The Honorable Rick Larsen (D-WA) Chairing
Status of the Boeing 737 MAX: Stakeholder Perspectives

Testimony of
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Thank you Chairman DeFazio, Chairman Larsen, Ranking Member Sam Graves, and Ranking Member Garret Graves for the opportunity to testify on the issues surrounding the Boeing 737 Max. My name is Sara Nelson, International President of the Association of Flight Attendants-CWA, AFL-CIO (AFA), representing nearly 50,000 of aviation's first responders at 20 airlines.

As I said on March 13th shortly after the U.S. grounding of the 737Max,

“It is good news that the 737 MAX will now get the focus it needs to address the concerns of undetermined safety issues. We must focus on the needed fix, rather than the uncertainty of flight. Lives must come first always. But a brand is at stake as well. And that brand is not just Boeing. It's America. What America means in international aviation and by extension in the larger world more generally—that we set the standard for safety, competence, and honesty in governance of aviation.”

I am here today because the public looks to flight attendants when it comes to aviation safety. We are aviation's first responders and last line of defense. We have more public interaction than any other profession within aviation, and the public trusts us to look out for their interests.

That is why both Boeing and the Federal Aviation Administration (FAA) have individually come to our union to engage us in discussions about our concerns and the process to return the 737 MAX to service.

Both Boeing and the FAA deserve credit for recognizing the need to win back public support and the importance of involving stakeholders in this process. The truth is that these tragic incidents and the revelations surrounding them have shaken the public trust in our entire aviation system due to the decisions made by Boeing during the original certification process, the slow and inadequate response in the wake of the loss of Lion Air flight 610 and Ethiopian Airlines flight 302, and the questions surrounding FAA oversight throughout.

Over the course of the last several months our union has witnessed a chastened tone from Boeing and what appears to be a real desire to regain trust. This is critically important if remaining questions are to be answered and stakeholders around the world are to be convinced the 737 Max is safe to fly.

It is significant that the FAA formed the Technical Advisory Board, with individuals not involved in any aspect of the Boeing 737 MAX certification including NASA, the U.S. Air Force and Volpe National Transportation Systems Center, to evaluate Boeing and FAA efforts related to Boeing's software update and its integration into the 737 MAX flight control system. We are also heartened to receive assurance from Acting Administrator Elwell that certification of the 737 Max is being done in close coordination with world-wide regulators under the most conservative approach and all of the time necessary to regain public trust around the world.

Regaining that trust first and foremost requires transparency. Congressional oversight is important, and we commend this Committee for its diligence in investigating the events surrounding the loss of 346 lives, and what must be done to ensure this never happens again.

We recognize the efforts of both Boeing and the FAA for seeking our input and help in reassuring the public. Questions remain, but we believe this is the right leadership approach. We encourage both Boeing and regulators to continue efforts with stakeholders to answer all questions and communicate fully the lessons learned along with any necessary changes in
procedures. Flight Attendants take seriously our role in aviation safety. While we are not there yet, we look forward to being able to reassure the public when this process is complete.

QUESTIONS REMAIN
On May 15, 2019, the House Transportation and Infrastructure Committee held a hearing on the “Status of the Boeing 737 MAX.” In their opening remarks,¹ Committee Chair Peter DeFazio and Aviation Subcommittee Chair Rick Larsen addressed the importance of this and subsequent hearings and investigations by this Committee and other investigative bodies into the two fatal accidents that occurred in a five month span of time and involved Boeing 737 MAX airplanes.

Chair Larsen noted, “[i]f the public doesn’t feel safe about flying then they won’t fly; if they don’t fly, airlines don’t need to buy airplanes; if they don’t need to buy airplanes, then airplanes don’t need to be built; and if there is no need to build the airplanes, then there will be no jobs … the foundation of the U.S. aviation system is safety.” Clearly, AFA and the aviation industry agree that the “foundation of the U.S. aviation system is safety.” Without safety, the commercial aviation system our economy is so reliant upon today would simply not exist, and neither would tens of thousands jobs held by flight attendants, pilots, dispatchers, maintenance technicians, baggage handlers, customer service representatives, the list goes on and on.

In his opening remarks on May 15, Chair DeFazio remarked on the historical process the Federal Aviation Administration (FAA) has used to approve airplane designs, noting that “[s]ince the 1950s, the FAA has relied on a system of delegating certain certification authorities to manufacturers. And it has done so safely. However, for years, I have raised questions about how the FAA oversees the work of manufacturers that have been delegated these responsibilities.” Some of the questions Chair DeFazio asked regarding FAA oversight include the following: “Does the FAA have sufficient resources to oversee the delegation program? Does the FAA have enough internal expertise to oversee the most sophisticated engineering work in the world? What firewalls exist between manufacturers and its FAA-designated representatives to ensure proper oversight and that there is no undue influence placed on them?”

Obtaining comprehensive answers to these questions through an open, transparent public investigative process will be the first step to addressing the concerns of crew members and the traveling public regarding the safety of commercial aviation. Equally critical to ensuring confidence is the effectiveness of any subsequent legislative and regulatory measures taken in response to identified shortcomings. This process will be long and resource intensive, but it is absolutely critical that it be done right to guarantee that the foundation of the U.S. aviation system continues to be safety.

On March 10, 2019, the Association of Flight Attendants released a statement regarding the crash of Ethiopian Airlines Flight 302 and called on U.S. airlines to “work with Boeing, the FAA, and the NTSB to address concerns and take steps to ensure confidence for the traveling public and working crews.” In a March 11, 2019 letter addressed to Acting FAA Administrator Dan Elwell, AFA recommended a comprehensive, public review of all potential issues that may have contributed to the two tragic accidents involving Flight 302 and last October’s Lion Air Flight 610 accidents. We noted at the time that these reviews should consider at minimum the “certification basis, maintenance practices, operational procedures, and crew training aspects of the 737 MAX program.”

CERTIFICATION ISSUES
The 737 MAX program is not the first recent Boeing aircraft to face intense scrutiny of its design certification process following a safety-related incident. In January, 2013, an auxiliary power unit (APU) lithium-ion battery on a Japan Airlines Boeing 787-8 caught fire, which led to the grounding of the U.S. 787 fleet, an investigation by the National Transportation Safety Board (NTSB), and modifications to the main and APU batteries. In its November, 2014 final report on the 787 APU battery incident, the NTSB noted several safety issues that occurred during the design certification process. These issues bear troubling similarities to problems that may have occurred during certification of the 737 MAX as alleged in recent media reports.

For example, the NTSB stated that the Boeing battery analyses “did not consider the possibility that cascading thermal runaway of the battery could occur as a result of a cell internal short circuit.” This may have reflected a lack of imagination, with unfortunately severe economic consequences for Boeing. A lack of imagination during the 737 MAX certification process may have led to far more tragic consequences. A June 1, 2019 article in the New York Times states that while some potential failures of the MCAS were flight-tested, the one test not conducted was activation of the MCAS “as a result of a faulty angle-of-attack sensor — a problem in the two [Lion Air and Ethiopian Airlines] crashes.”

The NTSB report also stated that there was insufficient guidance provided in “determining and justifying key assumptions in safety assessments” for the 787 batteries. Boeing had assumed that “an internal short circuit within a cell would be limited to venting of only that cell without fire.” The NTSB report noted that the “assessment did not explicitly discuss this key assumption or provide the engineering rationale and justifications to support the assumption. Also, as demonstrated by the circumstances of this incident, Boeing’s assumption was incorrect, and Boeing’s assessment did not consider the consequences if the assumption were incorrect or incorporate design mitigations to limit the safety effects that could result in such a case.” The June 1, 2019 New York Times article suggests that incorrect assumptions by Boeing engineers working on the 737 MAX design may have also occurred: “Current and former employees at Boeing and the Federal Aviation Administration who spoke with The New York Times said they had assumed the system [MCAS] relied on more sensors and would rarely, if ever, activate. Based on those misguided assumptions, many made critical decisions, affecting design, certification and training.”

The NTSB 787 battery report also noted that insufficient guidance was provided to FAA certification engineers whose role was to ensure compliance with certification requirements: “Guidance to FAA certification staff at the time that Boeing submitted its application for the 787 type certificate, including FAA Order 8110.4, ‘Type Certification,’ did not clearly indicate how individual special conditions should be traced to compliance deliverables (such as test procedures, test reports, and safety assessments) in a certification plan.” Similarly, the June 1, 2019 New York Times article appears to suggest that insufficient guidance provided to FAA engineers during the certification process may have also contributed to the flawed 737 MAX safety assessment: “Regulators didn’t conduct a formal safety assessment of the new version of MCAS. The current and former employees, many of whom spoke on the condition of anonymity because of the continuing investigations, said that after the first crash, they were stunned to discover MCAS relied on a single sensor. ‘That’s nuts,’ said an engineer who helped design

MCAS. ‘I’m shocked,’ said a safety analyst who scrutinized it. ‘To me, it seems like somebody didn’t understand what they were doing,” said an engineer who assessed the system’s sensors.”

Another issue that may have impacted the 737 MAX certification process arises from conflicts of interest due to inappropriate relationships between regulator and regulated party. An example of how a personal relationship has affected oversight was discussed on March 27, 2019 by the Department of Transportation (DOT) Inspector General (IG) in testimony to Congress. He made the following points regarding the relationship one inspector had with the regulated party, an airline: “FAA guidance recognizes the impact that a single inspector can have on safety culture and establishes standards that require inspectors to act impartially and avoid the appearance of preferential treatment when they perform their official duties. Nonetheless, our recent work identified concerns regarding an FAA inspector’s oversight of [an airline’s] flight test program, which is used to verify the airworthiness of aircraft following major repairs. We found that an inspector had developed a personal relationship with the head of the carrier’s flight test program and appeared to give the carrier preferential treatment when safety concerns were raised. The inspector also worked with the carrier to suppress future complaints. Ensuring that FAA’s inspector workforce meets standards of impartiality remains a key oversight challenge for the Agency to strengthen its safety culture and effectively identify and mitigate risks.”

The close relationship between the FAA, airplane manufacturers and airlines can be seen in how the FAA has changed policy over the years regarding design changes and its certification requirement that an airplane with a passenger seating capacity of more than 44 seats can be evacuated from the airplane to the ground within 90 seconds, often referred to as the 90 second rule.

Design standards are used in the design phase of a project, and can be verified while the product, in this case, an airplane, “is still on the drawing board.” i.e., before the airplane is built. Performance standards evaluate the performance of the product, often under the influence of factors that cannot be effectively integrated or evaluated during the design. Typically, a performance standard involves a test of the product after it is built. In the case of a full scale evacuation demonstration (a performance standard) of an airplane, the factors that must be evaluated are the performance of the passengers and crew.

Clearly, the original intent of the evacuation demonstration was to show the satisfactory accomplishment of emergency evacuation procedures. The final rule reinforced this intent and required airlines, as a Part 121 operational requirement, to conduct evacuation demonstrations. (30 FR 3200, March 9, 1965).

The following year, FAA Notice 66-26 (31 FR 10275, July 29, 1966) proposed to establish comparable requirements for the airplane manufacturers. This notice stated that “…traditionally,

it has been considered sufficient to provide the necessary components for emergency evacuation through detailed quantitative requirements prescribed in the airworthiness rules. However, experience has shown that compliance with these requirements does not ensure that the airplane can be evacuated, during an emergency, within an acceptable time interval. Differences in the relationships between elements of the emergency evacuation system introduce a considerable variation in evacuation time, and this variation is expected to be even more marked on larger transport aircraft under development." Thus, it was acknowledged that relationships between the various elements of the evacuation system, not just the elements themselves, had a critical influence on evacuation time. In other words, the whole was considerably more complicated than the sum of its parts. Since the manufacturer would be demonstrating the basic capability of a new airplane type without regard to crewmember training, operating procedures and similar items (such demonstration of procedures was still required under Part 121, the operational requirements), this new demonstration was not expected to validate the evacuation procedures of the air carriers or operators. FAA Notice 66-26 also proposed that once a manufacturer had successfully conducted an evacuation demonstration for a particular airplane type, the passenger seating capacity could be increased by no more than five percent if the manufacturer could substantiate, by analysis that all the passengers could be evacuated within the prescribed time limit. This appears to be the first proposal to suggest the use of “analysis” in lieu of full-scale evacuation testing. However, this analysis was intended to provide comparison with the full-scale evacuation actually conducted on the airplane. These proposals were adopted as a final rule (32 FR 13255, September 20, 1967).

The tests conducted by operators to show satisfactory accomplishment of emergency evacuation procedures and by manufacturers to show that the aircraft interior configuration and the relationship between the elements of its emergency evacuation system could be evacuated within a specified time period were allowed to be satisfied under a single test under Amendment 25-46 (43 FR 50578, October 30, 1978). Under this amendment, the FAA also stated that “A combination of analysis and tests may be used to show that the airplane is capable of being evacuated within 90 seconds under the conditions specified in 25.803(c) of this section if the Administrator finds that the combination of analysis and tests will provide data with respect to the emergency evacuation capability of the aircraft equivalent to that which would be obtained by actual demonstration.” The FAA recognized the problems with this new provision and in its discussion of it concluded that: “Several commentators objected to the proposed amendment to 25.803(d) which would allow analysis in showing that the airplane is capable of being evacuated within 90 seconds. One commentator stated that analysis alone is an incomplete means of showing compliance and should not be allowed. Another commentator stated that extrapolations based on analytical testing have no practical relation to actual conditions which occur in accidents and evacuation demonstrations. The FAA agrees that the limitations on the use of analytical procedures should be made clear. The requirement that the Administrator find the analysis data acceptable was intended to preclude approvals which might be based on insufficient test data, such as in the case of a completely new model or a model which has major changes or a considerably larger passenger capacity than a previously approved model” (Italics ours.)

Despite this intent, the FAA granted a request from Boeing to remove a pair of exits from the B747 airplane in the early 1980’s. AFA strongly protested this action that would make it more difficult for flight attendants to safely evacuate passengers from the airplane.

In a 1985 hearing before the U.S. House of Representatives Subcommittee on Investigations and Oversight of this Committee (formerly named Public Works and Transportation Committee) and its Chairman, James Oberstar, AFA testified and presented data and past accident
experience to illustrate our concerns, as well as those of passengers, with this emergency exit reduction. The FAA Administrator took steps that resulted in no US airline removing exits from their 747s, and at this hearing, suggested that a reassessment of regulations pertaining to emergency evacuation of transport airplanes was warranted. Consequently, an Emergency Evacuation Task Force, open to the public, for that purpose was established in September, 1985. The continued use of full-scale emergency evacuation demonstrations was one of the matters considered by that task force. One of the presentations, by Boeing, suggested that a rudimentary analytical procedure be used in lieu of full scale demonstrations. Basically, the manufacturers favored analysis, while the representatives of people who flew on the airplanes, either as crewmembers or passengers, opposed analysis. The task force was unable to reach consensus on when to accept analysis in lieu of a demonstration. A similar process was undertaken by an advisory committee to the FAA in the 1990s with the same failure to reach consensus.

The procedures used by the flight attendants in a full scale emergency evacuation certification demonstration are intended to become the baseline procedures for the aircraft type and model tested. This was the reason for the promulgation of the 1965 rule requiring operators to conduct full scale emergency evacuation demonstrations. These procedures are found in the Flight Standardization Board Report for each type and model of aircraft. Yet some demonstrations conducted since 1996 have utilized a procedure, with FAA allowance, that makes it easier for the manufacturer to pass the test, but it is not a procedure that is used by U.S. scheduled operators. The intent of the regulation requiring full scale evacuation demonstrations is not being carried out by the FAA.

The analytical method does little more than calculate that, if the design standards are met, the aircraft could be evacuated within the requirements of the performance standard. Since the design requirements were intended to provide an airplane capable of being evacuated within the requirements of the performance standard, use of the analytical method is redundant.

Analysis is not a method that can predict failure of an emergency evacuation system, unlike a full-scale demonstration utilizing appropriate evacuation procedures.

The result of the FAA’s policy and of the currently inadequate “state of the art” analytical methods accepted under the policy, is that the first full scale evacuation of a new airplane will be performed by the traveling public under emergency conditions rather than by paid test subjects under the controlled test conditions of a demonstration. There is no assurance that the evacuation would be successful. For this reason, the FAA should be required to rescind its policy of allowing the use of analysis in lieu of the full-scale demonstration until a scientifically valid method is developed, including current demographic changes in the passenger population.

This close relationship between FAA, airplane manufacturers and airlines was further touted and cemented on February 20, 2003 when, in her first major speech after becoming FAA Administrator, Marion Blakey referred to those regulated by the FAA as its “customers.” She said that the FAA needed to be more consistent in responding to “our customers.” Then Ms. Blakey said:

“So, I’m announcing today a new customer-service initiative that provides written guidance and training to all managers and supervisors in our regulation and certification offices throughout the country on applying FAA rules and policies in a standard and

consistent manner. And, we want to know from our customers if we’re not being consistent. We’re going to let them know that they have the right to ask for review on any inspector’s decision on any call that’s made in the certification process… that they can “buck it up” to first-line supervisors, field office managers, regional division managers, or even to Washington if necessary – with no fear of retribution. Information on how to do this — names, titles, and phone numbers — will be prominently displayed on the Web and in all our regional and field offices. We need your help to make this program a success.”

According to a USA Today article’s\(^6\) reference to an April 3, 2008 hearing before this Committee, “Inspectors who testified before Congress last month and others who spoke in recent interviews said they bitterly recalled the introduction of the program. They said it sent a not-too-subtle message that the airlines were encouraged to complain about them and had the upper hand in any dispute over safety-compliance issues.”

In addition to its effect on safety regulation of airlines, the FAA “Customer Service Initiative” specifically stated that customers “have the right to ask for review on any inspector’s decision on any call that’s made in the certification process” from all levels including FAA Washington.

On October 13, 2005, the FAA published its final rule\(^7\) (Establishment of Organization Designation Authorization Program, 70 FR 59931) establishing the Organization Designation Authorization (ODA) program. This rule expanded the scope of approved tasks, increased the number of eligible organizations, and established a systems-based approach to managing designated organizations. According to the rule’s summary, the “effect of this program will be to increase the efficiency with which the FAA appoints and oversees designee organizations, and allow the FAA to concentrate its resources on the most safety-critical matters.” Of course, not all who submitted comments to this rule agreed; one dissent in particular, from the National Air Traffic Controllers Association, was summarized in the rule’s preamble as arguing that the “proposed ODA program significantly modifies the current regulatory oversight system, deteriorating the established technical FAA oversight by going to a ‘systems’ oversight approach that would provide less specific and technical FAA oversight and would, in time, reduce safety.” The FAA disagreed, asserting that a systems approach will increase safety, as more effective delegation programs will free up resources for tasks more critical to safety. Unfortunately, the subsequent incidents involving the 787 main battery and 737 Max crashes appear to support the commenter’s prediction that safety will, in fact, be reduced over time.

Under various agreements between the FAA and other countries or groups of countries, foreign authorities agree to work with the FAA to enable acceptance of US Type certificated and manufactured aeronautical products, including aircraft, engines, propellers, rotorcraft, and aeronautical components. In many of these agreements, the FAA is relied upon to assist in the certification process of products for the aviation authority and country to approve these products. This system of international aircraft certification has been built upon global recognition of the FAA and its statutory mandate to maintain safety at the highest possible level. The loss of this past esteem of FAA certification and regulation of US aviation and the profound tragedies of two US aircraft crashes within five months, in addition to the other safety problems we’ve discussed, means that the FAA must ensure that it has taken all measures to assure the safety of the 737 MAX within the U.S. as well as in all countries who must also approve the this aircraft for return to service.

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In 2006, the NTSB published the results of a study, *Safety Report on the Treatment of Safety-Critical Systems in Transport Airplanes*.\(^8\) This report, which focused on certification of systems critical to flight safety and seems as relevant today as then, was prompted by four recently-concluded accident investigations involving two Boeing, one McDonnell-Douglas, and one Airbus aircraft: USAir flight 427 in 1999; TWA flight 800 in 2000; Alaska Airlines flight 261 in 2002; and American Airlines flight 587 in 2004. The NTSB suggested improvements to the certification process for the following three reasons, quoted directly from the report:

1. The process for assessing risks to aircraft systems does not adequately address important failure conditions associated with structures and with human/system interaction.
2. The results of the process for assessing risks to safety-critical systems are not adequately preserved to support continued airworthiness of certificated airplanes.
3. Existing policy, practices, and procedures for the ongoing assessment of risks to safety-critical systems do not ensure that the underlying assumptions made during design and certification are adequately and continuously assessed in light of operational experience, lessons learned, and new knowledge.

The NTSB also concluded that “a program must be in place, once the type certification process is completed, to ensure the ongoing assessment of risks to safety-critical systems. Such a program must recognize that ongoing decisions about design, operations, maintenance, and continued airworthiness must be done in light of operational data, service history, lessons learned, and new knowledge, for designs that are derivatives of previously certificated airplanes.”

Given the possibility that problems in the type certification process may have contributed to the recent 737 MAX accidents, as well as the concerns that have been expressed by Congress, the NTSB, DOT IG, and others, a return to the FAA certification processes prior to the 2005 FAA rule on ODA, footnote 7 supra, with inclusion of learned safety enhancements since then may be the best way to prevent a certification applicant’s pecuniary and market-based interests from interfering with ensuring safety of the airplane and related requirements directly by the FAA. Such a return to direct FAA certification with designated engineering representatives will likely require increased FAA personnel and funding, with compensation for certification engineers to be more competitive with the private sector.

**STABLE FUNDING FOR AVIATION SAFETY**

The “foundation of the U.S. aviation system is safety.” In the case of the Boeing 737 Max we not only need a conservative, transparent process for certification – we need to recognize the systemic issues that have undermined safety. We need an aviation system that is supported by stable, long-term funding and is shielded from political cliffs of government funding.

AFA supports HR 1108, the “Aviation Funding Stability Act of 2019,” introduced by Transportation & Infrastructure Committee Chairman Peter DeFazio and Aviation Subcommittee Chairman Rick Larsen. Aviation safety is non-negotiable. HR 1108 would authorize the FAA to keep all of its programs running and all of its employees working by drawing from the Airports and Airways Trust Fund (AATF) during any lapse in typical government appropriations. By drawing from the AATF during a shutdown, the FAA would ensure that all FAA employees

\(^8\) NTSB/SR-06/02, Adopted April 25, 2006
would be paid for work during a funding lapse and FAA programs would continue to operate. This bill should be acted on with urgency.

We encourage Congress to give serious attention in all budgeting to properly funding the Department of Transportation and the Federal Aviation Administration in order to fully support aviation safety.

CLOSING
Safety is not something “customers” buy, it is something we all fundamentally expect as a baseline of operation. Regulator oversight cannot be put in terms of client/customer relations.

Again, we commend this Committee for its diligence in promoting aviation safety. We look forward to continued leadership from Acting Administrator Elwell in promoting a 737 Max return to service that inspires confidence among aviation workers, our counterparts around the world, and the traveling public.