This document is scheduled to be published in the
Federal Register on 2026-07-02 and available online at
https://www.federalregister.gov/d/2026-13440, and on
https://govinfo.gov

-13-P]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Parts 1 and 91

[Docket No.: FAA- FAA-2026-6935; Notice No. 26-07]

RIN 2120-AM15

Enabling Supersonic Overland Flight

AGENCY: Federal Aviation Administration (FAA), Department of Transportation (DOT).

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: This proposal would advance the United States' leadership in next-generation aviation by replacing the longstanding prohibition on civil supersonic flight over land with a modern, performance-based regulatory framework. Consistent with national policy set forth by the Executive Order of June 6, 2025, *Leading the World in Supersonic Flight*, this action would enable the safe, efficient, and commercially viable operation of civil supersonic aircraft in the United States. Current regulations prohibit flight operations of civil aircraft at a true flight Mach number greater than 1 in the U.S., except under the conditions and limitations of an operation-specific authorization from the Administrator, to protect the public from sonic boom. FAA has determined the general ban on civil supersonic flight is outdated and no longer appropriate due to advancements in technology, flight techniques that prevent sonic booms from reaching the surface, and increased interest in civil supersonic flight. FAA proposes to repeal this outdated and unnecessary prohibition and establish a corresponding interim noise-based certification standard to allow supersonic flights without an operation-specific special authorization clearing the way for next-generation supersonic flight. This rule removes regulatory barriers, provides clear pathways for testing and early commercial operations,

and positions the United States to serve as the leader in setting global standards for supersonic flight. These actions will ensure that the United States leads the world in the safe, lawful, and rapid development and deployment of next-generation supersonic aviation.

DATES: Send comments on or before [INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: Send comments identified by docket number FAA-2026-6935 using any of the following methods:

- Federal eRulemaking Portal: Go to www.regulations.gov and follow the online instructions for sending your comments electronically. As required by 5 U.S.C. 553(b)(4), a plain language summary of the rule is also available on the Federal eRulemaking Portal.
- Mail: Send comments to Docket Operations, M-30; U.S. Department of Transportation (DOT), 1200 New Jersey Avenue, SE, Room W12-140, West Building Ground Floor, Washington, DC 20590-0001.
- Hand Delivery or Courier: Take comments to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE, Washington, DC, 20590 between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.
- Fax: Fax comments to Docket Operations at (202) 493-2251.

Privacy: In accordance with 5 U.S.C. 553(c), DOT solicits comments from the public to better inform its rulemaking process. DOT posts these comments, without edit, including any personal information the commenter provides, to www.regulations.gov, as described in the system of records notice (DOT/ALL-14 FDMS), which can be reviewed at www.dot.gov/privacy.

Docket: Background documents or comments received may be read at www.regulations.gov at any time. Follow the online instructions for accessing the docket or go to the Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, S.E., Washington, D.C., 20590 between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: Sterling Wiggins, Office of Environment and Energy**,** Federal Aviation Administration, 800 Independence Avenue SW, Washington, DC 20591; telephone 202-267-0747; email 9-APL-Supersonic-Noise-Inquiries@faa.gov.

SUPPLEMENTARY INFORMATION:

I. Executive Summary

A. Overview of Proposed Rule

Originally enacted in 1973, FAA regulations prohibit flight operations of civil aircraft at a true flight Mach number greater than 1 (referred to as "civil supersonic flight") in the U.S., except as authorized by the Administrator, to protect the public from civil aircraft sonic boom.[1] Over time, advancements in scientific understanding, technology, and flight techniques have made it technologically practical to achieve supersonic flight without sonic booms reaching the surface, minimizing the impact of supersonic flight at the surface. In light of these advancements, Executive Order (E.O.) 14304, "Leading the World in Supersonic Flight," directed the Administrator to repeal the outdated regulatory "prohibition on overland supersonic flight" and establish an interim noise-based certification standard.[2]

As directed by E.O. 14304, FAA proposes to repeal the prohibition on civil supersonic flight in the U.S. contained in 14 CFR § 91.817 by revising the current regulatory text in § 91.817 to provide an interim noise-based operating certification standard. Further, the proposed revision would provide the conditions under which

operators may engage in civil supersonic flight without the need for a special flight authorization (SFA) to exceed Mach 1, an operation-specific authorization that does not allow for civil supersonic flight outside of research and testing purposes in isolated test areas. To enable supersonic flight operations in the U.S., this proposal would require (1) the aircraft be operated such that sonic boom overpressure at the surface does not exceed 0.11 pound per square foot (psf), (2) the Administrator finds that the operator has shown, through measurement, modeling, or other methods, that primary and secondary (direct and indirect) sonic boom overpressure at the surface does not exceed 0.11 psf during operations, and (3) the aircraft be operated in compliance with any conditions and limitations issued by the Administrator.

The method the operator intends to use to demonstrate it can comply with this standard (flight test measurement equipment and procedures, modeling methodology, etc.) would require approval by FAA. This concept as well as the factors FAA may consider in reviewing the method of demonstrating compliance are discussed in Section IV.D. In addition, the docket for this NPRM will include a draft Advisory Circular for public comment, which provides guidance for one method operators may use to demonstrate compliance.

To receive a finding from the Administrator, this proposal would require the operator to demonstrate it has a means to comply with the standard proposed in this NPRM when conducting its operations. FAA does not propose prescriptive means of compliance in this proposal, and operators may propose a means of compliance they deem appropriate for consideration. Further, operators would be required to operate under any conditions and limitations issued by the Administrator. Once the Administrator makes the finding, the operator would not need to seek approval for individual flights or to specific operational areas, as is required under an SFA, as long as the finding remains valid and the operator operates within the conditions and limitations.

FAA proposes to maintain the provisions of current § 91.817(b) by relocating them to proposed § 91.817(c) to continue to allow for offshore civil supersonic flight operations with sonic boom that may reach the surface, provided the flight crew has information on the flight limitations to prevent sonic boom from reaching the U.S.

FAA also proposes to amend § 91.818 to conform with the proposed amendments to § 91.817. The SFA process would remain unchanged by this proposal and would continue to allow the Administrator to authorize civil supersonic flight in which sonic booms may reach the surface to allow for research, development, testing, and other operations in controlled areas. The proposal clarifies an SFA is not needed if an operator has a finding under § 91.817(a)(2) or flight limitations to ensure compliance with § 91.817(a).

Finally, FAA proposes to add definitions of "sonic boom," "primary sonic boom," and "secondary sonic boom" to § 1.1 General Definitions. Specifically, FAA proposes to define sonic boom as the acoustic event on the earth's surface that is a manifestation of the shock wave system generated by an aircraft when it flies at a speed greater than the speed of sound. The surface impacts are labeled as primary or secondary sonic boom(s).

Pursuant to the Executive Order, FAA was directed to finalize noise certification standards by June 6, 2027. This proposed rule, when finalized, would enable supersonic operations.

B. Summary of the Costs and Benefits

Benefits from the proposed rule would be derived from providing regulatory certainty that will encourage the advancement of new supersonic aircraft and technology. This would serve as a first step in enabling supersonic flights, while safeguarding the public from the adverse impacts of sonic booms.

The proposed rule would result in some costs and cost savings to operators and FAA. Operators would need to propose, and receive approval for, a method of

compliance (flight test measurement equipment and procedures, modeling methodology, etc.) to demonstrate they can comply with the proposed standard. FAA anticipates that the first generation of aircraft seeking certification under this proposed rule would require flight testing to receive a finding from the Administrator to conduct civil supersonic flights. However, these operators are not expected to incur flight testing costs above those already required to obtain flight authorizations. Operators would also need a means of compliance, such as avionics or other technology, to demonstrate sonic boom overpressure will reach the surface with a force less than 0.11 psf during civil supersonic operations. FAA assumed that manufacturers would develop cost-effective abatement solutions since the rule is performance-based, which allows manufacturers the flexibility to develop or continue developing their own means to comply. FAA is not able to estimate these costs and invites further comment on costs associated with conducting sonic boom abatement techniques in Section V.A. In addition, FAA estimates the proposed rule would save industry $1,567,636 and FAA $852,135 in flight authorization processing over the analysis period, totaling $2,419,771.

II. Authority for This Rulemaking

FAA's authority to issue rules on aviation safety is found in Title 49 of the United States Code (49 U.S.C.). Subtitle I, Section 106 describes the authority of the FAA Administrator. Subtitle VII, Aviation Programs, describes in more detail the scope of the FAA's authority. This proposal is issued under the authority described in Subtitle VII, Part A, Subpart III, Section 44715, Controlling aircraft noise and sonic boom. Under section 44715, FAA is charged with prescribing both standards to measure aircraft noise and sonic boom and regulations to control and abate aircraft noise and sonic boom. This proposal is within the scope of these authorities because it would revise regulations to enable civil supersonic flight provided sonic boom overpressure at the surface of the U.S.

does not exceed 0.11 psf, and FAA authorizes the operator of the aircraft to conduct civil supersonic flight operations in the U.S.

In addition, E.O. 14304 directs the FAA Administrator to "take the necessary steps, including through rulemaking, to repeal the prohibition on overland supersonic flight in 14 CFR 91.817" and to establish an interim noise-based certification standard. It also directs FAA to make any necessary modifications to § 91.818. This proposal is within the scope of E.O. 14304 because it both removes the ban and establishes an interim noise-based certification standard.

III. Background

A. History of FAA Regulation of Sonic Booms

Key to the scope of this rule is how a sonic boom is created and the characteristics of sonic booms. Any aircraft that moves through the atmosphere at speeds exceeding the local speed of sound (Mach 1) creates a system of nearly instantaneous pressure changes known as shock waves along the length of the aircraft. The system of individual shock waves due to aircraft features propagates through the atmosphere shifting in space over a long-distance, ultimately coalescing into two compressions, one at the nose and one at the tail, that form a sonic boom. When the energy from the shockwave reaches human ears, it is heard as the loud crack, or thunder-like, sonic boom.[3]

In 1973, FAA promulgated what is now § 91.817, which prohibited supersonic flight in the U.S. except when operating under the conditions and limitations of an SFA issued by the Administrator.[4] In the 1973 final rule, FAA stated that due to the limits of sonic boom monitoring and control technology at that time, a prohibition was needed to protect the public from sonic boom of any given intensity and ensure effective control of sonic boom at the source. As such, the regulation prohibited supersonic flight by preventing operations of a civil aircraft at a true flight Mach number greater than 1. This effectively eliminated the potential for sonic boom from civil aircraft operations in the

U.S. unless authorized under an SFA. In establishing this requirement, FAA noted the intent of the prohibition was not to prohibit supersonic speed per se, but to protect the public from sonic booms that may reach the surface given researchers at the time were unable to identify an acceptable level of sonic boom exposure. FAA also said that in the future it may be possible to conduct supersonic flights without a sonic boom reaching the surface. One of the reasons cited for providing the SFA process in § 91.818 was to provide future aircraft the opportunity to demonstrate this possibility.[5, 6]

In a 1978 rule, FAA established additional requirements for supersonic airplanes, including requiring supersonic aircraft (except for Concorde aircraft with flight time prior to 1980) to meet Stage 2 landing and takeoff (LTO) noise limits.[7] LTO regulations prescribe aircraft noise limits and assess aircraft noise levels against those limits based on measurement criteria that simulate operations at airports. In addition, the 1978 rule added what is now § 91.817(b) to the regulation, which prohibits civil supersonic airplanes that are outside the U.S. from causing sonic booms to reach the surface within the U.S. when flying to or from U.S. airports even if they are outside the U.S. at the time. The stated purpose of this provision was to protect the coastal areas from sonic booms generated by aircraft achieving supersonic speeds outside the U.S.[8, 9] The 1978 final rule did not mandate LTO noise standards for future supersonic aircraft because of the lack of adequate technical information, but FAA conveyed that it would not certificate any supersonic aircraft that failed to meet the noise standards applicable to subsonic airplanes at the time of type certification.[10]

FAA expressed interest in amending its noise standard regulations in 1986 to account for future supersonic aircraft through the issuance of an advance notice of proposed rulemaking (ANPRM) seeking information on propulsion systems for supersonic aircraft, potential methods of noise certification, and the "noise/performance/cost tradeoffs" of supersonic technology.[11] Following the ANPRM,

in 1990, FAA issued an NPRM to expand the applicability of part 36 subsonic LTO noise standards to supersonic aircraft and set noise limits for these aircraft at the same level as subsonic aircraft.[12] FAA withdrew this NPRM in 1994, stating further investigation and research were necessary before developing a final rule.[13] On the same day the agency withdrew the NPRM, FAA published a policy statement reiterating the agency's commitment to aviation's longstanding efforts to achieve increasingly effective noise abatement at its source. The policy also stated that any future supersonic transport airplane shall produce no greater noise impact on a community than a subsonic airplane certified to Stage 3 noise limits, the then-required limits for all newly certificated aircraft.[14, 15] FAA also indicated it would give consideration, to the extent possible, to the unique operational flight characteristics of future supersonic designs in developing provisions for the noise certification of those airplanes. FAA subsequently updated this policy statement in 2008 to state FAA's intent that future supersonic transport aircraft comply with the same noise limits as subsonic aircraft.[16, 17] At that time, FAA acknowledged there was still interest in supersonic aircraft technology.

Congressional interest in the potential operation of supersonic aircraft in the U.S. continued. Section 181 of the FAA Reauthorization Act of 2018[18] directed the Administrator to exercise leadership in the creation of Federal and international policies, regulations, and standards relating to the certification and safe and efficient operation of civil supersonic aircraft.[19] FAA's first step in response to Section 181, and to update and modify civil supersonic regulatory framework, was modernizing the SFA process. On January 15, 2021, FAA issued a final rule to streamline the application procedure for SFAs by clarifying the necessary information required by the FAA.[20] This rule provided clear application criteria for the public and identified the appropriate office to direct applications and questions in order to streamline the application and processing of supersonic SFAs. Section 181 also directed the Administrator to revise part 36 to address

LTO noise requirements for supersonic aircraft and incorporate necessary definitions and noise testing requirements. On April 13, 2020, FAA issued an NPRM pursuant to the Act's requirements to extend applicability of part 36 to provide LTO noise requirements for supersonic aircraft.[21] FAA's proposed standard would have only applied to aircraft seeking type certification in the U.S., as the International Civil Aviation Organization (ICAO) had yet to adopt a standard for civil supersonic aircraft (takeoff, landing, or en route). The comment period for the 2020 NPRM closed on July 13, 2020. After issuance of the 2020 NPRM, FAA shifted focus from developing unilateral standards for the United States to working through ICAO to develop and shape a globally harmonized standard. The 2020 NPRM issued for the rulemaking required by Section 181 of the FAA Reauthorization Act of 2018 is separate and distinct from the rule FAA is proposing in this notice, which does not address LTO noise certification. Since the 2020 NPRM, FAA has continued to work with applicants on SFA requests and to work internationally with ICAO to address noise issues associated with supersonic aircraft.

B. FAA's Current Efforts to Address Sonic Boom

The issuance of E.O. 14304 has accelerated FAA's efforts regarding supersonic aircraft. The E.O. directs FAA to take a series of actions to further enable the growth and development of the supersonic industry. Importantly, E.O. 14304 directs a series of rulemakings and other actions to remove regulatory barriers that, as E.O. 14304 describes, hinder the advancement of supersonic aviation technologies. E.O. 14304 directs the Administrator "to repeal the prohibition on supersonic overland flight," establish interim and final noise-based standards (takeoff, landing, and en route) for supersonic aircraft, coordinate with other executive branch agencies to advance supersonic research and development, and promote international engagement and harmonization on civil supersonic flight regulations.

The first rulemaking, as directed by E.O. 14304 in § 2(a), is "to repeal the prohibition on overland supersonic flight" in § 91.817, modify § 91.818 as necessary, and establish an interim noise-based certification standard consistent with applicable law. This NPRM is intended as the first step to address this mandate.

Section 2(a) of E.O. 14304 also directs the Administrator to take immediate steps to repeal §§ 91.819 and 91.821. Both provisions were promulgated in the 1970s to address LTO noise issues related to the Concorde aircraft. As these provisions are closely aligned with a second rulemaking directed by § 2(b) of E.O. 14304, FAA intends to address the repeal of these provisions in that future rulemaking.

Section 2(b) of E.O. 14304 directs FAA, through rulemaking, to establish a final standard for supersonic aircraft noise certification under part 36 and amend § 91.817 to incorporate this standard. The future rule to implement § 2(b) of E.O. 14304 would define an acceptable noise limit for LTO and en route supersonic operations based on operational testing and research, development, testing, and evaluation data and consider community acceptability, economic reasonableness, and technological feasibility. The future rule to implement § 2(b) of E.O. 14304 would also specify a process for periodic review and update of the rule to reflect future advances in aircraft noise reduction technology. If this rule is finalized, it would constitute the final en route sonic boom and LTO noise standards for supersonic aircraft.

Collectively, these efforts are intended to help support the development of the supersonic industry, give regulatory certainty to aircraft manufacturers and other stakeholders, and provide the benefits of supersonic flight to the public. This proposed repeal of the prohibition on overland flight of civil supersonic aircraft and the establishment of an interim noise-based certification standard is a critical first step.

C. Statement of the Problem

Manufacturers have demonstrated it is possible to fly supersonic aircraft without sonic booms reaching the surface by using sonic boom abatement techniques, making complete prohibition on civil supersonic flight outside of test areas no longer appropriate, and an unnecessary restraint on the growth of the U.S. aviation sector. One of these techniques, Mach cutoff operations (MCO), uses a combination of operational factors (*e.g.*, altitude and Mach speed) and specific atmospheric conditions along the flight path of the aircraft to refract sonic booms within the atmosphere. This refraction prevents potential sonic boom with an overpressure greater than 0.11 psf from reaching the surface. Manufacturers have stated it may be possible with avionics technologies to scale MCO such that operators can use the technique to operate at supersonic speeds and abate sonic booms at the surface. This technique was demonstrated by Boom Supersonic on February 10, 2025, under an SFA authorized by the Administrator, and by the National Aeronautics and Space Administration (NASA) during its Farfield Investigation of No Boom Threshold (FaINT) research project.[22, 23]

Current FAA regulations prohibit civil supersonic flight in the U.S., except under an SFA issued by the Administrator, regardless of whether the sonic booms reach the surface. SFAs are issued by the Administrator for an individual aircraft and for operation within a specific, limited operational area for aircraft research and testing. This speed-based restriction, with only limited exceptions with an SFA, limits the scalability and types of operations that aircraft capable of supersonic flight can conduct. This is true even if the aircraft's performance capabilities enable operation in a manner that obviates the purpose of the prohibition.

FAA held eight listening sessions with original equipment manufacturers and trade association stakeholders between August 11, 2025, and August 28, 2025.[24] Stakeholders supported a safe incremental transition from the current speed-based

prohibition on sonic booms to a performance-based operational standard preventing sonic booms from reaching the surface. Stakeholders also supported continued domestic and international U.S. leadership in the development of standards for supersonic aircraft.

Under 49 U.S.C. 44715, the Administrator is authorized to regulate aircraft noise and sonic booms and given a statutory duty to protect public health and welfare from aircraft noise and sonic booms. In addition, the Administrator must consider whether a regulation promulgated under § 44715 is economically reasonable, technologically practicable, and appropriate for the applicable aircraft. FAA also has a statutory duty to consider whether a regulation is consistent with the highest degree of safety and carries out the purposes of § 44715. As part of its obligations under § 44715, FAA has consulted with the Environmental Protection Agency (EPA) on this proposal.

Considering the advancements in technology and general feedback from stakeholders, FAA is proposing to amend its regulations to repeal the prohibition on civil supersonic flight in the U.S. and allow the Administrator to authorize operators to conduct supersonic flight in the U.S. without an SFA. Under this proposal, an operator would be able to conduct these flights in the U.S. if the operator: (1) operates in a manner that sonic boom overpressure at the surface does not exceed the proposed limit of 0.11 psf, (2) receives a finding from the Administrator, and (3) operates the aircraft in compliance with any FAA-issued conditions and limitations. The proposal would replace the prescriptive speed-based prohibition on civil supersonic flight in the U.S. with a performance-based standard. FAA considers this proposal consistent with its obligations under 49 U.S.C. 44715.

D. Scope of this Proposal

Consistent with the direction in § 2(a) of E.O. 14304, this proposal would repeal the prohibition on supersonic flight in the U.S., establish an interim en route noise-based operating certification standard for sonic boom by revising § 91.817, and modify

§ 91.818 as needed. To implement these changes fully, the rule also proposes definitions and specifies findings required by the Administrator to operate above Mach 1 in the U.S.

FAA recognizes this proposal is the first step of a multi-step regulatory process to enable the next generation of supersonic flight. Though this proposed rule would address some of the goals in E.O. 14304, future rulemakings will be necessary to enable civil supersonic flight fully in the U.S. Topics of future rulemakings may include: establishing LTO noise standards for supersonic aircraft, establishing technical standards for sonic boom abatement technology, and establishing other operational requirements for supersonic aircraft.

FAA is required to prescribe regulations under § 44715 prior to issuance of a type certificate for any aircraft. FAA has traditionally addressed this mandate for subsonic aircraft by prescribing LTO regulations in part 36. Whereas subsonic aircraft noise is primarily regulated based on their LTO noise profile, supersonic aircraft have the addition of an en route noise profile because sonic booms have the potential to produce adverse impacts on the public. This proposed regulation would address the en route noise profile of supersonic aircraft. As FAA intends to address LTO noise profile in future rulemaking, LTO noise standards are beyond the scope of this rulemaking.

Because LTO standards necessary to enable civil supersonic flight fully will be addressed in a future rulemaking, FAA does not anticipate receiving an application for a type certificate based on this rulemaking alone. If FAA were to receive an application for a type certificate prior to promulgating the LTO standards and noise limits, FAA would propose a rule of particular applicability establishing LTO standards for the applicant's aircraft as required by § 181(f) of the FAA Reauthorization Act of 2018 to complete the noise certification for the applicant.[25, 26]

Supersonic flight using MCO may produce low-level noise on the ground that does not have all the characteristics of a sonic boom and are known as evanescent waves.

These waves were measured and described by NASA as low "rumbling" noise at the level of background street noise. This proposal would permit evanescent waves on the ground with overpressures less than 0.11 psf and would prohibit any overpressures greater than 0.11 psf. Additional information on the rationale behind the selection of the 0.11 psf overpressure limit in this proposal can be found in Section IV.A. FAA may consider regulation of noise associated with supersonic flight, such as evanescent waves, in the future if the Administrator determines it is necessary to protect public health and welfare.

NASA has been investigating supersonic aircraft shaping to allow for supersonic flight without generating loud sonic booms. This research is being conducted under NASA's Quesst mission with planned flight campaigns of its X-59 aircraft.[27] This mission is designed to increase the understanding of low-boom technology and techniques, allow researchers to better understand the effects of sonic booms on communities, and gather data for correlating a noise limit that results in minimal noise. Though the Quesst mission holds the potential to reduce the adverse impact of sonic booms significantly at the surface, additional research is needed to assess the viability of implementing this technology in future commercial supersonic aircraft. Therefore, this proposed rule would not permit low-boom operations resulting in a sonic boom overpressure at the surface greater than 0.11 psf.

This proposed rule would provide a first step in enabling supersonic flight by repealing the general prohibition against civil supersonic flight in the U.S. while protecting public health and welfare from sonic boom by establishing an en route interim noise-based certification standard.

E. Related International Efforts

In 2020, FAA issued an NPRM to establish LTO standards for supersonic aircraft pursuant to the FAA Reauthorization Act of 2018 and based on interest from industry in

developing next generation supersonic aircraft.[28] This 2020 NPRM and industry interest led to ICAO discussions on development of a globally harmonized LTO standard for supersonic aircraft.[29] Because of these discussions, FAA's focus shifted to working through ICAO to develop and shape a globally harmonized standard rather than a U.S.-specific standard for civil supersonic aircraft. ICAO's Committee on Aviation Environmental Protection (CAEP) endorsed this standard in February 2025, which is currently undergoing final review within ICAO before final acceptance by the ICAO Council. FAA intends to consider this standard as the agency develops the future rulemaking directed by § 2(b) of E.O. 14304.

In addition to the LTO standard, ICAO plans to develop an en route low-boom noise standard. However, ICAO does not expect this standard to be complete until 2031.[30] Given this timetable and the current stage of development of low-boom civil supersonic aircraft, FAA does not consider it appropriate to wait for finalization of the ICAO en route low-boom standard. FAA's proposed performance-based en route standard will provide flexibility for industry to continue to develop technology while protecting the public from the adverse effects of sonic booms in the near-term. Should ICAO finalize an en route standard, FAA could address any complete en route low-boom noise standards from ICAO as part of a future rulemaking. Therefore, FAA is proposing a U.S.-specific en route interim noise-based certification standard. FAA continues to work through the ICAO CAEP and with member states to align regulatory approaches as directed by § 4(a) of E.O. 14304.

IV. Discussion of the Proposal

A. Repeal of the Prohibition on Civil Supersonic Flight in the U.S.

As described, the current regulations were enacted in 1973 to preclude civil supersonic flight in the U.S., unless the operator is operating under an SFA, due to concerns about potential adverse impacts of sonic boom to people on the surface. These

concerns remain true today, and ongoing research is working to address the characterization of sonic booms and how to limit their impacts.[31, 32, 33] E.O. 14304 also recognized the potential for adverse impacts on the surface from sonic booms in directing that FAA establish an interim noise standard while, at the same time, directing FAA to enable civil supersonic flight in the U.S. To address these concerns in a manner that enables supersonic flight in the U.S., FAA proposes to repeal the general speed-based prohibition and replace it with a regulation that would allow "supersonic overland flight" if the operator meets three conditions. These conditions would be: (1) the operator meets the performance-based interim en route certification standard of no sonic boom overpressure greater than 0.11 psf reaching the surface;(2) after an operator demonstration, the operator receives a finding from the Administrator; and (3) the aircraft is operated in compliance with FAA-issued conditions and limitations.[34]

i. Prohibition on Sonic Boom Reaching the Surface

Historically, the public has expressed concerns and a need for relief from sonic booms reaching the surface and their impact on public health. FAA conducted flight testing on the impact of sonic booms on the public in the 1960s and 1970s. Significant public backlash from those impacted by sonic booms during this testing resulted in the prohibition of civil supersonic flight over land that exists today, and the restrictions on Concorde operations in § 91.819.[35] To relieve the concerns that led to the initial prohibition on civil supersonic flight in the U.S. as next-generation supersonic aircraft prepare to enter the National Airspace System (NAS), FAA drew on the best available data to propose an overpressure limit that data indicated sufficiently abated sonic boom at the surface. Based on this data, FAA determined operators should be required to ensure primary and secondary (including direct and indirect) sonic boom overpressure at the surface does not exceed 0.11 psf, as proposed in § 91.817(a)(2)(i).

In developing the sonic boom noise levels in proposed § 91.817(a)(2)(i), FAA considered the NASA study entitled "Mach Cutoff Analysis and Results from NASA's Farfield Investigation of No-boom Thresholds (FaINT)"[36] and a 1980 DOT Transportation Systems Center, now the John A. Volpe National Transportation Systems Center ("NTSC" or "Volpe"), study "Detection and Assessment of Secondary Sonic Booms in New England."[37] These studies followed a similar approach of examining sonic boom noise measures at the surface and quantified several distinct types of sonic booms from supersonic aircraft as overpressures in psf. The NASA study (*i.e.*, FaINT) documented primary sonic booms that were abated operationally when the aircraft was flown within a constrained MCO flight airspeed-altitude envelope and under non-anomalous meteorological conditions. The FaINT study demonstrated a successfully abated sonic boom by measuring the resulting noise (evanescent waves measured upon successful abatement of the primary sonic boom) and quantifying the residual surface pressure. In other words, successful abatement of a sonic boom was determined when the only remaining noise related to the sonic boom was noise no longer characteristic of a sonic boom (*e.g.,* evanescent waves).

To further include the wider spectrum of residual pressure data from primary sonic boom impacted by atmospheric propagation effects, FAA included data from the NTSC study into the analysis of sonic boom impact at the surface. In this study, the NTSC examined data on sonic booms generated by Concorde aircraft and identified noise that the NTSC study termed as "secondary sonic booms." These secondary sonic booms were classified as two types based on their refraction or reflection path—type 1 (which FAA defines as direct in proposed § 1.1) initially traveled upward before refracting off of the atmosphere and type 2 (which FAA defines as indirect in proposed § 1.1) initially traveled downward and were reflected off the surface, then traveled upward to the thermosphere before being refracted downward again to the ground. Utilizing

microphone arrays and vibration measuring systems, NTSC recorded instances of peak-to-peak overpressure changes at surface-level. After logging these pressure changes into a database, NTSC was able to correlate these pressure changes with Concorde flights near the test areas utilizing air carrier schedules and FAA radar track data.

FAA referenced both the NTSC and NASA study data to establish a level for purposes of this NPRM (see proposed § 91.817(a)(1)) where MCO was successful and only evanescent waves and unheard secondary sonic booms (attenuated secondary sonic booms) existed. Based on the FaINT and NTSC datasets, FAA determined the appropriate demarcation threshold where sonic booms were sufficiently abated at the surface was at an overpressure of 0.11 psf using MCO. Consistent with the Administrator's duty to protect the public health from sonic boom, and due to the lack of integrated metric data available to determine a tolerable level of sonic boom at the surface, FAA determined the level where sonic booms were sufficiently abated by MCO was the appropriate overpressure limit to propose in this NPRM. FAA seeks comment on this noise standard to protect the public, including any supporting data for an overpressure limit other than 0.11 psf.

While FAA is proposing a standard, FAA is providing flexibility to operators regarding methods of compliance to meet the standard. The method of compliance is how the noise would be assessed (*e.g.*, measured) at the surface to ensure that sonic boom overpressure does not exceed the limit in this standard. This proposal would require FAA to approve the method of compliance, rather than mandating a method of compliance as FAA does for subsonic aircraft. This method can vary from those contained in part 36.

FAA expects to consider the following information when approving a proposed method of compliance: (1) whether data used to develop the proposed method of compliance is based on, or validated by, physical noise measurement; (2) whether the proposed method of compliance is technologically practicable and appropriate for the

aircraft to which it would apply; (3) whether the proposed method of compliance considers developments in noise measurement and other associated fields (such as research programs into quantification and control of aircraft noise); (4) whether the proposed method of compliance is based on an industry-consensus standard; and (5) whether the proposed method of compliance clearly documents all assumptions used in the development, validation, results, and limitations. These factors are similar to those factors FAA stated it would consider when approving voluntary noise consensus standards in the Modernization of Special Airworthiness Certification final rule,[38] as well as the factors FAA proposed the agency would consider when approving an unmanned aircraft system (UAS) noise consensus standard in proposed part 108.[39] These factors represent best practices when evaluating industry-developed methods of compliance. FAA has proposed a draft Advisory Circular, which will be included in the docket for this NPRM, describing collection methods that fulfill the above criteria; however, the collection methods in the draft Advisory Circular are guidance and would not be mandatory. As supersonic flight without sonic boom reaching the ground is a new operational concept, FAA expects that flight testing will be the primary method of demonstrating compliance for the first-generation of aircraft seeking to comply with the proposed standard. As the data pool grows and develops based on flight testing, applicants may develop reusable mathematical models and analyses, validated through test data, that can confidently estimate the sonic boom overpressure at the surface without the need for additional flight testing. This proposal would require that an operator make certain demonstrations of compliance to the FAA, rather than complying in an operational sense.

By prescribing sonic boom noise limits and not specific noise data collection requirements to demonstrate compliance, FAA intends to provide flexibility for the development of future collection methods that may be more novel or appropriate for

supersonic aircraft. FAA invites comments on this approach to sonic boom methods of compliance, as well as on the draft Advisory Circular. FAA also requests comment on whether any material in the draft Advisory Circular should be included in the regulation.

ii. Finding by the Administrator to Conduct Operations and Conditions and Limitations Associated with the Finding

As previously discussed, the Administrator has a duty to protect the public health from sonic booms and ensure safe operations. In addition, the technology to enable the ability to operate civil aircraft at supersonic speeds on a routine and consistent basis without sonic booms reaching the surface remains new and novel. As such, to comply with the Administrator's duty to protect the public health from sonic booms, FAA proposes in § 91.817(a)(2) that it would make a finding, after an operator demonstration, that the operation does not exceed the stated limit and the operator has a means to comply with the limit. This process ensures the operator is properly equipped and capable of consistently operating in a manner that ensures that surface sonic boom overpressure at the surface does not exceed 0.11 psf.

FAA proposes in § 91.817(a)(2) that the operator demonstrate, and FAA find, that: (1) through a method approved by FAA, surface sonic boom overpressure does not exceed 0.11 psf for primary and secondary sonic boom levels at the surface; and (2) the operator has a means to ensure sonic boom overpressure in excess of 0.11 psf does not reach the surface. This finding would remain valid as long as the operator meets the criteria that are the basis of the finding.

Using the approved methods of demonstration (see discussion in Section IV. A. i.), surface sonic booms would be measured as sound overpressure. As proposed, measurement of each of the following at the surface could not exceed an overpressure of 0.11 psf: primary sonic boom levels, secondary direct sonic boom levels, and secondary indirect sonic boom levels.

In identifying other factors appropriate as the basis of the Administrator's finding, FAA reviewed the criteria for SFA in current § 91.818 to see if any were applicable. Though not the same in context, FAA determined the concepts in § 91.818(a)(8)(iii), regarding establishing a means of compliance to reduce or eliminate the effects of sonic boom on the surface, would be helpful in evaluating a requested operation. The proposed addition of § 91.817(a)(2)(ii) is consistent with this approach. Whereas an operator's method of compliance is a showing to FAA through measurement, modeling, or other methods that the operator can achieve the conditions of the proposed noise standard in a demonstration environment, a means of compliance is how the operator intends to ensure that no overpressure over 0.11 psf reaches the surface in an operational scenario. Proposed § 91.817(a)(2)(ii) would allow an operator to propose its means of compliance with the standard in proposed § 91.817(a)(1) along the flight path on an operational basis. Means that the operator may use to comply with the proposal could be generic, as in MCO, or they could be a proprietary method developed by a stakeholder. Depending on the means of compliance, FAA would issue appropriate conditions or limitations (see proposed § 91.817(a)(3)).

FAA is considering whether to incorporate a regulatory requirement that the applicant should provide specific information to FAA regarding its means of compliance. This specific information would define the operational conditions and limitations to ensure the sonic boom overpressure does not exceed 0.11 psf. For example, if proposing to conduct MCO, the operator would need to provide information defining its weather source, the model used to predict boom propagation, and how it would ensure the airspeed during an operation would not exceed the maximum speed that supports MCO, or other controlling factors that ensure successful MCO. FAA invites comment on whether operators should be required to submit this or other information to assist the Administrator with evaluating a request to conduct supersonic flight in the U.S.

Based on FAA's knowledge of the industry and what it has heard from stakeholders, FAA anticipates operators may mitigate the impacts of sonic boom on the surface either by modifying the aircraft through on-board technology or through directions by a dispatch command center. FAA expects that initial operations under the proposed rule will be based on MCO. As described previously, MCO is a flight technique where the sonic pressure wave is refracted upward through the atmosphere away from the ground, resulting in lower intensity evanescent waves reaching the ground. To operate consistently in MCO, the operator must be able to determine the optimal speed and altitude based on the non-anomalous, atmospheric conditions along the intended route of flight during flight planning and control the speed and route of flight during operation to ensure sonic boom noise levels remain within the sonic overpressure requirement. NASA has released a model, PCBoom,[40] which is a sonic boom propagation suite of programs with a proven record of utility in predicting MCO conditions when actual atmospheric conditions are known. Flight demonstrations of MCO by NASA as a part of the FaINT study used atmospheric sounding data in the specific area of the intended flight test to provide necessary weather information.[41] When conducting MCO, an operator must account for the uncertainty in the terrain, actual weather, and atmospheric parameters that ensure MCO are achievable along the flight path. The operator may also need to monitor certain weather conditions that are observable, such as the winds in real-time along the aircraft trajectory.

The application to compute the maximum allowable speed for the route of flight and environmental conditions would need to be validated by the operator, through comparison with previously validated tools (such as PCBoom) or through specific flight testing designed to validate the model.

In the future, industry may develop aircraft that abate sonic boom to the point where only sonic boom overpressures below 0.11 psf reach the surface through aircraft

design and operating configuration management systems. An aircraft with a low-boom design, such as the previously discussed X-59 aircraft, prevent the shock waves emanating from various aircraft surfaces from coalescing to form a single overpressure wave. The atmospheric conditions also play a key role in preventing the waves from coalescing between the aircraft and the ground. The operator would likely rely on models provided by the aircraft type certificate holder, and on aircraft systems that control the aircraft surfaces in real time, to manage the development of pressure waves at the airframe. Under the existing systems and equipment regulations (*i.e.*, 14 CFR part 25 subpart F), the applicant for an airplane type certificate would demonstrate that the systems governing the flight controls perform their intended function (including the management of pressure wave generation) and do not create a hazard upon failure. The operator of such an aircraft could propose these design and operating configuration management systems as its means of compliance with the levels in proposed § 91.817(a)(2)(i). Currently, FAA and industry are building experience with these aircraft. NASA has developed the X-59 and plans to conduct flight testing over the next few years, which will further inform the specific aerodynamic design and associated onboard systems appropriate for this potential means of compliance.

In proposed § 91.817(a)(3), once established, the operator would be required to comply with FAA-issued conditions and limitations. FAA anticipates conditions and limitations would be limited to those related to meeting the operational limit in § 91.817 (a)(1) and the means of compliance in § 91.817 (a)(2)(ii). The conditions and limitations related to the means of compliance could identify the type of aircraft and include any specific equipment, parameters, instructions, or other items that are necessary to ensure the operator meets the requirements in § 91.817 (a)(1) and (2)(i). FAA does not intend that these conditions and limitations would address operation-by-operation specific items,

such as geographical limitations, or mirror those under a special flight authorization in 91.818.

FAA considered where it would be appropriate to document the conditions and limitations that would be required under proposed § 91.817(a)(3). FAA identified several alternatives for documenting the conditions and limitations, including placement in operations specifications, modification of § 21.5 to require information in the flight manual, or development of a stand-alone document. FAA invites comments on where it should place operator-specific conditions and limitations to ensure that the operator meets the requirements in § 91.817(a)(1). FAA determined that any conditions or limitations that would be necessary under this proposal can be addressed in the finding by the Administrator, including additions or changes to information in the flight manual. Therefore, changes to part 21 are not necessary.

FAA is also considering whether to limit FAA's review for en route noise certification purposes to approval by the Administrator of the method of compliance (e.g. flight demonstration or model-based evaluation) used to demonstrate the ability to comply with the 0.11 psf limit. Any potential conditions and limitations issued by the Administrator would only pertain to the approved method of compliance. FAA invites comments on whether FAA review should be limited to the method of compliance and whether potential conditions and limitations should pertain only to the method of compliance, rather than the operation of the aircraft.

iii. Section-by-Section Analysis for § 91.817(a) and § 91.817(b)

For these reasons, FAA proposes the following amendments.

Section § 91.817 is currently titled "Civil aircraft sonic boom." FAA proposes to retitle this section "Civil supersonic flight" to capture the new regulation proposed in this NPRM accurately.

Current § 91.817 prohibits operation of a civil aircraft in the U.S. at a true flight Mach number greater than 1 except in compliance with conditions and limitations in an authorization to exceed Mach 1 issued to the operator in accordance with § 91.818. Proposed § 91.817 would create new paragraphs enabling civil supersonic flight. Under the proposed rule, no person may operate a civil aircraft in the U.S. at a true flight Mach number greater than 1 unless they meet the conditions in proposed §§ 91.817(a), 91.817(c), or 91.818. Section 91.817(a)(1) proposes that, to operate an aircraft at a true flight Mach number greater than 1, sonic boom overpressure at the surface must not exceed 0.11 psf. Proposed § 91.817(a)(2) would require the operator of the aircraft to demonstrate and the Administrator to make a finding prior to operation at a true flight Mach number greater than 1. Proposed § 91.817(a)(3) would require the aircraft be operated in compliance with any conditions and limitations to ensure compliance with proposed paragraph (a)(1) and (2)(ii).

Proposed § 91.817(a)(2) contains the items the operator must demonstrate before the Administrator can issue a finding.

Proposed § 91.817(a)(2)(i) would require the operator demonstrate through measurement, modeling, or other methods approved by FAA, that sonic boom overpressure does not exceed 0.11 psf from primary or secondary sonic booms.

In proposed § 91.817(a)(2)(ii), the operator would be required to have a means of ensuring sonic boom overpressure at the surface does not exceed 0.11 psf.

FAA would only issue a finding after the operator demonstrates that each of the criterion in proposed § 91.817(a)(2) is met.

B. Supersonic Flight to or From an Airport in the U.S.

After initially prohibiting supersonic flight in the U.S. in 1973, except via SFAs, FAA realized areas along the coast were still being impacted by sonic booms. This was because the sonic booms were being caused by flights that had originated outside of the

U.S. and not yet arrived in the U.S. territorial waters.[42] Research by NASA would term this phenomena "secondary sonic boom."[43] In response, in 1978, FAA promulgated current § 91.817(b) to prevent secondary sonic booms from Concorde reaching the shores of the U.S. when Concorde was flying to and from U.S. airports.[44] This effectively expanded the geographic area around the U.S. where supersonic flight was prohibited in response to the Administrator's statutory responsibility to protect the public health from sonic boom. FAA did provide exceptions to this requirement in current § 91.817(b) for operations of civil aircraft where (1) the flight crew has information available that ensures sonic booms do not reach the surface in the U.S. and they comply with those limitations, or (2) the operator complies with conditions and limitations in an SFA. The proposed rule would retain these exceptions. These exceptions ensure that in situations where a sonic boom would reach the surface, it would do so either outside the U.S. or in an area specifically authorized by FAA through an SFA.

As operations authorized under proposed § 91.817(a) would prevent a sonic boom overpressure in excess of 0.11 psf from reaching the surface of the U.S., the operations would be consistent with the original intent and purpose of the exceptions in the 1978 regulation. For this reason, FAA proposes to add an additional exception to the exceptions in current § 91.817(b) to permit civil supersonic flight operations to or from an airport in the U.S. when authorized by the Administrator under proposed § 91.817(a).

For these reasons, FAA proposes the following amendments.

FAA proposes current § 91.817(b) be revised and relocated to § 91.817(c). FAA proposes to add a new § 91.817(c)(1) to permit operations in accordance with proposed § 91.817(a). FAA proposes to revise §§ 91.817(b)(1) and (b)(2) and relocate the provisions to new §§ 91.817(c)(2) and (c)(3). Current § 91.817(b)(1) requires that information available to the flight crew include the flight limitations that ensure flights entering or leaving the U.S. will not cause a sonic boom to reach the surface in the U.S.

Current § 91.817(b)(2) requires, in part, that the operator complies with those flight limitations. These requirements would be relocated as new § 91.817(c)(2). Current § 91.817(b)(2) alternatively allows an operator to comply with conditions and limitations under an SFA. FAA proposes to relocate that portion of current § 91.817(b)(2) as new § 91.817(c)(3). This would maintain the exception for an operation to or from an airport in the U.S. that is in compliance with conditions and limitations in an SFA. These proposed changes would provide three avenues through which operators could operate civil supersonic flight to or from an airport in the U.S.

C. Special flight authorization to exceed Mach 1 and produce sonic booms that may reach the surface of the U.S.

FAA maintains there may be times when it is in the public interest for civil aircraft to produce a sonic boom that may reach the surface of the U.S. in controlled environments, for example when developing aircraft and demonstrating compliance with proposed § 91.817(a). Therefore, the ability for the Administrator to evaluate and continue to permit such operations under an SFA remains necessary.

To implement these changes, FAA proposes the following amendments. Proposed § 91.817(b) would retain the exception in current § 91.817(a) allowing an operator to obtain an SFA. Specifically, this would retain the ability of the Administrator to permit operations in the U.S. at a true flight Mach number greater than 1 as an alternative to the requirements in proposed paragraph § 91.817(a), through an SFA issued under § 91.818. Proposed § 91.817(b) is substantially the same as the current § 91.817(a), however, it has been rephrased to capture the enabling nature of the proposed § 91.817 and revised to account for the proposed § 91.817(a).

FAA proposes conforming amendments to § 91.818. Current § 91.818 contains the SFA process and is titled “Special flight authorization to exceed Mach 1.” FAA proposes to revise the introductory language for clarity and to account for the

authorization to conduct operations at a true flight Mach number greater than 1 in proposed § 91.817(a) or (c)(2). In addition, current § 91.818(a)(8)(v) references the limits for operation in current § 91.817(b), which permits supersonic operations under the conditions and limitations of an SFA. As FAA is proposing to relocate current § 91.817(b) to § 91.817(c), FAA proposes to revise § 91.818(a)(8)(v) to reference § 91.817(c) instead of § 91.817(b) accordingly.

D. Definitions of Sonic Boom

Key to the scope of this rule is how a sonic boom is created and the characteristics of that sonic boom. Any aircraft that moves through the atmosphere at speeds exceeding the local speed of sound (Mach 1) creates a system of nearly instantaneous (about 3-6 milliseconds of rise time) pressure changes known as shock waves along the length of the aircraft. The system of individual shock waves due to aircraft features propagates through the atmosphere shifting in space over a long-distance, typically coalescing into two compressions, one at the nose and one at the tail, that form a sonic boom. When the energy from the shockwave reaches our ears, it is heard as the loud crack, or thunder-like, sonic boom.[45] Certain flight maneuvers, such as accelerating an aircraft to speeds above Mach 1 and conducting other maneuvers such as steep turns and push-overs, can result in louder sound events that are known as "focus booms". These focus booms are transient, brief events. FAA is not proposing to regulate focus boom in this NPRM, as these booms are limited in area and duration. In addition, during civil operations, flight planning (*e.g.*, milder maneuvers and controlled acceleration and deceleration) can be utilized to manage focus boom. Upon reaching speeds greater than Mach 1, the aircraft produces a sonic boom that radiates from the aircraft. A sonic boom that travels directly to the surface is termed as a primary sonic boom. This sonic boom is less intense than a focus sonic boom but continues for the duration of the time the aircraft is flying greater than Mach 1, including the duration of the en route phase of flight.

When an aircraft is producing a primary sonic boom, depending on the atmospheric conditions, that aircraft may also produce secondary sonic booms. Secondary sonic booms are the result of primary sonic booms reflecting off the surface reaching the upper atmosphere and returning to the surface, or refracting off the upper atmosphere and then reaching the surface. Secondary sonic booms are generally significantly quieter than focus and primary sonic booms, but travel over much longer distances. They may be difficult to notice outdoors, but can manifest indoors as vibrations.[46] The two types of secondary sonic booms are direct and indirect, which identify based on a single ("over the top" reflecting from the upper atmosphere) or double (initially reflecting from surface and then refracted by the upper atmosphere) reflection path, respectively.

FAA proposes to amend § 1.1, General definitions, to add definitions related to sonic boom. Specifically, FAA proposes to define "sonic boom" as the acoustic event, notably on the earth's surface, that is a manifestation of the shock wave system generated by an aircraft when it flies at a speed greater than the local speed of sound. This is the accepted definition of sonic boom established by the ICAO acoustics panel of noise experts while aiding the Air Navigation Bureau (ANB) with developing an ICAO circular.[47] In this circular, ICAO defines sonic boom and prescribes how it may be abated by flight operations to avoid land and population impacts. FAA proposes to add a final sentence to the ICAO ANB definition: "Its resulting surface impacts have been labelled as primary or secondary sonic boom(s)." For purposes of this proposed rule, sonic boom would include both types of sonic boom, primary and secondary, as well as both types of secondary boom, direct and indirect. Both are consequences of supersonic flight and both may reach the surface, though in different ways. FAA considers both primary sonic booms and secondary sonic booms harmful if they reach the surface.[48] FAA also proposes to define both primary and secondary sonic booms in § 1.1.

FAA proposes to define "primary sonic boom" as the sonic boom which travels directly down from the supersonic aircraft to the surface. This definition was established by NASA in its compendium of sonic boom research based on scientific observations of primary sonic booms.[49]

FAA proposes to define "secondary sonic boom" as the sonic boom that is refracted or reflected in certain atmospheric conditions to travel further from the source of the original boom and may eventually reach the surface. Secondary sonic booms are identified as either: Direct secondary that travels upward from the aircraft and refracts through the upper atmosphere down to the surface, or Indirect secondary that travels down to the surface after both (1) reflecting from the surface or refracting upward due to parameters being met (e.g. MCO conditions); and (2) refracting downward through the upper atmosphere to the surface. This definition is adopted from the definition NTSC established in its 1980 study of Concorde flights off the coast of New England.[50]

V. Regulatory Notices and Analyses

A. Regulatory Impact Analysis

E.O. 12866 ("Regulatory Planning and Review") and E.O. 13563 ("Improving Regulation and Regulatory Review") require agencies to regulate in the "most cost-effective manner," to make a "reasoned determination that the benefits of the intended regulation justify its costs," and to develop regulations that "impose the least burden on society."

The Office of Management and Budget has determined this proposed rulemaking is a significant regulatory action as defined in § (3)(f) of E.O. 12866. E.O. 14192 ("Unleashing Prosperity through Deregulation") instructs agencies to "alleviate unnecessary regulatory burdens." FAA expects this rule, if finalized as proposed, to be an E.O. 14192 deregulatory action. This section provides FAA's analysis of the regulatory impact of the proposed rule.

i. Need for Regulatory Action

The proposed rule would repeal the prohibition on civil supersonic flight and establish an interim noise-based certification standard for sonic boom to allow for supersonic flight over the U.S. without the need for a Special Flight Authorization (SFA). This action also addresses the direction in E.O. 14304, "Leading the World in Supersonic Flight." The proposed rule would facilitate the development of new supersonic aircraft, new system technology, and enable future rulemakings to further expand the supersonic industry.

ii. Baseline for the Analysis

The baseline for the analysis comprises the existing regulatory framework for conducting civil supersonic flight operations over the U.S., including the affected entities and operations under this framework. While civil supersonic flight over the U.S. is prohibited, manufacturers or operators may apply for an SFA that authorizes a limited number of supersonic flights within an isolated test area for limited purposes and allows sonic booms to reach the surface. Only four SFAs have been issued to date. These authorizations were issued to: Scaled Composites for Spaceship One (2003); Gulfstream Aerospace Model 650 (2010); Boom Supersonic XB-1 demonstrator (2024); and Hermeus for the Supersonic Quarterhorse Mark 2.1 unmanned aircraft system (2026).

Currently, two manufacturers are actively developing civil supersonic aircraft for passenger carrying operations in the NAS. Under this proposed rule, these manufacturers would continue to use the existing SFA process to conduct flight tests; therefore, the cost of these SFAs are excluded from this analysis. In addition, FAA anticipates five operators will apply for an SFA to operate supersonic aircraft within the analysis period. Because FAA limits SFAs to a specific operational area and a set number of flights, FAA assumes each SFA remains valid for no more than one year. Consequently, FAA assumes that

each operator would apply for a new SFA annually. Table 1 displays the affected entities and new SFA applications in the analysis period.

Table 1. Affected Entities and New SFA Applications

Year	Operators	SFA Applications
1	0	0
2	0	0
3	5	5
4	5	5
5	5	5
Total		**15**

FAA uses a 5-year analysis period for this preliminary Regulatory Impact Analysis. FAA determined that a shorter analysis period is appropriate for this proposed rule because civil supersonic flight is still an emerging technology and may evolve in a manner different from current expectations. This timeframe also accounts for the time it will take for FAA to set final LTO standards that will allow supersonic aircraft to operate from U.S. airports.

iii. Benefits

There is currently a prohibition on civil supersonic flights in the U.S., and no aircraft can operate at speeds exceeding Mach 1 unless the aircraft operator obtains an SFA. The proposed rule would remove this prohibition and implement an interim en route noise certification standard, thereby supporting the development of the next generation of supersonic flight while safeguarding the public from the adverse impacts of sonic booms.

The repeal of the prohibition and defining interim noise standards would allow the commercial supersonic aircraft industry to innovate and promote economic viability by providing growth opportunities for the domestic aviation sector. Repeal of the prohibition establishes the necessary regulatory framework to enable the development of civil

supersonic aircraft, paving the way for the public to benefit eventually from significantly reduced travel times and more efficient global connectivity.

iv. Costs

The proposed rule would result in some regulatory costs and cost savings for FAA and industry. FAA anticipates costs to demonstrate compliance with the proposed rule's noise requirements, including means of compliance costs and the incremental flight testing costs. FAA expects the proposed rule to generate administrative cost savings because operators would no longer need to apply for an SFA; instead, they will request a less burdensome, one-time authorization from the Administrator.

Means of Compliance Costs

FAA anticipates manufactures would incur costs to develop technology and flight techniques (*e.g.*, MCO) to ensure a sonic boom overpressure in excess of 0.11 psf does not reach the surface during civil aircraft operations. The proposed rule would not require specific technology or techniques but instead would provide manufacturers with flexibility to develop or continue developing their own means to comply. FAA expects that this flexibility would lead manufacturers to choose the most cost-effective solution. Given the new and novel nature of MCO and other sonic boom abatement techniques and technology, FAA does not have data on the costs to implement MCO or other sonic abatement techniques and accompanying technologies and thus is unable to estimate these costs.

FAA requests comment and supporting data on the assumption that manufacturers would choose the most cost-effective means of compliance, as well as on costs to develop MCO and other means of compliance to ensure sonic booms do not reach the surface.

Testing Costs

FAA expects operators seeking to operate within the analysis period would need to use flight testing as a part of the process to obtain authorization from the

Administrator. However, these operators are not expected to incur flight testing costs above those already required to obtain a flight authorization. In addition, as the inventory of sufficiently robust data increases, FAA expects other ways to demonstrate compliance, including modeling and other methods that do not incur flight testing costs, to be sufficient. To conduct this testing, operators would use a method (*e.g.* microphones) to conduct acoustic data acquisition that assesses the sound level set forth in proposed § 91.817(a)(1). FAA assumes five operators would seek to operate civil supersonic aircraft in the U.S., and they would be required to demonstrate the method and means of compliance proposed in § 91.817(a)(2). FAA does not have flight testing cost data specific to measuring a sonic boom.[51] FAA seeks public comment on the costs of data collection and the assumption of no additional flight testing costs.

Cost Savings

FAA expects administrative cost savings for industry and FAA by replacing the yearly process for applying for an SFA with an authorization from the Administrator to conduct civil supersonic flights. The following analysis compares the baseline costs where operators would need to submit an SFA application against the proposed rule's costs in which operators would apply for a one-time authorization.

Currently, FAA estimates that each SFA application costs an operator $110,928 in administrative costs annually.[52] Over the five-year period of analysis, an operator would submit three applications, resulting in a per operator cost of $332,784 and a total industry cost of $1,663,920. The proposed rule would replace this recurring cost for operators with a one-time administrative cost per aircraft type. FAA estimates that an operator would spend 200 hours[53] requesting the one-time authorization. Based on a 2024 fully loaded wage rate of $96.28 per hour for an aerospace engineer ($67.88 per hour base wage[54] plus 1.42 overhead factor),[55] the one-time administrative cost would be $19,257 per operator, or $96,284 for the industry. FAA based the 200-hour estimate for the noise compliance

reports in proposed § 91.817 on historical data from similar subsonic aircraft noise compliance reports under part 36.

FAA currently incurs an administrative cost of $58,973 for each SFA.[56] Based on the 15 SFAs projected during the analysis period, total FAA processing costs are estimated to be $884,595. The proposed rule would reduce this burden by requiring only one initial authorization per operator per aircraft type. Under the proposed rule, FAA expects that an FAA engineer would process the initial flight authorizations for all five operators. For an FAA engineer (J Pay Band), the base wage is $59.56 per hour.[57] With overhead costs of 36.25 percent added,[58] the total salary is $81.15 per hour.[59] With each application estimated to take 80 hours[60] to process, the cost to the FAA per operator to process each authorization would be $6,492. Therefore, FAA estimates the Agency to incur $32,460 in administrative costs under the proposed rule.

The baseline costs are $1.66 million to industry and $0.88 million to FAA, for a total of $2.55 million. Under the proposed rule, the costs would decrease to $96,284 and $32,460, respectively, for a total of $128,744. Therefore, FAA estimates that the proposed rule would result in cost savings to industry and FAA of $2,419,771 in the analysis period. Table 2 displays the baseline and proposed rule's cost estimates, and Table 3 displays the industry and FAA cost savings.

Table 2. Baseline and Proposed Rule Administrative Costs

Year	Baseline Costs				Proposed Rule Costs			
	SFAs	Industry Costs	FAA Costs	**Total**	Operator Authorizations	Industry Costs	FAA Costs	**Total**
1	0	$0	$0	**$0**	0	$0	$0	**$0**
2	0	$0	$0	**$0**	0	$0	$0	**$0**
3	5	$554,640	$294,865	**$849,505**	5	$96,284	$32,460	**$128,744**
4	5	$554,640	$294,865	**$849,505**	0	$0	$0	**$0**
5	5	$554,640	$294,865	**$849,505**	0	$0	$0	**$0**
Total	**15**	**$1,663,920**	**$884,595**	**$2,548,515**	**5**	**$96,284**	**$32,460**	**$128,744**

Table 3. Administrative Cost Savings

Year	Industry Cost Savings	FAA Cost Savings	Total Cost Savings
1	$0	$0	$0
2	$0	$0	$0
3	$458,356	$262,405	$720,761
4	$554,640	$294,865	$849,505
5	$554,640	$294,865	$849,505
Total	**$1,567,636**	**$852,135**	**$2,419,771**

v. Summary

The proposed rule would remove the current barrier to developing the next generation of supersonic aircraft by establishing an interim noise standard. Benefits from the proposed rule include providing regulatory certainty that will encourage the advancement of new supersonic aircraft and technology. The proposed rule would also result in means of compliance and flight-testing costs that FAA cannot estimate due to a lack of data and uncertainty. However, FAA expects the incremental increase in these costs to be minimal as most compliance costs are already captured within the existing costs of obtaining a flight authorization. Lastly, FAA estimates undiscounted administrative cost savings of $1,567,636 for industry and $852,135 for the government, totaling $2,419,771. The proposed rule is the first step in providing regulatory certainty that would enable the supersonic industry and regular supersonic transport flights. Table 4 displays the qualitative benefits, qualitative costs, and undiscounted and discounted cost savings of the proposed rule.

Table 4. Summary Benefits and Costs (2024$)

Qualitative Benefits
• Supporting the development of supersonic flight. • Establishes the necessary framework to enable the development of civil supersonic aircraft.
Qualitative Costs
• Industry costs to demonstrate compliance, including means of compliance costs and incremental flight testing costs.
Cost Savings

	2024$	7%	3%	7%	3%
Category		**Present Value**		**Annualized**	
Industry Cost Savings	$1,567,636	$1,192,738	$1,390,688	$290,898	$303,663
FAA Cost Savings	$852,135	$649,386	$756,475	$158,379	$165,180
Total Cost Savings	**$2,419,771**	**$1,842,124**	**$2,147,163**	**$449,277**	**$468,843**

vi. Uncertainties

Due to the novel and innovative nature of the supersonic aircraft industry, FAA has noted several uncertainties that limit the ability to provide a quantitative economic impact analysis for this proposed rule. The table below summarizes the uncertainties in the analysis. FAA invites comment and requests additional information and data to consider in these areas.

Table 4. Uncertainties

Category	Uncertainty
Population and Timeframe	The number of manufacturers and operators entering the industry after the analysis period.
	The time it will take for the industry to have a functioning supersonic transport category aircraft available to the public.
Benefits	The revenue and profits of manufacturers, operators, and third-party entities in the industry.
	The routes and the number of routes; size of the aircraft, including the number of seats in an aircraft; and price per seat and other economic factors of operations.
Costs	The methods and means of complying with the noise standard. This includes the cost of instruments to read the noise levels, software, data acquisition, and noise testing.
	The administrative costs the industry will incur with compliance.

vii. Alternatives

FAA evaluated the alternative to not promulgate this proposed rule. Under this alternative FAA would work in conjunction with ICAO to set noise standards for en route supersonic transport, an effort that is currently underway.[61] FAA does not expect this ICAO effort to be complete until 2031. After the ICAO standard is established, FAA would then promulgate a proposed rule to implement these ICAO noise standards. However, this is a long-term effort and would hinder the supersonic industry's ability in

the more immediate term to be innovative. This alternative would not be appropriate to meet the needs of the industry. It would not provide for advancements in technology and development of flight techniques that prevent sonic booms from reaching the surface.

B. Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA) of 1980, Pub. L. No. 96–354, 94 Stat. 1164 (5 U.S.C. 601–612), as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (Pub. L. No. 104–121, 110 Stat. 857, Mar. 29, 1996) and the Small Business Jobs Act of 2010 (Pub. L. No. 111–240, 124 Stat. 2504 Sept. 27, 2010), requires Federal agencies to consider the effects of the regulatory action on small business and other small entities and to minimize any significant economic impact. The term "small entities" comprises small businesses and not-for-profit organizations that are independently owned and operated and are not dominant in their fields, and governmental jurisdictions with populations of less than 50,000.

Agencies must perform a review to determine whether a rule will have a significant economic impact on a substantial number of small entities. If the agency determines that it will, the agency must prepare a regulatory flexibility analysis as described in the RFA. However, if an agency determines a rule is not expected to have a significant economic impact on a substantial number of small entities, § 605(b) of the RFA provides that the head of the agency may certify and a regulatory flexibility analysis is not required. The certification must include a statement providing the factual basis for this determination with a reasoned explanation.

FAA used the definition of small entities in the RFA for this analysis. The RFA defines small entities as small businesses, small governmental jurisdictions, or small organizations. In 5 U.S.C. section 601(3), the RFA defines "small business" to have the same meaning as "small business concern" under section 3 of the Small Business Act. The Small Business Act authorizes the Small Business Administration (SBA) to define

"small business" by issuing regulations. SBA (2023) has established size standards for various types of economic activities, or industries, under the North American Industry Classification System (NAICS).

SBA defines a small scheduled passenger air carrier as any operator with 1,500 or fewer employees and a small nonscheduled passenger air carrier as any operator with 1,500 or fewer employees.[62] FAA identified five operators contemplating supersonic overland flight operability. Based on the SBA size standard and on publicly available data on employment for these entities, both operators are large businesses. Therefore, FAA certifies the proposed rule will not have a significant economic impact on a substantial number of small entities because the proposed rule does not impact a small entity. FAA solicits comment regarding this determination.

C. International Trade Impact Assessment

The Trade Agreements Act of 1979 (Pub. L. No. 96-39), as amended by the Uruguay Round Agreements Act (Pub. L. No. 103-465), prohibits Federal agencies from establishing standards or engaging in related activities that create unnecessary obstacles to the foreign commerce of the U.S. Pursuant to these Acts, the establishment of standards is not considered an unnecessary obstacle to the foreign commerce of the U.S., so long as the standard has a legitimate domestic objective, such as the protection of safety and does not operate in a manner that excludes imports that meet this objective. The statute also requires consideration of international standards and, where appropriate, that they be the basis for U.S. standards.

FAA has assessed the potential effect of this proposed rule and determined it ensures the safety of the American public and does not exclude imports that meet this objective. As a result, FAA does not consider this proposed rule as creating an unnecessary obstacle to foreign commerce.

D. Unfunded Mandates Assessment

The Unfunded Mandates Reform Act of 1995 (2 U.S.C. 1531-1538) governs the issuance of Federal regulations that require unfunded mandates. An unfunded mandate is a regulation that requires a State, local, or Tribal government or the private sector to incur direct costs without the Federal Government having first provided the funds to pay those costs. FAA determined the proposed rule would not result in the expenditure of $193,000,000 or more ($100,000,000 adjusted for inflation using the most current Implicit Price Deflator for the Gross Domestic Product) by State, local, or Tribal governments, in the aggregate, or the private sector, in any one year.

E. Paperwork Reduction Act

The Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)) requires FAA consider the impact of paperwork and other information collection burdens imposed on the public. According to the 1995 amendments to the Paperwork Reduction Act (5 CFR 1320.8(b)(2)(vi)), an agency may not collect or sponsor the collection of information, nor may it impose an information collection requirement unless it displays a currently valid Office of Management and Budget (OMB) control number.

This action contains the following proposed new information collection requirements. As required by the Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)), FAA has submitted these proposed information collection amendments to OMB for its review.

Summary: FAA is proposing to require operators seeking to operate supersonic flight overland to demonstrate a means and method of compliance that ensures sonic boom overpressure in excess of 0.11 psf does not reach the surface. Each applicant's collected information would be incorporated into a noise compliance report that is provided to and approved by FAA.

Use: The noise compliance report of test data would be used by FAA to make a compliance finding with proposed § 91.817.

Respondents (including number of): There are currently five aircraft operators contemplating authorization for supersonic overland flight operability.

Frequency: There are estimated to be five supersonic airplane authorizations to enable supersonic overland flight operability in the 3-year period of this PRA and will occur in the first year.

Annual Burden Estimate: For a private industry worker working full-time as an aerospace engineer, the 2024 base wage rate is $67.88 per hour.[63] Using an overhead factor of 1.42 makes total compensation $96.28 per hour.[64] For a single applicant spending 200 hours[65] on compliance collection at a wage of $96.28 per hour, the cost would be $19,257 per applicant.

There will be a total of five respondents for domestic projects who would report. FAA expects the respondents to report once as FAA assumes they have aircraft they will test. The cost for five applicants is $19,257 per applicant, the cumulative total is $96,284 in year three and no cost in the first two years. At a seven percent present value, the total cost is $78,596.

FAA Cost

For an FAA engineer in the J Pay Band, the base wage is $59.56 per hour.[66] With overhead costs of 36.25 percent added,[67] the total salary is $81.15 per hour.[68] Based on two requests expected in the first year, requiring 80 hours[69] per response at a wage rate of $81.15 per hour, the total government cost is estimated to be $32,460. At seven percent present value, the total government cost is $26,497. FAA based its estimate of time spent on completing the noise compliance report for proposed § 91.817 on time estimates it uses for its review of similar noise compliance reports under part 36.

FAA is soliciting comments to—

(1) Evaluate whether the proposed information requirement is necessary for the proper performance of the functions of FAA, including whether the information will have practical utility;

(2) Evaluate the accuracy of FAA's estimate of the burden;

(3) Enhance the quality, utility, and clarity of the information to be collected; and

(4) Minimize the burden of collecting information on those who are to respond, including by using appropriate automated, electronic, mechanical, or other technological collection techniques or other forms of information technology.

Individuals and organizations may send comments on the information collection requirement to the address listed in the **ADDRESSES** section at the beginning of this preamble by [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]. Comments also should be submitted to the Office of Management and Budget, Office of Information and Regulatory Affairs, Attention: Desk Officer for FAA, New Executive Office Building, Room 10202, 725 17th Street, NW, Washington, DC 20053.

F. International Compatibility

In keeping with U.S. obligations under the Convention on International Civil Aviation, it is FAA policy to conform to ICAO Standards and Recommended Practices to the maximum extent practicable. FAA has determined there are no ICAO Standards and Recommended Practices that correspond to these proposed regulations. ICAO has not issued en route standards for supersonic aircraft.

G. Environmental Analysis

The Department has analyzed the environmental impacts of this proposed rulemaking pursuant to the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 *et seq*.). FAA has determined this proposed rulemaking is categorically excluded pursuant to FAA Order 1050.1G § 1.4(f). Categorical exclusions are categories

of actions the agency has determined normally do not significantly affect the quality of the human environment and therefore do not require either an environmental assessment (EA) or environmental impact statement (EIS). See DOT Order 5610.1D § 9. In analyzing the applicability of a categorical exclusion, the agency must also consider whether extraordinary circumstances are present that would warrant the preparation of an EA or EIS.[70] This rulemaking, which as proposed would repeal the prohibition on supersonic overland flight and establish an interim noise-based (acoustical) en route sonic boom noise certification standard of no sonic boom overpressure greater that 0.11 psf reaching the surface, is categorically excluded pursuant to Appendix B-2.6(f) of FAA Order: "Regulations, standards, and exemptions (excluding those that if implemented may cause a significant impact on the human environment)." FAA does not anticipate any environmental impacts, and there are no extraordinary circumstances present in connection with this rulemaking.

H. Regulations Affecting Intrastate Aviation in Alaska

Section 1205 of FAA Reauthorization Act of 1996 (110 Stat. 3213) requires the Administrator, when modifying 14 CFR regulations in a manner affecting intrastate aviation in Alaska, to consider the extent to which Alaska is not served by transportation modes other than aviation, and to establish appropriate regulatory distinctions. Because this proposed rule would apply to civil supersonic flight throughout the U.S., it is unlikely, if adopted, to affect intrastate aviation in Alaska. FAA, therefore, specifically requests comments on whether there is justification for applying the proposed rule differently in intrastate operations in Alaska.

VI. Executive Order Determinations

A. Executive Order 13132, Federalism

FAA has analyzed this proposed rule under the principles and criteria of E.O. 13132, Federalism. FAA has determined this action would not have a substantial

direct effect on the States, or the relationship between the Federal Government and the States, or on the distribution of power and responsibilities among the various levels of government, and, therefore, would not have federalism implications.

B. Executive Order 13175, Consultation and Coordination With Indian Tribal Governments

Consistent with E.O. 13175, Consultation and Coordination with Indian Tribal Governments,[71] and FAA Order 1210.20, American Indian and Alaska Native Tribal Consultation Policy and Procedures,[72] FAA ensures Federally Recognized Tribes (Tribes) are given the opportunity to provide meaningful and timely input regarding proposed Federal actions that have the potential to affect uniquely or significantly their respective Tribes. FAA has not identified any unique or significant effects, environmental or otherwise, on Tribes resulting from this proposed rule. In accordance with the E.O. 13175 and FAA Order 1210.20, and in consideration of the requirements in 49 U.S.C. 44715 (b)(2) requiring the Administrator to consult with appropriate departments, agencies, and instrumentalities of the U.S. Government and State and interstate authorities, FAA intends to notify tribal authorities of the availability of this rulemaking for comment upon publication of this NPRM.

C. Executive Order 13211, Regulations That Significantly Affect Energy Supply, Distribution, or Use

FAA analyzed this proposed rule under E.O. 13211, Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use (May 18, 2001). FAA has determined that it would not be a "significant energy action" under the

E.O. and would not be likely to have a significant adverse effect on the supply, distribution, or use of energy.

D. Executive Order 13609, Promoting International Regulatory Cooperation

E. O. 13609, Promoting International Regulatory Cooperation, promotes international regulatory cooperation to meet shared challenges involving health, safety, labor, security, environmental, and other issues and to reduce, eliminate, or prevent unnecessary differences in regulatory requirements. FAA has analyzed this action under the policies and agency responsibilities of E.O. 13609 and has determined, given that ICAO and other civil aviation authorities have not adopted regulations for supersonic overland flight, this action would have no effect on international regulatory cooperation.

E. Executive Order 14192, Unleashing Prosperity Through Deregulation

E.O. 14192 ("Unleashing Prosperity through Deregulation") instructs agencies to "alleviate unnecessary regulatory burdens." FAA expects this proposed rule, if finalized as proposed, to be an E.O. 14192 deregulatory action.

VII. Additional Information

A. Comments Invited

FAA invites interested persons to participate in this rulemaking by submitting written comment, data, or views. FAA also invites comment relating to the economic, environmental, energy, or federalism impacts that might result from adopting the proposals in this document. FAA encourages commenters to include supporting facts, research, and evidence in their comments. When doing so, commenters are encouraged to provide citations to the published materials referenced, including active hyperlinks. Likewise, commenters who reference materials which have not been published are encouraged to upload relevant data collection instruments, data sets, and detailed findings as a part of their comment. Providing such citations and documentation will assist FAA in analyzing the comments. To ensure the docket does not contain duplicate comments,

commenters should submit only one time if comments are filed electronically, or commenters should send only one copy of written comments if comments are filed in writing.

FAA will file in the docket all comments it receives, as well as a report summarizing each substantive public contact with FAA personnel concerning this proposed rule. Before acting on this proposal, FAA will consider all comments it receives on or before the closing date for comments. FAA will consider comments filed after the comment period has closed if it is possible to do so without incurring expense or delay. FAA may change this proposal in light of the comments it receives.

B. Confidential Business Information

Confidential Business Information (CBI) is commercial or financial information that is both customarily and actually treated as private by its owner. Under the Freedom of Information Act (FOIA) (5 U.S.C. 552), CBI is exempt from public disclosure. If your comments responsive to this NPRM contain commercial or financial information that you actually and customarily treat as private, that will harm your commercial or financial interests if disclosed to the public, and that is relevant or responsive to this NPRM, it is important that you clearly designate the submitted comments as CBI. Please mark each page of your submission containing CBI as "PROPIN." FAA will treat such marked submissions as confidential under the FOIA, and they will not be placed in the public docket of this NPRM. Submissions containing CBI should be sent to the person in the **FOR FURTHER INFORMATION CONTACT** section of this document. Any commentary FAA receives which is not specifically designated as CBI will be placed in the public docket for this rulemaking.

C. Electronic Access and Filing

A copy of this NPRM, all comments received, any final rule, and all background material may be viewed online at www.regulations.gov using the docket number listed

above. Electronic retrieval help and guidelines are available on the website. It is available 24 hours each day, 365 days each year. An electronic copy of this document may also be downloaded from the Office of the Federal Register website at www.federalregister.gov and the Government Publishing Office website at www.govinfo.gov. A copy may also be found at FAA's Regulations and Policies website at www.faa.gov/regulations_policies.

Copies may also be obtained by sending a request to the Federal Aviation Administration, Office of Rulemaking, ARM-1, 800 Independence Avenue SW, Washington, DC 20591, or by calling (202) 267-9677. Commenters must identify the docket or notice number of this rulemaking.

All documents FAA considered in developing this proposed rule, including economic analyses and technical reports, may be accessed in the electronic docket for this rulemaking.

D. Small Business Regulatory Enforcement Fairness Act

The Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996 requires FAA to comply with small entity requests for information or advice about compliance with statutes and regulations within its jurisdiction. A small entity with questions regarding this document may contact its local FAA official, or the person listed under the **FOR FURTHER INFORMATION CONTACT** heading at the beginning of the preamble. To find out more about SBREFA on the Internet, visit www.faa.gov/regulations_policies/rulemaking/sbre_act/.

---

[1] Civil Aircraft Sonic Boom Final Rule, 38 FR 8051 (March 28, 1973).
[2] Executive Order 14304, "Leading the World in Supersonic Flight" (June 6, 2025).
[3] https://www3.nasa.gov/specials/Quesst/science-of-sound.html.
[4] Civil Aircraft Sonic Boom Final Rule, 38 FR 8051 (March 28, 1973).
[5] Civil Aircraft Sonic Boom NPRM, 35 FR 6189 (April 16, 1970); 38 FR 8051 (March 28, 1973).
[6] Additional reasons cited for provisions now in § 91.818 for SFAs include (1) recognize cases in which it may be in the public interest for sonic boom to reach the surface to show compliance with the airworthiness provisions of the Federal Aviation Regulations or for aircraft development; (2) allow for research and development flights necessary to determine the sonic boom characteristics of an aircraft; and (3) allow for flights to demonstrate conditions and limitations that reduce or eliminate the effect of sonic boom on the surface. In 2021, FAA added a fourth reason for an authorization to exceed Mach 1, to conduct noise

testing during supersonic flight. *Id*.; Special Flight Authorizations for Supersonic Aircraft Final Rule, 86 FR 3782, 3786 (Jan. 15, 2021).

[7] Aircraft noise limits have varied over time from Stage 1 in the 1970s to current Stage 5 certification limits. Noise limits for subsonic aircraft at the time of the 1978 rulemaking were Stage 3. FAA did not require then-current generation Concorde aircraft to meet Stage 3 limits because it was not economically reasonable or technologically practicable for them to do so. FAA's stated goal was to not certificate or permit to operate in the U.S. a supersonic airplane that did not meet the standards applicable to subsonic airplanes at the time of certification. However, if it was not technologically feasible to produce such an airplane, FAA considered Stage 2 the minimum level of stringency that was acceptable. Civil Supersonic Airplanes Final Rule, 43 FR 28406, 28414 (June 29, 1978).

[8] Civil Supersonic Airplanes Supplemental NPRM, 42 FR 55176, 55181-55182 (Oct. 13, 1977).

[9] Additional information on the regulatory history of § 91.817(b) is available in the FAA legal interpretation "Supersonic Aircraft Operations in the United States" (Feb. 29, 2016) available in the docket.

[10] 43 FR at 28414 (June 29, 1978).

[11] Noise Standards; Civil Supersonic Aircraft Noise Type Certification Standards and Operating Rules ANPRM, 51 FR 39663 (Oct. 30, 1986).

[12] Civil Supersonic Aircraft Noise Type Certification Standards and Operating Rules NPRM, 55 FR 22020 (May 30, 1990). While the 1990 NPRM used phrase "noise standards" rather than "landing and takeoff noise standards," FAA only directly regulates subsonic noise standards during the landing and takeoff phases of flight. The distinction is made in this proposal for clarity and to differentiate between LTO noise standards and the sonic boom noise standards proposed by this NPRM.

[13] Civil Supersonic Aircraft Noise Type Certification Standards and Operating Rules Withdrawal of NPRM, 59 FR 39711 (Aug. 4, 1994).

[14] Civil Supersonic Aircraft Noise Type Certification Standards and Operating Rules Statement of Policy, 59 FR 39679 (Aug. 4, 1994).

[15] A "Stage" is a 14 CFR part 36 designation of an airplane that reflects a stringency (noise limit reductions) change of U.S. noise certification standards for large transport jet airplanes. Such amendments are intended to lower the noise compliance limits for the flyover, lateral, and approach conditions based on advances of noise reduction technology. Stage 4 airplanes must comply with part 36, Amendment 36-26. See Stage 4 Aircraft Noise Standards Final Rule, 70 FR 38742 (July 5, 2005).

[16] At the time of issuance of this policy statement, Stage 4 noise limits were the limits required for certification of new transport category turbojet airplanes. Newly certificated transport category turbojet airplanes are now required to comply with Stage 5 noise limits. See 14 CFR 36.103 (d) and (e).

[17] 73 FR 62871 (Oct. 22, 2008).

[18] Pub. L. No. 115-254 (Oct. 5, 2018).

[19] Section 1110 of the FAA Reauthorization Act of 2024 (Pub. L. No. 118-63) reiterated this leadership role and renewed the requirement that FAA report on efforts undertaken to fulfill this requirement.

[20] Special Flight Authorizations for Supersonic Aircraft Final Rule, 86 FR 3782 (January 15, 2021).

[21] Noise Certification of Supersonic Airplanes NPRM, 85 FR 20431 (April 11, 2020).

[22] "Boom Supersonic Announces Boomless Cruise" (Feb. 10, 2025), available at https://boomsupersonic.com/press-release/boom-supersonic-announces-boomless-cruise .

[23] Mach Cutoff Analysis and Results from NASA's Farfield Investigation of No-Boom Thresholds; NASA Armstrong Flight Research Center (May 30, 2016), available at https://ntrs.nasa.gov/api/citations/20160007348/downloads/20160007348.pdf.

[24] FAA met with six original equipment manufacturers (Boom Supersonic, Pivotal SST, Gulfstream, Spike SST, Boeing, and Hermeus) and two trade associations (General Aviation Manufacturers Association and Aerospace Industries Association). Listening sessions were held in accordance with DOT Memorandum "Guidance on Communication with Parties outside of the Federal Executive Branch (Ex Parte Communications)" dated April 19, 2022 (https://www.transportation.gov/regulations/guidance-ex-parte-communications), and DOT Order 2100.6B, "Policies and Procedures for Rulemakings" (https://www.transportation.gov/regulations/dot-order-21006b-policies-and-procedures-rulemakings).

[25] Pub. L. No. 115-254 (Oct. 5, 2018).

[26] FAA has not received any requests to-date for a rule of particular applicability (RPA) under §181(f); however, FAA expects to follow a similar evaluation process as the RPA process FAA has used for UAS. See "Noise Certification Standards: Matternet Model M2 Aircraft" 87 FR 19639 (Sept. 12, 2022) for an example of an RPA issued for a UAS.

[27] https://www.nasa.gov/mission/quesst/.

[28] 85 FR 20431 (April 13, 2020).

[29] https://www.icao.int/supersonic-aircraft-noise-standards-development and https://www.icao.int/sites/default/files/sp-files/environmental-protection/Documents/EnvironmentReport-2010/ICAO-ENV-Report-2022-F4.pdf.
[30] https://www.icao.int/environmental-protection/Pages/envrep2025.aspx.
[31] "Acoustical Model of Mach Cut-Off", Project 042, ASCENT Centers of Excellence, https://ascent.aero/project/acoustical-model-of-mach-cut-off/.
[32] https://www.nasa.gov/mission/quesst.
[33] "Boom Supersonic Partners with Nasa to Capture Iconic Image of Civil Supersonic Flight"; https://boomsupersonic.com/press-release/boom-supersonic-partners-with-nasa-to-capture-iconic-image-of-civil-supersonic-flight (March 3, 2025).
[34] Though this proposal would require no sonic boom overpressure greater than 0.11 psf to reach the surface, FAA does not expect these flights to be completely silent. Supersonic aircraft will likely produce engine noise comparable to subsonic aircraft, as well as non-sonic boom noise associated with supersonic flight. See the discussion in Section III. D. regarding evanescent waves.
[35] Civil Supersonic Airplanes Final Rule, 42 FR 28406 (June 29, 1978).
[36] Cliatt, Hill, Hearing, "Mach Cutoff Analysis and Results from NASA's Farfield Investigation of No - boom Thresholds" AIAA 2016-3011.
[37] Edward J. Rickley and Allan D. Pierce, "Detection and assessment of secondary sonic booms in New England," Report No. FAA-AEE-80-22 (May 1980) by. Another study expanded on the terminology from the NTSC study and changed the terminology from "Type 1" and "Type 2" secondary sonic booms to secondary "direct" sonic boom and secondary "indirect" sonic boom, respectively: K. Kaouri, D. Allwright, L. Dallois: "Secondary sonic boom in a stratified atmosphere and related issues," 10th Intl. Symp. On Long Range Sound Propagation, Grenoble, France, NCPA Report No. JC 1003-01 (2002).
[38] Modernization of Special Airworthiness Certification Final Rule, 90 FR 35034 (July 24, 2025).
[39] Normalizing Unmanned Aircraft Systems Beyond Visual Line of Sight Operations, 90 FR 38316 (Aug. 7, 2025).
[40] PCBoom 7 Technical Reference, 2nd Edition, NASA/TM–20250003228 (August 2025).
[41] Mach Cutoff Analysis and Results from NASA's Farfield Investigation of No-Boom Thresholds, by Larry J. Cliatt II, Michael A. Hill, & Edward A Haering, Hr., NASA Armstrong Flight Research Center (May 30, 2016).
[42] 49 U.S.C. 40101.
[43] Detection and assessment of secondary sonic booms in New England, Report No. FAA-AEE-80-22, May 1980-05-01, by Edward J. Rickley and Allan D. Pierce.
[44] 43 FR 28419.
[45] https://www3.nasa.gov/specials/Quesst/science-of-sound.html.
[46] Maglieri, Bobbitt, Plotkin, Shepard, Coen, Richwine, "Sonic Boom, Six Decades of Research," NASA SP 2014-622, Chap. 1, page 19.
[47] ICAO Circular 126, "Guidance for SST Aircraft Operations" (1975).
[48] FAA has acknowledged in a previous rulemaking that secondary sonic booms could reach the surface of the U.S. and that protection from secondary sonic booms similar to protection from primary sonic booms was needed. FAA proposed the current requirement in § 91.817(b) that flight crews have information that ensures sonic booms from flights outside the U.S. will not reach the surface of the U.S. following reports of sonic boom noise from aircraft outside U.S. territorial waters reaching coastal areas. In that NPRM, FAA stated that protection like the prohibition on supersonic overland flight in § 91.817(a) was needed to protect these areas from aircraft beyond U.S. territorial waters. (42 FR 55176, 55181, Oct. 13, 1977). The 1980 NTSC study subsequently identified sounds like those discussed in the NPRM and termed them secondary sonic booms.
[49] Maglieri, Bobbitt, Plotkin, Shepard, Coen, Richwine, "Sonic Boom, Six Decades of Research," NASA SP 2014-622.
[50] Edward J. Rickley and Allan D. Pierce, "Detection and assessment of secondary sonic booms in New England," Report No. FAA-AEE-80-22 (May 1980)- by.
[51] FAA estimates the cost of transport category airplanes under part 36 to be between $1.21 million and $3.64 million in 2024 dollars (See: GAO Report to Congressional Committees: Aircraft Noise – Information on a Potential Mandated Transition to Quieter Airplanes (2020), available at https://www.gao.gov/assets/710/708979.pdf). Operators seeking to test a civil supersonic aircraft would incur these flight testing costs. However, these costs would be incurred as part of transport category flight testing and are not directly attributable to the proposed rule.
[52] FAA estimates that 6 applicant employees (level 1 and 2 technical project managers; level 1 and 5 engineers; and level 2 and 5 environmental engineers/scientists) spend 540 cumulative hours to apply for an SFA. FAA estimated the total SFA application burden using a weighted average wage of $144.21 per

employee and a fringe benefit factor of 1.42 (See: Employer Costs for Employee Compensation—December 2024. https://www.bls.gov/news.release/archives/ecec_03142025.htm).
[53] The 200 hours estimate obtained from the Supporting Statement in the Noise Certification Standards for Subsonic Jet Airplanes and Subsonic Transport Category Large Airplanes Information Collection Review (OMB 2120-0659). https://www.reginfo.gov/public/do/DownloadDocument?objectID=139394001.
[54] Bureau of Labor Statistics (BLS), "Employer Costs for Employee Compensation—May 2024," Employee costs for private industry workers in Series: 17-2011 Aerospace Engineers, available at https://data.bls.gov/oes/#/industry/000000.
[55] The 1.42 multiplier has been rounded up from 1.4184. The total wage includes BLS compensation data. For 2024, BLS estimates that wages are 70.5 percent total compensation while benefits are 29.5 percent. Employer Costs for Employee Compensation—December 2024, available at https://www.bls.gov/news.release/archives/ecec_03142025.htm.
[56] FAA estimates that seven Washington, DC-based employees (a J-band and K-band technical project manager; a J-band and K-band program analyst; a J-band and K-band environmental engineer/scientist; and a K-band attorney) spend 520 cumulative hours processing an SFA application. FAA estimated the total SFA processing burden using a weighted average wage of $83.24 and a fringe benefit factor of 1.3625 (See: Update to Civilian Position Full Fringe Benefit Cost Factor, Federal Pay Raise Assumptions, and Inflation Factors used in OMB Circular No. A-76, "Performance of Commercial Activities," Office of Management and Budget, March 11, 2008, https://www.whitehouse.gov/wp-content/uploads/legacy_drupal_files/omb/memoranda/2008/m08-13.pdf).
[57] FAA Technical Pay Band J with Washington DC locality; effective Jan. 2024, minimum salary $123,884.
[58] Update to Civilian Position Full Fringe Benefit Cost Factor, Federal Pay Raise Assumptions, and Inflation Factors used in OMB Circular No. A-76, "Performance of Commercial Activities,", Office of Management and Budget, March 11, 2008, https://www.whitehouse.gov/wp-content/uploads/legacy_drupal_files/omb/memoranda/2008/m08-13.pdf.
[59] The total loaded salary of $168,792 is divided by 2,080 hours to get the $81.15 hourly wage. 2024 FAA Core Compensation Plan Pay Bands.
[60] The 80 hours estimate obtained from the Supporting Statement in the Noise Certification Standards for Subsonic Jet Airplanes and Subsonic Transport Category Large Airplanes Information Collection Review (OMB 2120-0659). https://www.reginfo.gov/public/do/DownloadDocument?objectID=139394001.
[61] See ICAO Environmental Report 2025.
[62] 13 CFR 121.201.
[63] Employer Costs for Employee Compensation—May 2024, BLS. Employee costs for private industry workers in Series: 17-2011 Aerospace Engineers, available at https://data.bls.gov/oes/#/industry/000000.
[64] The 1.42 multiplier has been rounded up from 1.4184. The total wage includes BLS compensation data. For 2024, BLS estimates wages are 70.5 percent total compensation while benefits are 29.5 percent. Employer Costs for Employee Compensation—December 2024. https://www.bls.gov/news.release/archives/ecec_03142025.htm
[65] The 200 hours estimate obtained from the Supporting Statement in the Noise Certification Standards for Subsonic Jet Airplanes and Subsonic Transport Category Large Airplanes Information Collection Review (OMB 2120-0659), available at https://www.reginfo.gov/public/do/DownloadDocument?objectID=139394001.
[66] FAA Technical Pay Band, J Band with Washington DC locality; effective Jan. 2024, minimum salary $123,884.
[67] Update to Civilian Position Full Fringe Benefit Cost Factor, Federal Pay Raise Assumptions, and Inflation Factors used in OMB Circular No. A-76, "Performance of Commercial Activities," Office of Management and Budget, March 11, 2008, https://www.whitehouse.gov/wp-content/uploads/legacy_drupal_files/omb/memoranda/2008/m08-13.pdf.
[68] The total loaded salary of $168,792 is divided by 2,080 hours to get the $81.15 hourly wage. 2024 FAA Core Compensation Plan Pay Bands.
[69] The 80 hours estimate obtained from the Supporting Statement in the Noise Certification Standards for Subsonic Jet Airplanes and Subsonic Transport Category Large Airplanes Information Collection Review (OMB 2120-0659), available at https://www.reginfo.gov/public/do/DownloadDocument?objectID=139394001.
[70] DOT Order 5610.1D § 9(b).
[71] 65 FR 67249 (Nov. 6, 2000).
[72] FAA Order No. 1210.20 (Jan.28, 2004), available at www.faa.gov/documentLibrary/media/1210.pdf.

List of Subjects

14 CFR Part 1

Air transportation.

14 CFR Part 91

Afghanistan, Agriculture, Air carriers, Air taxis, Air traffic control, Aircraft, Airmen, Airports, Alaska, Aviation safety, Canada, Charter flights, Cuba, Drug traffic control, Ethiopia, Freight, Iran, Iraq, Libya, Mexico, Noise control, North Korea, Political candidates, Reporting and recordkeeping requirements, Security measures, Somalia, Syria, Transportation, Yemen, Yugoslavia.

The Proposed Amendment

For the reasons discussed in the preamble, the Federal Aviation Administration proposes to amend chapter I of title 14, Code of Federal Regulations as follows:

PART 1— DEFINITIONS AND ABBREVIATIONS

1. The authority citation for part 1 continues to read as follows:

Authority: 49 U.S.C. 106(f), 40113, 44701.

2. In § 1.1, add the definitions “Primary sonic boom,” “Secondary sonic boom,” and “Sonic boom” in alphabetical order to read as follows:

§ 1.1 General definitions.

* * * * *

Primary sonic boom is the sonic boom that travels directly down from the supersonic aircraft to the surface.

* * * * *

Secondary sonic boom is the sonic boom that is refracted or reflected in certain atmospheric conditions to travel farther and may eventually reach the surface. Secondary sonic booms are identified as either direct or indirect. Direct secondary sonic boom travels upward from the aircraft and refracts through the upper atmosphere down to the

surface. Indirect secondary sonic boom travels down from the aircraft to the surface; (1) either reflecting from the surface or refracting upward due to atmospheric parameters being met; and (2) refracting downward through the upper atmosphere back to the surface.

* * * * *

Sonic boom is the acoustic event on the earth's surface that is a manifestation of the shock wave system generated by an aircraft when it flies at a speed greater than the local speed of sound. Its resulting surface impacts have been studied and labelled as primary or secondary sonic boom(s).

* * * * *

PART 91— GENERAL OPERATING AND FLIGHT RULES

3. The authority citation for part 91 continues to read as follows:

Authority: 49 U.S.C. 106(f), 40101, 40103, 40105, 40113, 40120, 44101, 44111, 44701, 44704, 44709, 44711, 44712, 44715, 44716, 44717, 44722, 46306, 46315, 46316, 46504, 46506-46507, 47122, 47508, 47528-47531, 47534; Pub. L. No. 114-190, 130 Stat. 615 (49 U.S.C. 44703 note); Sec. 828 of Pub. L. No. 118-63, 138 Stat. 1330 (49 U.S.C. 44703 note); articles 12 and 29 of the Convention on International Civil Aviation (61 Stat. 1180), (126 Stat. 11).

4. Revise and republish § 91.817 to read as follows:

§ 91.817 Civil Supersonic Flight.

(a) No person shall operate a civil aircraft in the United States at a true flight Mach number greater than 1 unless—

(1) The sonic boom overpressure at the surface does not exceed 0.11 pound per square foot (psf);

(2) The operator demonstrates and the Administrator finds each of the following:

(i) Through measurement, modeling, or other methods approved by the Administrator, that sonic boom overpressure—

(A) Does not exceed 0.11 psf for primary sonic boom levels at the surface;

(B) Does not exceed 0.11 psf for secondary direct sonic boom levels at the surface; and

(C) Does not exceed 0.11 psf for secondary indirect sonic boom levels at the surface.

(ii) The operator has a means to comply that ensures sonic boom overpressure in excess of 0.11 psf, as provided in paragraph (a)(1), does not reach the surface; and

(3) The aircraft is operated in compliance with any conditions and limitations issued by the Administrator to ensure compliance with paragraph (a)(1) and (a)(2)(ii).

(b) Notwithstanding paragraph (a), no person shall operate a civil aircraft in the United States at a true flight Mach number greater than 1 unless the operator of the aircraft is conducting operations in compliance with conditions and limitations in a special flight authorization issued to the operator in accordance with § 91.818.

(c) No person may operate a civil aircraft for which the maximum operating limit speed M_{M0} exceeds a Mach number of 1, to or from an airport in the United States, unless—

(1) The person is conducting operations under paragraph (a) of this section;

(2) Information available to the flight crew includes flight limitations that ensure flights entering or leaving the United States will not cause a sonic boom to reach the surface within the United States and the operator complies with these flight limitations; or

(3) The operator complies with conditions and limitations in a special flight authorization to exceed Mach 1 issued in accordance with § 91.818.

5. Revise the introductory paragraph and paragraph (a)(8)(v) of § 91.818 to read as follows:

§ 91.818 Special flight authorization to exceed Mach 1.

For all civil aircraft, any operation in excess of Mach 1 that does not meet the requirements of § 91.817(a) or (c)(2) of this part must be conducted only in accordance with a special flight authorization issued to an operator in accordance with the requirements of this section.

(a) * * *

(8) * * *

(v) Measure the noise characteristics of an aircraft to demonstrate compliance with noise requirements imposed under this chapter, or to determine the limits for operation in accordance with § 91.817(c).

* * * * *

Issued under authority provided by 49 U.S.C. 106(f), 44701(a), and 44715 in Washington, DC

Bryan K. Bedford,
Administrator.
[FR Doc. 2026-13440 Filed: 7/1/2026 8:45 am; Publication Date: 7/2/2026]