, the primary category is Option A, a primary-boom arrival, or Option B, a Mach cutoff evanescent-wave arrival. Additional direct secondary, indirect secondary, or focus-boom arrivals may occur at one or more locations or times during that flight.

A direct secondary pathway produces one surface arrival. The indirect secondary category has two alternatives: Option A produces two associated arrivals after the wave reaches the surface, changes direction upward, and later bends back toward the surface; Option B produces one arrival after the wave travels upward and bends downward. Focus booms may result from relevant maneuvers and may occur more than once during a flight.[7] Figure 3 provides the source-based descriptions of these categories and pathways.

The cited record does not establish a generally applicable maximum number or spacing of surface arrivals during one flight or whether a particular community receives a primary arrival, an additional arrival, or both. Actual locations and counts may depend on trajectory, altitude, speed, maneuvers, atmospheric conditions, and propagation. Monitoring can document where each arrival type occurs, under what conditions, and how often relative to total flights.

FIGURE 3

What the Four Categories and Pathways Mean

Aviation-Impacted Communities Alliance (AICA) analytical descriptions of the categories and alternative pathways depicted in Figures 1 and 2

Relationship to Figures 1 and 2: Figure 1 depicts how the pathways may reach the Earth's surface. Figure 2 shows that one flight may produce multiple surface-arrival types at different locations or times.

1. Primary sonic boom

At a particular surface location, the primary category has two alternatives:

Option A: Conventional pathway
The primary pressure wave travels from the aircraft to the Earth's surface, producing one surface arrival. The proposal describes a crack or thunder-like noise.

Option B: Mach cutoff pathway
The main primary wave bends upward at the Mach cutoff caustic before reaching that location. Evanescent waves continue beyond the caustic and produce one surface arrival, described in the cited material as low rumbling noise.

Options A and B are alternatives at a particular location. The cited sources do not provide corresponding noise metrics and numerical sound levels or vibration measures for the proposed operations.

2. Direct secondary sonic boom

A pressure wave initially travels upward from the aircraft, bends downward through the atmosphere, and produces one surface arrival. The proposal states that a secondary boom may be difficult to notice outdoors and may produce indoor vibration, and it does not provide corresponding noise metrics and numerical sound levels or vibration measures.

3. Indirect secondary sonic boom

At a particular surface location, the indirect secondary category has two alternatives:

Option A: Surface-return pathway
The original wave reaches the Earth's surface, changes direction upward, and later bends back toward the surface, producing two surface arrivals associated with the pathway.

Option B: Upward-first pathway
The wave initially travels upward and later bends downward toward the Earth's surface, producing one surface arrival.

The cited sources describe possible noise or vibration from secondary booms, and they do not provide corresponding noise metrics and numerical sound levels or vibration measures for each arrival under the proposed operations.

4. Maneuver-related focus boom

Acceleration, steep turns, pushovers, or other maneuvers may concentrate shock waves and produce one or more focus boom surface arrivals during a flight. The proposal describes focus booms as louder events that are brief and limited in area and duration. It excludes them from the proposed 0.11 psf overpressure ceiling and indicates that flight planning can manage them, and it does not establish generally applicable procedures, operating conditions, monitoring requirements, noise metrics and numerical sound levels, or vibration measures.

AICA figure derived from: FAA [1] (categories and Mach cutoff, evanescent wave, and focus boom descriptions); NASA [6] (secondary pathways); NASA FaINT [8] (Mach cutoff and evanescent waves); U.S. Department of Transportation/NTSC [9] (secondary boom pathways and surface observations). Aviation-Impacted Communities Alliance (AICA) organized the source material for this analytical description.

Scope: The descriptions distinguish information stated in the cited sources from AICA's analytical organization and from information that the proposal does not provide. They are conceptual and do not predict the effect of a particular operation or receiving condition.

Coverage note: The proposal does not expressly include Mach cutoff evanescent wave arrivals within the boom categories subject to the 0.11 psf ceiling and expressly excludes maneuver-related focus booms.

C. Source-Based Descriptions and Missing Quantification

Figure 4 separates source-based descriptions of possible sound and vibration from the measurement information the proposal does not provide. It also identifies the different treatment of Mach cutoff evanescent-wave arrivals and focus booms. This distinction is important because an overpressure value does not quantify a sound level or vibration value and, by itself, does not characterize annoyance or other community or environmental effects.

FIGURE 4

What the Proposal Describes and Does Not Quantify

Source-based descriptions of possible sound and vibration and the measurement information the proposal does not provide

Boom category and AICA pathway structure	Propagation pathway	What may reach the surface	SOUND		VIBRATION	
			Described in FAA proposal?[1]	Metric and numerical sound level provided?	Described in FAA proposal?[1]	Measure and numerical value provided?
1. Primary sonic boom *At a location: 1A or 1B*	1A. Conventional	One conventional primary-boom surface arrival.	**YES** Crack or thunder-like sound.	**NO** The proposal provides no sound metric and corresponding numerical sound level for any depicted boom category or pathway.[2]	**NOT STATED** Source does not state whether vibration may occur.	**NO** The proposal provides no vibration measure and corresponding numerical value for any depicted boom category or pathway.[2]
	1B. Mach cutoff[4]	No conventional primary-boom arrival; evanescent waves produce one surface arrival.	**YES** Low rumbling noise.		**NOT STATED** Source does not state whether vibration may occur.	
2. Direct secondary	Direct secondary pathway	One direct secondary surface arrival.	**POSSIBLE[3]** May be difficult to notice outdoors.		**YES[3]** Can manifest indoors as vibration.	
3. Indirect secondary *At a location: 3A or 3B*	3A. Surface reflection	Two associated surface arrivals.	**POSSIBLE[3]** Either arrival may be audible.		**YES[3]** Can manifest indoors as vibration.	
	3B. Upward first	One surface arrival after traveling upward and bending downward.	**POSSIBLE[3]** May be audible.		**YES[3]** Can manifest indoors as vibration.	
4. Maneuver-related focus boom[4]	Maneuver-related focusing	A focus boom surface arrival associated with acceleration, turns, pushovers, or other maneuvers. A flight may produce zero or more.	**YES** Described as a louder sound event.		**NOT STATED** Source does not state whether vibration may occur.	

[1] YES means the FAA proposal affirmatively describes the effect or capability; it does not mean the effect will occur during every arrival. POSSIBLE means the proposal uses conditional language. NOT STATED means the proposal does not address the effect.

[2] The 0.11 psf value is an overpressure ceiling. It is not a sound metric, numerical sound level, vibration measure, or numerical vibration value.

[3] FAA describes secondary sonic booms generally as potentially difficult to notice outdoors and capable of manifesting indoors as vibration. The proposal does not separately characterize direct and indirect secondary booms, or pathways 3A and 3B, in terms of sound or vibration. AICA applies FAA's general secondary boom description to each secondary pathway shown.

[4] The proposal treats the two pathways differently. FAA relies on Mach cutoff evanescent wave measurements in selecting 0.11 psf and states that evanescent waves below that value would be permitted. However, FAA treats the Mach cutoff condition as abating the primary sonic boom when the remaining noise is no longer characteristic of a sonic boom, and it does not expressly include that remaining noise within the primary or secondary sonic boom categories subject to the proposed ceiling. FAA expressly excludes maneuver-related focus booms from the proposed 0.11 psf overpressure ceiling.

AICA FIGURE DERIVED FROM: SOURCES AND ATTRIBUTION: FAA proposal [1] provides the primary, direct secondary, indirect secondary, and focus boom terminology and the sound and vibration descriptions shown. NASA [6] supports the secondary pathway geometry. NASA FaINT [8] supports the Mach cutoff caustic, evanescent wave physics, and FaINT's classification of evanescent waves. U.S. Department of Transportation/NTSC [9] supports the direct and indirect secondary pathway definitions and surface observations. Aviation-Impacted Communities Alliance (AICA) organized the categories, alternative pathways, and source-based comparison for this analytical figure.

SCOPE: The chart distinguishes source descriptions from the noise metrics, numerical sound levels, vibration measures, and numerical vibration values that the proposal does not provide.

III. Evidentiary Basis for FAA's Proposed 0.11 psf Ceiling

A. FAA's Cited Studies Address Different Questions

FAA principally cites NASA's Farfield Investigation of No-Boom Thresholds (FaINT) and the Department of Transportation's 1980 NTSC study of secondary sonic booms in New England.[1] These differently designed studies provide relevant evidence about propagation, surface overpressure, and selected acoustic or vibration observations.[8][9] Their scopes do not establish a systematic relationship between 0.11 psf and noise levels, vibration values, repeated exposure, annoyance, or broader environmental effects.

B. What FaINT and NTSC Provide

FaINT provides useful evidence about Mach cutoff physics and measured residual pressure and sound. It reported cutoff cases with maximum overpressure of 0.09 psf and Perceived Sound Exposure Level of 68 dB, while explaining that an acceptable noise threshold for commercial Mach cutoff operations remained to be defined.[8] That result is not a finding that 68 dB is an acceptable threshold, nor does it establish that 0.09 psf is a community-protection value.

FaINT also states that evanescent waves remain classified as sonic booms. FAA relies on the study's measurements in selecting 0.11 psf and treats the remaining signal after Mach cutoff as noise no longer characteristic of a sonic boom. The proposal does not translate that selected overpressure into a noise metric, vibration value, repeated-exposure measure, or community response. Monitoring before and during required environmental review can supply the operational evidence that the study was not designed to provide.

The NTSC study provides field observations of secondary sonic booms associated with Concorde operations. Investigators recorded changes in outdoor pressure, took A-weighted sound readings on selected days, noted whether events were audible, and documented one instance in which an exterior pressure change and window-pane vibration occurred at the same time.[9] The observations varied by flight, date, location, and atmospheric conditions.

Reported sound readings reached 58 dBA, and one event exceeded the instrument's 60 dBA measurement range. The study also reported that technicians heard events when recorded pressure changes exceeded approximately 0.1 psf. That finding was an observation from this particular field study, not a validated national threshold.

The study did not provide a consistent sound level for every event or evaluate SEL, DNL, NANL, repeated exposure, community response, or a general relationship between overpressure and vibration. Its observations help show what people may hear or experience at the surface, while additional monitoring is needed to characterize modern operations using consistent sound, vibration, event-count, and community-effect information.

C. NASA's Quesst Campaign Provides Important, Purposefully Bounded Evidence

NASA's Quesst campaign is designed to connect X-59 sound exposure with community response. It will examine individual and cumulative responses during repeated events over approximately one month, with planned Perceived Level exposures of about 70 to 87 dB and survey questions addressing annoyance, rattle, and vibration.[10][18] This work will provide important community-response evidence and a credible foundation for future low-boom policy.

NASA's acoustic-measurement approach also provides a useful model for interim operational monitoring. NASA plans to use Ground Recording System noise monitors to record X-59 sonic-boom waveforms, and its research has examined measurement uncertainty for eight different noise metrics derived from those recordings.[21] Preserving the underlying waveform allows the same event to be analyzed using different appropriate metrics as research, environmental-review, and policy questions develop. Applying that principle to interim civil supersonic operations would permit FAA and researchers to examine individual-event sound, cumulative exposure, and other relevant characteristics without limiting future analysis to a single initially selected metric. FAA should coordinate with NASA to make the recorded acoustic waveforms, derived metrics, processing methods, and relevant non-sensitive flight and meteorological metadata available for examination by researchers, policymakers, communities, and the public.

The planned scope does not include nighttime exposure or sleep disturbance. NASA will not directly acquire community-response data for focus booms because their limited geographic footprints are difficult to predict and measure. Quesst materials reviewed by AICA also do not identify Mach cutoff operations, caustics, or evanescent-wave arrivals as planned test conditions. These are stated boundaries of the campaign, not criticisms of NASA.

Operational monitoring can complement Quesst by applying the same waveform-preservation principle to actual civil supersonic operations and by documenting the arrival types outside Quesst's planned scope, the conditions under which they occur, their frequency relative to total flights, and their resulting noise and vibration. Together, the research and operational evidence can provide more complete information for environmental review and future policy.

D. Further Support Is Needed for Selection and Application of the Ceiling

Section III.B describes what FaINT and NTSC contribute, and Section III.C describes the planned scope of Quesst. This section identifies the additional explanation and operational evidence needed to apply that material to a national interim authorization. To complete that record, FAA should provide:

- How the cited FaINT and NTSC evidence supporting 0.11 psf as a technical demarcation for sufficiently abated sonic booms also supports applying that value to the regulatory, community-protection, and environmental purposes assigned to it;
- How FAA accounted for measurement uncertainty, variability, differing pressure quantities, and the differences between the FaINT and NTSC observations;
- What the existing evidence establishes across all surface-arrival types, aircraft, routes, flight profiles, atmospheric conditions, geographic settings, building types, and ambient-noise environments;
- A clear and accurate description of the potential environmental impacts, consistent with FAA's environmental-review process, including sound, vibration, annoyance, indoor disturbance, repeated exposure, and relevant health considerations; and
- Monitoring and reporting requirements for actual operations to develop the environmental information that is not available from the current record.

FAA's concurrent noise-policy review reinforces the importance of this analysis. In 2023, the agency identified supersonic aircraft among the vehicle types for which noise policy should consider how information is described and disclosed using metrics.[11] That notice also addressed community annoyance and certain adverse health impacts associated with aviation-noise exposure.[11] The proposal does not explain how that framework applies to the resulting sound or vibration.

FAA's Neighborhood Environmental Survey provides dose-response evidence for subsonic aircraft operations around airports.[12] Comparable evidence will be needed to evaluate community response to sonic-boom exposure, including the different surface-arrival types and pathways shown in Figures 1 through 3. Operational monitoring can begin developing the sound, vibration, event, and exposure information needed to support future dose-response research and informed policy decisions. NASA research indicates that rattle and vibration can contribute to annoyance.[16][17] Planned Quesst surveys ask whether participants heard rattle or saw, felt, or heard vibration.[18] The NPRM does not identify a vibration measure, numerical value, dose-response relationship, or community criterion.

New operational evidence should be available for examination by researchers, policymakers, communities, and the public. A common monitoring and data protocol should preserve the information needed to calculate appropriate metrics and evaluate all arrival types, operating conditions, detected and non-detected events, activity levels, and uncertainty. Timely availability would allow the evidence to inform environmental review, FAA's noise-policy work, and future decisions.

IV. The Scope of Authorization Should Reflect the Supporting Evidence

A. Efficiency and Public Protection Can Be Addressed Together

Executive Order 14304 seeks both regulatory efficiency and progress in civil supersonic aviation.[2] AICA supports an efficient, learning-oriented process that facilitates innovation while developing the evidence needed to inform future policy. The interim rule can advance both objectives through a single national framework that applies common requirements to all eligible operators.[1] Those requirements can address flight quantity and frequency, routes and affected areas, operating hours, duration, treatment of all surface-arrival types, measurement and reporting procedures, unexpected-event protocols, scheduled evaluation, and an expiration or renewal process. This approach would avoid repeating the same foundational review while providing consistent information for operators, FAA, and affected communities.

B. A Single National Framework Avoids Unnecessary Repetition

FAA anticipates approximately five operators during its analysis period.[1] That estimate does not require five independently designed processes. A common national structure can apply to every qualifying operator and provide advance notice of the requirements that govern interim operations.

The interim rule should include a defined expiration date and scheduled evaluation milestones. Review should be based on operational measurements, activity levels, Quesst results, other research, community information, noise-policy developments, and future ICAO standards. Applying this evidence on a stated schedule will allow FAA to evaluate the emerging technology and make evidence-based adjustments before renewal or extension.

C. Demonstrated Capability Does Not Establish Every Operational Outcome

A demonstration under selected conditions cannot by itself establish performance across every aircraft, route, flight profile, atmosphere, geography, and receiving environment or identify every location at which a surface arrival may occur. A common interim framework can address this uncertainty by pairing initial demonstrations with monitoring of actual operations across the conditions encountered in service.

Monitoring can answer the unresolved questions identified in Figures 1 through 4 by identifying primary-boom and Mach cutoff alternatives, direct and indirect secondary arrivals, and focus booms; measuring their sound and vibration; and relating them to operating and atmospheric conditions. This evidence can support environmental review, scheduled evaluation, and future policy decisions.

V. Recommended Structure for an Emerging-Technology Interim Program

A. Common Requirements for an Emerging Technology

FAA should establish one national interim framework designed for an emerging technology, with common requirements for all eligible operators. Because Figures 1 through 4 identify unresolved questions about surface arrivals, their operating relationships, and their noise and vibration effects, the requirements should develop and apply new evidence in phases. They should address operating and geographic boundaries, flight quantity and frequency, operating hours, duration, monitoring, reporting, data availability, scheduled evaluation milestones, and expiration or renewal.

B. Monitoring and Reporting to Develop Operational Evidence

FAA should require monitoring and reporting of actual operations to support its environmental-review responsibilities and develop the information identified as missing in Figures 1 through 4. Monitoring should occur at representative surface locations and preserve pressure, acoustic, and vibration waveforms where technically feasible. Reports should provide overpressure, Perceived Level, Lmax, SEL or another appropriate event-energy measure, vibration values, event counts, NANL, and a suitable cumulative-exposure metric. Retaining waveforms allows appropriate metrics to be calculated without assuming that PLdB, Lmax, and SEL are directly convertible.

Reports should distinguish the incremental supersonic contribution from existing and combined aviation exposure where technically feasible. They should identify the arrival category and pathway, time and location, flight, operating and atmospheric conditions, detected and non-detected events, and total monitored flights. Focus-boom reporting should allow FAA to determine the conditions in which those arrivals occur and whether they are isolated or recur during a meaningful share of operations.

C. Scheduled Evaluation and Evidence-Based Phasing

FAA should conduct scheduled evaluations during the interim period and before renewal or extension. Each evaluation should assess the information developed in response to the unresolved questions shown in Figures 1 through 4, including measured noise and vibration, activity and event counts, arrival types, operating conditions, community information, Quesst results, other research, noise-policy developments, and ICAO work. This emerging-technology evaluation can support evidence-based phasing and adjustment of the interim requirements and inform FAA's noise-policy work and future decisions.

VI. Environmental Review

FAA applies a categorical exclusion to the proposal and states that no extraordinary circumstances are present and that environmental impacts are not anticipated.[1] Its public explanation of NEPA states that agencies must disclose a clear and accurate description of potential environmental impacts and consider effects on the human environment. Thresholds then serve as indicators of significant impact for certain resource categories.[13]

A streamlined common set of monitoring and reporting requirements can efficiently provide the information needed for that review. Figures 1 through 4 identify the surface arrivals, operating relationships, source descriptions, and missing measurement information that should be addressed. A 0.11 psf overpressure ceiling does not by itself describe single-event or cumulative noise, vibration, event counts, timing, geography, repeated exposure, affected populations, receiving conditions, or the incremental and combined aviation-noise environment.

AICA does not ask FAA to assume that every measured effect is significant. It asks the agency to characterize expected effects before making that policy determination. FAA's drone package-delivery review illustrates that an emerging aviation activity can be evaluated using DNL together with disclosed operating assumptions and flight quantities.[19][20] For supersonic operations, monitoring and appropriate noise and vibration measures, including single-event levels, frequency, vibration, and cumulative exposure, would connect environmental review to the lived experience of affected communities.

VII. Conclusion

AICA supports an efficient pathway for innovation and early supersonic operations consistent with Executive Order 14304.[2] The emerging nature of civil supersonic operations and the unresolved noise, vibration, community-response, and environmental questions support an interim framework with common requirements, defined operating boundaries, monitoring of all surface-arrival types, scheduled evaluation milestones, and an expiration or renewal process.[1] These measures can preserve regulatory efficiency, provide the clear and accurate environmental information contemplated by FAA's own process.[13] They can also advance FAA's stated objective of safeguarding the public from potential harm caused by sonic-boom impacts.[1][2]

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Appendix A. Technical Definitions

Pressure wave: A pressure disturbance traveling through the atmosphere.

Overpressure: The amount by which air pressure at a stated point exceeds the surrounding atmospheric pressure. At the Earth's surface, it is expressed in psf and compared with the proposed 0.11 psf overpressure ceiling.

Surface arrival: Any pressure disturbance or acoustic signal that reaches a particular location on the Earth's surface. As used here, the term includes a primary sonic boom arrival; an evanescent wave arrival below a Mach cutoff caustic; a direct secondary arrival; either of the two associated surface return arrivals or the single upward first indirect secondary arrival; and a maneuver-related focus boom arrival. The term does not presume whether the arrival creates noise, causes vibration, or produces a community effect.

Sound: Acoustic energy capable of being heard and described through appropriate sound metrics and corresponding decibel levels.

Noise: Sound experienced as unwanted.[3] This comment uses the term when discussing aviation exposure, annoyance, community response, environmental review, and potential effects.

Vibration: Perceptible movement of a building, object, or surface associated with a pressure disturbance. Vibration requires an appropriate measure and corresponding value.

Mach cutoff caustic: The turning boundary where the main primary pressure wave bends upward before reaching the surface. The caustic is not a separate arrival.

Evanescent waves: Lower-level acoustic signals that extend below the Mach cutoff caustic and reach the surface.

Noise metric and corresponding level: A defined method for characterizing sound exposure together with the numerical value reported in the units required by that metric. The 0.11 psf ceiling is an overpressure value, not a noise metric or decibel level.

Perceived Level: A single-event metric intended to characterize the perceived noisiness of an impulsive sound. A value in PLdB is not directly interchangeable with Lmax, SEL, or DNL.

Number Above Noise Level (NANL): The number of events exceeding a specified sound level during a defined period.

General principle: At a particular location, a surface arrival may result in noise, vibration, both, or neither.