

S. HRG. 117-817

IMPLEMENTATION OF AVIATION SAFETY REFORM

HEARING

BEFORE THE

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION UNITED STATES SENATE

ONE HUNDRED SEVENTEENTH CONGRESS

FIRST SESSION

NOVEMBER 3, 2021

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SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ONE HUNDRED SEVENTEENTH CONGRESS

FIRST SESSION

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IMPLEMENTATION OF AVIATION SAFETY REFORM

WEDNESDAY, NOVEMBER 3, 2021

U.S. SENATE,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
Washington, DC.

The Committee met, pursuant to notice, at 10:05 a.m., in room SR-253, Russell Senate Office Building, Hon. Maria Cantwell, Chair of the Committee, presiding.

Present: Senators Cantwell [presiding], Klobuchar, Blumenthal, Markey, Peters, Tester, Sinema, Rosen, Hickenlooper, Warnock, Wicker, Blunt, Cruz, Fischer, Moran, Sullivan, Blackburn, and Scott.

OPENING STATEMENT OF HON. MARIA CANTWELL, U.S. SENATOR FROM WASHINGTON

The CHAIR. The Senate Committee on Commerce, Science, and Transportation will come to order. We are having a hearing today on the implementation of our new aviation reform law, and want to welcome the honorable Steve Dickson, Administrator for the Federal Aviation Administration, for joining us today. I also want to take a moment to recognize the families who have lost loved ones who are with us today.

Thank you so much for being here and for your continued oversight on this issue. I can't imagine the pain and suffering of your loss and the pain that you are still feeling. But I certainly want you to know we appreciate your vigilance on aviation safety reform. You have shaped the safety work of this committee, and with your support and critical input, the Committee played a leading role in drafting the Aircraft Certification, Safety and Accountability Act.

This important legislation enacted into law almost a year ago, I believe, provided a big down payment on the direction that we need to go to implement safety reforms in the United States and to make us the gold standard around the world. That is why we are here today to have this hearing, to determine whether the Federal administration, the Federal Aviation Administration, has faithfully and vigorously executed the safety reform law in accordance with Congressional mandates for deadlines and action. I will be upfront with you, Mr. Administrator, about the purpose of this hearing. It is to find out whether you are upholding the spirit and the letter of this law.

While not the only thing we need to do, the law that we implemented was a clear course correction. It said that we needed to have a stronger FAA oversight, the people in place to do that job,

and to hold manufacturers accountable. Directing the FAA and making sure that that job is done is critical. While I know your communication to the Committee in your written testimony talks about a lot of the actions and requirements that were in the law, we also know that there is more to be done. I want to say that I am very appreciative of Ian Won at the Boeing Aviation Oversight Office, who on May 13 issued a letter basically slowing down the 777X so that more information could be provided, needed to be provided for the oversight of that plane.

[The letter referred to follows:]



U.S. Department
of Transportation
**Federal Aviation
Administration**

Aviation Safety

2200 South 216th Street
Des Moines, WA 98198-6547

May 13, 2021

In Reply
Refer To: 860-21-0268

Mr. Tom Galantowicz
ODA Lead Administrator
Regulatory Administration
The Boeing Company
P.O. Box 3707, M/C 081-53
Seattle, WA 98124-2207

Dear Mr. Galantowicz:

Subject: Boeing Model 777-9 Type Inspection Authorization (TIA) Readiness

- References:
- (1) Boeing Letter RA-21-0402 "777-9 Common Core System (CCS) Applicant Proposal in support of 777-9 TIA," dated May 7, 2021
 - (2) FAA Letter 860-19-1081 "777-9 TIA Execution Plan," dated April 7, 2021
 - (3) FAA Letter 860-17-0556 "777-9 Plan for the Development Assurance Aspects of Certification," Revision C, dated October 31, 2017
 - (4) Boeing Letter RA-21-01067, "777-9, CCS Engineering Safety Assessment," dated April 12, 2021
 - (5) FAA letter 860-21-0286, "FAA Response to Boeing Submittal of 777-9 CCS Engineering Safety Assessment (ESA)," dated April 30, 2021

The purpose of this letter is to provide the Federal Aviation Administration (FAA) position and expectations for the upcoming Boeing Model 777-9 TIA.

The FAA Order 8110.4C states:

"The TIA is issued when examination of technical data required for type certification is completed or has reached a point where it appears the aircraft or component being examined is expected to meet the applicable regulations."

The FAA has received the reference (1) letter that submitted the CCS Applicant Proposal in support of Boeing Model 777-9 TIA. We noted in the reference (1) letter that the Organization Designation Authorization (ODA) Lead Administrator and Deputy Engineering-Unit Member (E-UM) Administrator acknowledge the CCS E-UM positions regarding incomplete software and Design Assurance Review (DAR) activities for the CCS, and that the CCS does not meet TIA readiness requirements. Despite these shortfalls

identified by the E-UMs, the ODA Unit believes the applicant position proposing that the program proceed with Phase 1 of the TIA warrants FAA consideration. The CCS is a very complex and critical avionics system of the Boeing Model 777-9. It is an integrated modular avionics architecture that provides a set of shared computing, networking, and input/output resources to support the computing and system interface needs for multiple airplane systems. The CCS also provides the means for hosted functions of all criticalities to safely share the same physical resources. The CCS on the Boeing Model 777-9 is a significant change from the baseline 777-300ER. There are about 56-hosted functions using any resource within the CCS platform and interdependency of the CCS Hosted Functions and the CCS platform.

The FAA and Boeing have been discussing the TIA readiness of the Boeing Model 777-9 in numerous meetings over the past nine months. Based on our assessment, the FAA considers that the aircraft is not yet ready for TIA, even if it is a phased TIA of limited scope with a small number of certification flight test plans (CFTPs) proposed. The technical data required for type certification has not reached a point where it appears the aircraft type design is mature and can be expected to meet the applicable regulations.

The FAA position is based upon the following items:

1. Incomplete DAR Activities
 - The FAA has retained the Development Assurance compliance findings for the CCS (Reference 3). Boeing has yet to complete the DAR activities for the FAA to conduct compliance findings (DAR 2 and DAR 3). The FAA noted DAR 1 was conducted by Boeing with findings/actions, DAR 2 and DAR 3 are not complete.
 - Without finishing DAR activities, it is difficult for the FAA to determine if the system is mature and will provide only uncorrupted data for FAA certification testing. Completion of DAR activities provides confidence on the maturity of the CCS.
 - We communicated our requirement to complete DAR activities in our TIA expectation letter in reference (2).
 - We have also noticed that Boeing's DAR review dates have continuously slid over a year, which is also a concern for the FAA.
2. Lack of availability of Preliminary Safety Assessment for the FAA to review. Boeing does not meet own process (TIA Requirements for Boeing ODA Projects: D950-11761-1).
3. Lack of data to support the airplane level assessment (airplane level developmental assurance and airplane safety assessment) and system level integration.
4. The FAA retained development assurance compliance findings for common core system. We are unable to make compliance findings for retained development

assurance areas of the CCS based on the Plan for the Development Assurance Aspects of Certification as noted in reference (3).

5. Lack of sufficient data and artifacts to provide the FAA confidence in the ability to collect valid test data for the CFTP's that are planned to be conducted in this phased TIA and their relation to immaturity of the CCS.
6. A significant supplier finding for inadequate peer review of the safety analysis resulting in inconsistencies within and across safety reports and incorrect reuse of 787 data was noted by the FAA in Boeing's CCS Engineering Safety Assessment (reference 4). The assessment also stated that the data is not yet mature enough to show compliance, lists many open Problem Reports against safety documentation, assessments and requirements. The assessment identified many gaps.
7. Boeing has advised the FAA that there is an upcoming major software update with the software load of flight control 6.4.X and 6.5.X. The FAA understands that there are many significant problem report items that will be addressed by that version of the software load, including the software fix for the un-commanded pitch event that occurred on December 8, 2020. In addition, software load dates are continuously sliding and the FAA needs better visibility into the causes of the delays.
8. After the un-commanded pitch event, the FAA is yet to see how Boeing fully implements all the corrective actions identified by the root cause investigation, including system requirement development and tracing, robust verification process, supplier communication, systems integration validation and verification, and airplane level verification to ensure the "maturity" and safety/airworthiness of the aircraft. We are expecting Boeing to complete comprehensive validation, verification reviews and document the process improvements and lessons learned identified by the root cause investigation, and implement a robust process so similar escape will not happen in the future and this is not a systemic issue.
9. Boeing is proposing modifications that will involve firmware and hardware changes to the actuator controls electronics (ACE) of the Flight Control System. The European Union Aviation Safety Agency (EASA) has not yet agreed on a way forward on the Model 777-9. The FAA's concern is due to the addition of late change; Boeing needs to ensure the changes do not introduce new, inadvertent failures modes.
10. Stabilize the certification basis. Boeing informed the FAA more than a year ago regarding the plan for advancement certification basis to Title 14, Code of Federal Regulations, 25-146, which was pending due to this TIA discussion and potential impact on certification documents.

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11. Design maturity is in question as design changes are on-going and potentially significant.

For example, the Stabilizer Design/Architecture for the 777-9 Relative to Removal of the STAB GREENBAND, Modified Indications during a failure of all Flight Control Modules and Modified Indications/new alert when airspeed protections are lost, Continuous Lateral Path, Extended Inertial Coasting and FLT DIR GUIDANCE, and a Mode Failure in Flight Director Only Mode.

Based on the information from Boeing, the Model 777-9 Amended Type Certification (ATC) date is realistically going to be mid to late 2023 (>2 years from now). The FAA anticipates a significant impact to the level of regression testing, change impact analysis, and the potential to increase the number of certification flight tests that will need to take place between TIA and ATC if we issue the TIA now. The additional activity will require the FAA to expend additional resources to review the changes and may reduce our resources to support other certification programs/activities, potentially with a higher priority.

The FAA requests the ODA Unit and the applicant to consider the items stated above, and close these gaps prior to submittal of a request for TIA issuance.

If you have any questions regarding this technical issue, please contact Mr. Tom Phan, Technical Program Manager, by telephone at [REDACTED] or by email at [REDACTED].

If you have any questions regarding the program, please contact Mr. Amod Koirala, Boeing Model 777-9 Program Manager, by telephone at [REDACTED] or by email at [REDACTED].

Sincerely,

IAN Y WON
Digitally signed by IAN Y WON
 Date: 2021.05.13 16:29:49
 -0700

Ian Won
 Aviation Safety
 Acting Manager, BASOO Branch
 Aircraft Certification Service

The CHAIR. I am a firm believer that engineers on the ground know their job. What is not clear to me is whether people are listening to them and whether the FAA has their back. I also want to enter into the record an August 19 letter from Mr. Won also, talking about the changes to the Boeing BASOO Office and things that needed to be done to make sure that they continue to have the oversights and objectives. He has been clear, we need more resources. He has been clear, we need the right people to do this job. [The letter referred to follows:]



U.S. Department
of Transportation
**Federal Aviation
Administration**

Aviation Safety

2200 South 216th Street
Des Moines, WA 98198-6547

August 19, 2021

In Reply

Refer To: 860-21-0541

Ms. Wendi Folkert
Safety, Certification, & Quality Integration Leader
The Boeing Company
P.O. Box 3707, M/C 081-53
Seattle, WA 98124-2207

Dear Ms. Folkert:

Subject: Assessment results regarding Organization Designation Authorization (ODA)
Unit Member (UM) Independence

The BASOO Organization Management Team (OMT) conducted an investigation into engineering unit member (E-UM) and project administrator (PA) ability to openly and transparently share information with the Federal Aviation Administration (FAA), express concerns, act independently from the Boeing Company, and not fear repercussions. This investigation was from May 2021 through July 2021. We performed this oversight to ensure compliance with Title 14, Code of Federal Regulations (14 CFR). The basis for this activity are the following required conditions:

Title 14 CFR section 183.57(b)(c), Responsibilities of the ODA Holder, states:
“The ODA Holder must-- Give ODA Unit members sufficient authority to perform the authorized functions”; and “Ensure that no conflicting non-ODA Unit duties or other interference affects the performance of authorized functions by ODA Unit members.”

Outcomes from our discussions with E-UMs and PAs, resulted in 35 percent of people voicing concerns and sharing experiences that indicate the environment does not support independence of the ODA unit. The feedback highlighted concerns in several categories (excerpts are enclosed):

1. Safety and Airworthiness (SAW) organization involvement in ODA unit activities, as they are representatives of the company/applicant.
2. Conflicts of interest
3. Interference
4. Transparency with the FAA
5. Ability of the ODA unit to represent FAA interests

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Boeing's company culture appears to hamper members of the ODA unit from communicating openly with the FAA, which is also identified as a concern in the recent Congressional Aircraft Certification Safety and Accountability (ACSA) Act. Further, the organizational structure also appears to provide a strong influence on how unit members are appointed, managed, and allowed to perform authorized functions, which provides ample opportunity for interference rather than independence.

These concerns require an objective review and further fact finding. We would like to work collectively on this issue, and offer the following suggestions as next steps:

1. Refer results to Boeing Safety Management System (SMS) for risk management (SRM) assessment and identification of mitigations.
2. The FAA will conduct an anonymous, independent survey of all Boeing unit members to identify any remaining concerns and share the results with the SRM team.
3. Using results of both activities, develop corrective action plans to address the concerns.

Please provide a letter describing any additional actions you think are necessary within 30 working days after receipt of this letter. We will take into consideration any discussion or written statement rather than processing this as a formal compliance action, at this time.

If you have any questions regarding this issue, please contact Dr. Melissa Sandow, System Oversight Manager, by telephone at (206) 231-3857 or by email at melissa.sandow@faa.gov.

Sincerely,

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WON

Digitally signed by
IAN Y WON
Date: 2021.08.19
12:21:51 -0700

Ian Won
Aviation Safety
Acting Manager, BASOO Branch
Aircraft Certification Service

Enclosure
Engagement Discussion Excerpts

Engagement Discussion Excerpts

The following are excerpts from the interviews categorized in areas where interference appears to be a concern:

- A. SAW Organization (representing applicant needs) Involvement –
- “...he didn’t feel he had the project management skills and ability needed to be an EUM and couldn’t tell his manager he wasn’t ready. He couldn’t communicate that he wasn’t ready because he was being pushed into the role...”
 - “...It would be of extreme benefit if the E-UM direct chain of command included FAA specialists. This would eliminate the conflict of interest with SAW presence in the process currently...”
 - “...I had to have a sit down with a manager and explain why I can’t approve something. They did some EUM shopping...”
 - “...My advisor is conflict avoidant. Approaches or decisions that compromise the applicant are always raised to include the SAW which is usually not a positive experience and becomes contentious and creates delays for resolution...”
 - “If a design is non-compliant...essentially they raise issues that require further research that causes delays in decisions about design so that airplanes can continue to deliver in the interim while the issue is “resolved” even though I am positive the design is non-compliant...”
 - “...The applicant leverages poor process allowances to extend delivery during “suspected” non-conformances that may arise. To me either there is a non-conformance or not, but the applicant creates uncertainty allowed in the process purposefully to support delivery schedule....”
 - “...“SAW is an advocate for the program (applicant).” Typically, I am called into SAW meetings and they bring in an SME from the program and say my position is flawed for some reason and that I can go ahead and make the finding without FAA involvement. This is something I have to stand up to often...”
- B. Conflict of Interest –
- “...SAW priority is the position of the applicant. Fundamentally, SAW should not be in the chain of command of E-UMs performing as finders of compliance or agreeing for showing of compliance or in BPSM development or COS etc. They should go only through the ODA and not SAW, which puts direct conflict in the process...”
 - “...as the only XX person, he wears 2 hats as the program manager and the EUM. This works well to wear both roles, where schedule and functionality are critical for BCA...”

The CHAIR. So we need the FAA, as I said, to be that gold standard. When a Special Committee Review of Aviation Certification Process, the SCRACP, came back with a whitewash of what we needed to do, I was disappointed that you did not take more critique with that. In fact, basically—you testified before Congress, basically, the system is not broken. Well, there were parts that were broken, and they need to be fixed. So I look forward to your testimony, but reading it, I see more of the same. Now is not a time to mince words.

Now is the time to provide the leadership that it takes to get the staffing, the oversight, and the direction that is required of an oversight agency to hold manufacturers accountable. Make no mistake, the manufacturer has its own responsibilities here, and we will also hold them accountable. We believe there is more to be done on certification, more to be done on the oversight and certification process so that we are not just creating check marks on a list that now we can say the list has its check marks.

That is where we were with the MCAS system. In the end, it was the tragedy that we all know too well and are still living with. So I am very challenged by your testimony. We don't believe the FAA is prepared, on January 1 of 2022, to restore direct supervision and control over those manufacturing engineers and delegated authority because they—that process should have started sooner because it is a big oversight responsibility.

I will have questions for you in the Q&A about that and the type of personnel that we need in all of these jobs. We don't believe the FAA has conducted the necessary workforce review for determining the staffing and experience of those levels. And the FAA has not taken steps necessary to limit the delegation of certification tax to industry until the FAA has verified all human factor assumptions. Restating the law's requirement in a two page memo is not what it takes to get that implemented. It might be a basic start, but where is proof of the implementation? And this level of reform is needed immediately.

And the FAA has not fully implemented new requirements for applicants to disclose safety critical information like information related to flight control systems, so that the FAA can be aware and fully assess the impact of those proposed design changes and innovation technologies. Again, this went into the U.S. Code and was effective immediately, but the FAA expects to issue guidance in 2022. We don't have time to wait. We need that kind of oversight today.

And the FAA has yet to complete the work of the Independent Expert Panel, which is supposed to be convened 30 days from enactment to provide timely advice on whether the FAA should formally rein in Boeing's ODA authority. I also would like to enter into the record a letter from the families who are actually calling for a pulling of that authority. I understand this—that there is a panel that is meeting now, but the process and procedures in place to review their actions and have it be transparent is critically important if we are going to get this right. So all of these safety issues are critical to all of us in America. It is critical to our families who fly on planes.

It is critical to our economy. We need the leadership of the FAA to—not just before our hearing today. The complexity that got us to this situation is a lot of complexity of language. In reality, it has to be leadership of FAA in implementing the law. Now I will turn to my colleague, Senator Wicker, for his opening statement.

**STATEMENT OF HON. ROGER WICKER,
U.S. SENATOR FROM MISSISSIPPI**

Senator WICKER. Thank you, Senator Cantwell, for convening this oversight hearing on aviation safety and the Federal Aviation Administration's implementation of ACSA, the Aircraft Certification, Safety and Accountability Act, which this committee shepherded through Congress and was signed into law at the end of last year.

As we all know, a little more than 3 years ago, a Boeing 737 MAX crashed in Indonesia. Approximately 5 months later, a second MAX aircraft crashed in Ethiopia. And I too want to recognize the families of the victims and tell them how much we appreciate their input over time. It is really hard to put into words our emotions in this regard. However, the Committee did produce bipartisan legislation to improve aviation safety based on recommendations from several experts and several expert groups that carefully examined these accidents and the development of the 737 MAX.

We then worked on merging our bill with one that our colleagues in the House used. The result was that bicameral, bipartisan bill representing the most significant aviation safety legislation in recent history. I particularly want to applaud the work of the families of the victims in pressing to reform how the Federal Government oversees aviation safety, particularly the process of certifying aircraft design and production.

We will continue, Senator Cantwell and I and the members of this committee, to press the FAA to implement the reforms in this law. Enacting legislation was an important first step. Now, the FAA and the industry must follow through with implementing new programs and requirements. And so I am pleased to welcome Administrator Dickson before us today. His agency has already taken a number of actions in response to the accidents as well as the new law, but there is still much more work ahead, as the Chair has just mentioned.

Administrator Dickson should update us on the progress the FAA has made so far, and he should outline how he will ensure that the FAA follows through on the remaining work. I would also ask the Administrator to let us know if Congress needs to do more to ensure that the U.S. system remains the gold standard for aviation safety. Safety is a constant mission requiring the focus of the entire aviation community.

We are fortunate that our Nation continues to have a truly remarkable aviation safety record. That high level of safety is the result of decades of lessons learned, as well as the dedication and hard work of safety professionals throughout the system. We cannot ever be complacent. We should always be working to improve aviation safety. So thank you, Madam Chair, and I thank the Administrator for being with us today.

The CHAIR. Thank you, Senator Wicker. I failed to mention in my opening statement what great bipartisan work that legislation was and certainly appreciate the hard work of your staff and my staff and obviously our work with our House colleagues on getting that over the goal line.

And so, so many members who are with us here this morning also had legislation that was included in that, so it really was a comprehensive list of issues that the Committee really, and I can say from what I know about the Senate, engaged in in a very deep way and I think that that will lead to a very deep oversight of its implementation. Administrator Dickson, welcome. We welcome you to make your opening statement.

**STATEMENT OF HON. STEVE DICKSON, ADMINISTRATOR,
FEDERAL AVIATION ADMINISTRATION**

Mr. DICKSON. Thank you, Chair Cantwell. And good morning, Chair Cantwell, Ranking Member Wicker, and members of this committee. Thank you for the opportunity to discuss the FAA's approach to aviation safety oversight and our efforts to strengthen the aircraft certification process.

Safety is a journey, not a destination. We are constantly evolving as a regulator and an air navigation services provider to deliver the safest and most efficient aerospace system in the world. That is our mission, and our entire workforce of nearly 45,000 Federal employees is singularly focused on achieving that mission. As the Head of the FAA, safety is my North Star. One of the first things I did as FAA Administrator was to make it clear that we are the regulator, and that included resetting our relationship with Boeing.

I said that we would continue to exert a high level of scrutiny across the board, and we continue that scrutiny today. I have made it clear internally that we always do the right thing when it comes to safety and that I have the workforce's back. We are also asking ourselves the hard questions, and we are asking them of those that we regulate. When it comes to safety, we do not accept the status quo.

This is why we embrace reform, and we are focused across the agency on continuous improvement. I will discuss a number of initiatives that we have underway and the work that we have completed to address this goal and to implement the Aircraft Certification, Safety and Accountability Act. But first, let me say to the families of the victims of the Ethiopian Airlines and Lion Air crashes that the FAA is committed to applying the lessons learned from these tragedies so that the aviation system here and around the world continues to improve.

I want this committee to know that the FAA appreciates and respects the input and direction from Congress and that we remain fully committed to executing this legislation to make near and long term safety improvements that benefit the global aviation system. Now, the Act has more than 100 specific requirements that we are implementing to make aircraft certification and safety oversight more holistic, systematic, transparent, and effective.

I can say with confidence that we are doing more for certification oversight, and we are doing it more systematically than we were this time last year. For one, we are delegating fewer responsibil-

ities to manufacturers and demanding more transparency from them. At the same time, we are making use of their technical expertise as we prioritize our safety oversight functions. The FAA is also revising guidance and criteria that we use for determining significant modifications to an aircraft, so the proposed changes are evaluated from a whole aircraft system perspective and not just a single part.

We are promoting the use of safety management systems, or SMS, internally and externally. With SMS, an organization actively searches for and identifies safety issues and then addresses the root cause. From my own experience, I know that SMS works, but only if there is buy-in from everyone at all levels of the organization, from the C-suite down to the person pushing the broom on the shop floor. At the FAA, that means when anyone at any level flags an issue, I have got their back. No questions asked.

Because SMS works, we have not let the rulemaking process hinder manufacturers from using it now. Currently four design and manufacturing organizations including Boeing have voluntarily adopted SMS with six others in progress. As we know, human factors continues to be an important part of our work in evaluating aircraft and aircraft systems. We have expanded our evaluation of manufacturers assumptions about human factors that equipment manufacturers make when they perform system safety assessments, including pilot response times.

The FAA has initiated rulemaking to update regulations and the guidance for conducting system safety assessments on transport category aircraft. And we have increased our research on automation, including potential overreliance on automated systems and loss of basic piloting skills. To support this increased emphasis on human factors, we have hired 14 human factor specialists in our aircraft certification flight standards organizations. We are actively expanding our portfolio of data collection and analytics tools so that we can more effectively share safety data within the FAA and among industry stakeholders and international partners. Data is key to the early identification of potential hazards and safety problems.

Per the Act, we have a new contract with the Transportation Research Board that will help us discover emerging safety trends in aviation. Since aviation is a global system, the FAA is also working closely with the International Civil Aviation Organization and other international stakeholders to influence and adjust the maintenance and pilot training requirements for U.S. products operating under other civil aviation authorities.

Chair Cantwell, Ranking Member Wicker, and members of this committee, as you can see, the FAA is fully committed to a thorough and complete implementation of the Aircraft Certification, Safety and Accountability Act. We approach all of this work with humility and never take safety for granted.

However, we are not just doing this work because you have directed us to do it. We are doing it because it is the right thing to do for aviation safety. It is our mission. That is what the public expects, and it is the standard that we have set for ourselves, and the agency will accept nothing less. Thank you again for your sup-

port and your direction, and I look forward to answering your questions.

[The prepared statement of Mr. Dickson follows:]

PREPARED STATEMENT OF STEPHEN M. DICKSON, ADMINISTRATOR,
FEDERAL AVIATION ADMINISTRATION

Good morning Chair Cantwell, Ranking Member Wicker, and Members of the committee:

Thank you for the opportunity to be here with you today to discuss the Federal Aviation Administration's (FAA) approach to aviation safety oversight and our activities to implement changes to strengthen the aircraft certification process. Certifying aviation products is a critical aspect of the FAA's safety mission. We are committed to improving the certification process, including our oversight of functions delegated to aircraft designers and manufacturers. We have undertaken a number of initiatives to address this goal, as well as to comprehensively implement the requirements of the bipartisan Aircraft Certification, Safety, and Accountability Act ("Act").

Before we begin to discuss the specifics of certification reform implementation, on behalf of the United States Department of Transportation and everyone at the FAA, I would like to recognize, as we have before, the families of the victims of the Lion Air and Ethiopian Airlines accidents and extend our deepest sympathies and condolences to them. It has been 3 years since the Lion Air accident, and we have made significant progress on addressing the findings and recommendations that resulted from the numerous investigations and independent reviews of both accidents involving the Boeing 737 MAX. We will continue to prioritize our work to improve aviation safety to make sure this never happens again.

As mentioned, our efforts to implement certification reform are well underway. I want to thank Congress for enacting this landmark aviation safety legislation and for this committee's continued leadership on aviation safety matters. The Act has more than one hundred unique requirements that we are implementing in a holistic, systematic, transparent, and efficient manner to improve aircraft certification and safety oversight. The FAA is working diligently to implement the requirements while also ensuring that we are approaching our efforts as systemically and effectively as possible. Specific agency actions taken to implement the requirements of the Act are discussed more fully below; however, I also wish to note that, in general, our approach to aircraft certification and safety oversight has changed. The FAA's relationship with manufacturers is evolving. We are prioritizing oversight of manufacturers and working to focus that oversight on safety critical areas. We are delegating fewer responsibilities and demanding more transparency from them, and evaluating key assumptions prior to delegating functions in certain areas. While we continue to value their technical expertise, we are also committed to enforcing the highest safety standards for the manufacturers that we regulate. Our work to fully implement the Act is still in the early stages, and we are carrying it out with the urgency that it requires. The discussion below provides an overview of some of our accomplishments to date.

- *Safety Management Systems.* To ensure a holistic and proactive assessment and mitigation of hazards, and to support further improvement in safety performance, we continue to work with industry to increase transparency, strengthen risk management practices, and improve feedback channels between industry and the FAA. We believe that enhancing and promoting the use of safety management systems (SMS)—where safety issues are actively looked for and identified, and then the root cause is addressed—is integral to achieving this objective, and we have taken a number of steps toward increasing the use of SMS in the design and manufacturing environment. As required by the Act, we have initiated a rulemaking that contemplates requiring aircraft manufacturers that hold both a type certificate and a production certificate to adopt SMS, consistent with international standards and practices.¹ As part of this rulemaking, we will also evaluate potential SMS requirements for repair stations, certificate holders that conduct common carriage operations under part 135, and certain air tour

¹ RIN 2120-AL60, Safety Management System (SMS) for Parts 21, 91, 135 and 145 issued. <https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202104&RIN=2120-AL60>

operators under part 91.² We also created guidance for the development of voluntary SMS programs and are working closely with industry to encourage participation in voluntary SMS programs to further enhance safety across the entire aviation system. Currently, four design and manufacturing organizations have voluntarily adopted SMS with six others in progress. Boeing also established an SMS under the FAA's Voluntary SMS program as part of the settlement agreement. The voluntary programs have enabled the FAA to gain valuable experience on oversight of SMS for design and manufacturing organizations, and the lessons learned will help inform FAA's SMS rulemaking and policy development.

- *System Safety and Human Factors.* We are working on several initiatives to ensure system safety assessments and human factors assumptions are incorporated into the FAA's aviation safety policy and oversight. We have initiated a rulemaking to standardize regulations and guidance for conducting system safety assessments on transport category airplanes.³ In addition, the expert safety review panel that we established pursuant to the Act is meeting regularly to review the assumptions relied upon in aircraft design and certification of transport category aircraft—including assumptions regarding pilot response times. We are also developing new guidance for industry on the submission of safety critical information. There are several interrelated provisions regarding human factors and human systems integration. To address these, we have taken a number of steps to strengthen the foundation of aviation human factors safety research and to bolster the technical expertise within the Aviation Safety (AVS) organization. This includes developing a human factors education and training program, doubling the number of human factors staff within AVS, and realigning the hiring of technical advisors with the necessary technical expertise involved in critical safety decisions.
- *Global Collaboration.* To further international harmonization and collaboration with respect to aircraft type certification and continued operational safety, the FAA established the Changed Product Rule International Authority Working Group and held the first meeting in July 2021. This working group will develop recommendations for international policy and guidance to ensure proposed changes to an aircraft are evaluated from an integrated whole aircraft system perspective. The FAA is working closely with the International Civil Aviation Organization and other international stakeholders to influence and adjust the maintenance and pilot training requirements for U.S. products operating under the oversight of another civil aviation authority. In addition, FAA representatives have presented at and attended several webinars, work group meetings, and seminars, including a presentation at the 2021 Zhuhai International Flight Training and Safety seminar on topics of competency based pilot training and automation dependency. The FAA plans to continue this global engagement into the future, including seeking new opportunities to collaborate with civil aviation authorities and other international stakeholders to foster improvements in international safety standards and practices for aircraft design and certification, pilot training, and operational safety management. Additionally, to fulfill the requirement to ensure that pilot operational evaluations for aircraft type certifications utilize pilots from air carriers that are expected to operate such aircraft, the FAA has already begun to incorporate air carrier pilots into such evaluations.
- *Data.* We are actively expanding our oversight capabilities by advancing data collection and analytics tools to share safety data within the FAA and between industry stakeholders and international partners. These efforts include technological enhancements to the Aviation Safety Information Analysis and Sharing system to integrate new data sources and methods for safety analysis, which will improve data quality and accessibility to support risk-based decision-making. In addition, the FAA's new contract with the Transportation Research Board, established pursuant to the Act in June 2021, will aid the agency's effort to conduct annual analysis and reporting on current and emerging safety trends in aviation. As the aviation landscape continues to evolve, it will be increasingly necessary to bolster the FAA's use of safety data and collaboration with indus-

²The FAA is developing a final rule to require the use of SMS at airports certificated under Part 139. RIN 2120AJ38, Airport Safety Management System. <https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202104&RIN=2120-AJ38>

³RIN 2120-AJ99, System Safety Assessments for transport category airplanes issued. <https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202104&RIN=2120-AJ99>

try to identify potential hazards and safety problems and to solve these problems before they give rise to an accident or incident.

- *Integration of Certification and Oversight.* The Act requires the FAA to convene an interdisciplinary integrated project team upon the agency's receipt of every application for a new type certificate for a transport category airplane. The FAA previously commissioned the Integrated Program Management team comprised of subject matter experts from Flight Standards and the Aircraft Certification Service to assess current practices and policies and make recommendations for improving FAA oversight through the integration of design and operations. The best practices identified from this process are being applied to ongoing certification projects, and we intend to enhance the current procedures to incorporate additional requirements contained in the Act. The FAA is also revising our current Technical Advisory Board (TAB) process to use the TAB in all new and amended type certification projects. We anticipate implementing this policy next spring. The Act also directs FAA to establish an executive council to oversee the FAA Compliance Program. This program provides a framework for how the agency returns a regulated entity to compliance through comprehensive safety data sharing between the FAA and regulated entities. Pursuant to the Act's requirements, we established the FAA Compliance Program Executive Council to monitor the operation and effectiveness of the Compliance Program, and held the first meeting in August 2021. We also updated the Compliance Program order to reflect the implementation of the Executive Council and the Compliance Program Steering Committee.⁴
- *Culture of Safety and Excellence.* The FAA is committed to fostering a just safety culture, while providing transparency to improve safety, operational excellence, and efficiency. These efforts include promoting voluntary safety reporting, increasing workforce competencies, and attracting talented staff. In April 2021, we implemented the Voluntary Safety Reporting Program (VSRP) to provide a mechanism for employees to voluntarily report potential hazards and safety concerns without fear of reprisal or other repercussions.⁵ Preliminary data on VSRP usage indicates that employees are comfortable using the system and they are regularly using it to raise safety concerns. An added bonus of VSRP is that it promotes collaboration between employees and management for proactively addressing safety concerns and developing corrective action recommendations. To assess the effectiveness of these efforts and to meet the requirements of the Act, we will conduct annual internal safety culture assessments that include surveys of AVS employees in order to evaluate the safety culture and the implementation of VSRP programs.
- *Accountability.* A critical part of fostering a just safety culture is ensuring that we hold our people to the highest safety standards. In response to requirements in the Act, we have taken a critical look at our own internal oversight processes and taken steps to enhance accountability. This includes re-designating the Office of Investigations to the new Office of Investigations and Professional Responsibility and establishing investigative processes that are based on best practices identified from similar offices at other Federal agencies and from the FAA's experience, expertise, and other sources. Although our work is not yet done, we believe that incorporating these best practices will improve the effectiveness, efficiency, and transparency of the FAA's investigative process.
- *Delegation.* The Act requires the FAA to institute extensive and meaningful changes to the Organization Designation Authorization (ODA) program and our oversight of that program. To address these legislative requirements, we expect to implement significant changes to our policies and procedures for delegating certification authority to private entities. These changes include policy requiring FAA approval of individual ODA unit members for certain ODA types, and policy aimed at preventing interference with ODA unit members in performance of their duties. We are also standing up an expert panel to conduct a review of ODAs for transport category airplanes and make recommendations to the FAA based on that review. Additionally, as required under the FAA Reauthorization Act of 2018, we previously established the ODA Office to provide oversight and to ensure consistency of the FAA's audit functions under the ODA

⁴Federal Aviation Administration, *Federal Aviation Administration Compliance Program*, Order 8000.373B, April 22, 2021, at http://www.faa.gov/documentLibrary/media/Order/FAA_Order_8000.373B.pdf.

⁵Federal Aviation Administration, *Aviation Safety Voluntary Safety Reporting Program*, Order 800.375, February 02, 2021, at http://www.faa.gov/documentLibrary/media/Order/VS_8000.375.pdf.

program. In April 2021, the FAA realigned the ODA Office to report directly to the Associate Administrator for Aviation Safety. This reporting structure reflects the FAA's priority to oversee, standardize, and ensure consistency in the ODA system, as well as to facilitate many of the ODA reform requirements contained in the Act. To that end, the ODA Office anticipates adding more employees in Fiscal Year 2022, and hiring has already begun. The additional staff will allow the office to perform more outreach, identify best practices, and implement measures to maintain consistent oversight.

- *Certification and Continued Operational Safety Processes.* Ensuring the safety of aviation products through certification is an important function of the FAA, and we are continuously taking steps to enhance the type certification process. This includes revising guidance and criteria used for determining significant changes to best ensure that proposed changes to an aircraft are evaluated from a whole aircraft-level perspective, including human interface elements. We have also commissioned external reviews to evaluate our Transport Airplane Risk Assessment Model and type certification process. To address the Act's requirements to establish an appeal and issue resolution processes for certification decisions, we are developing an implementing order.
- *Innovation.* Aviation is incredibly dynamic, and it is imperative for the FAA to take steps to accelerate and expand the deployment of new technologies in order to reduce barriers and actively promote innovation that enhances the safety and efficiency of the National Airspace System. We recently established and staffed the Center for Emerging Concepts and Innovation to support certification of new aircraft and technologies by providing preapplication engagement with companies to identify a preliminary path to compliance. We are also taking steps to foster enhanced coordination across the FAA on emerging products and concepts.

Chair Cantwell, Ranking Member Wicker, I want to assure you, and each member of the committee, that the FAA is fully committed to thorough and complete implementation of the Aircraft Certification, Safety, and Accountability Act. As we continue this process, we remain committed to our transparent and accountable approach, which includes regular briefings on our progress with staff of the committees of jurisdiction, labor partners, industry stakeholders, and more. We will continue to assess our entire certification and oversight framework in light of past experience, industry growth, technological advancements, and innovation as we carry out our responsibilities for public safety. We approach all of this work with humility and do not take safety for granted. We are confident that we are making substantial and meaningful progress, and will continue to keep Congress apprised throughout this work.

The CHAIR. Thank you, Administrator Dickson. On the bill itself, just I want to get to some basic yes and noes if I could. The legislation in our mind, in crafting it, was a clear stop of what we thought was a continuation toward more delegation and a return closer to the elements of what DER was. Do you agree, yes or no?

Mr. DICKSON. I would agree with that. Yes, we have restricted—we have limited the amount of delegation that we are doing, particularly in the case of Boeing, but we are looking at across the entire ODA system as well.

The CHAIR. So would you answer these questions, has the FAA completed a workforce review recommended by the Department of Transportation IG in 2015 as it relates to your workforce needs?

Mr. DICKSON. We are in the process of completing that review in the context of the certification reform legislation. As I said, we have increased our number of human factors. Experts almost doubled our cadre there.

We have done a review of our chief scientists and technical advisors and using them as well. But that review is ongoing, and I look forward to working with the Committee as it is completed because I think that we need to continue to make sure that that is a dynamic process.

The CHAIR. Well we had a deadline for September 23, 2021, and certainly you could have written to Congress and said, we can't meet that deadline. But having a workforce that you know is the technical oversight necessary to do the reviews we think is step number one.

And when we look at the lack of technical oversight on certain issues in a changing dynamic aviation market, this is really problematic. And I think in Mr. Won's letter, he is basically talking about the fact that 53 people in an oversight office of 1,500 people on such the scale of aviation manufacturing is not enough. Would you agree?

Mr. DICKSON. We have increased our number of engineers in the BASOO, and our engineers on the production line as well. And we will continue to evaluate all of that going forward.

The CHAIR. This is the language I don't like, OK. We had a deadline. We would have loved to see an assessment of the workforce, something that would have said to Congress, here is where we think we are coming up short, here is what we think we need to do. So today, just like all the other IG reports, everything else, the comments back from the FAA are, we are working on this. We want to get on the same page about needs. We are about to go into our appropriation process.

And even though we have authorized various things in the past, we have appropriators who end up cutting these very necessary functions for the FAA to do a good oversight role. But if we just say for a deadline of September 23 of this year, we are continuing to work on it in the future, it hasn't given us the ability to hold you accountable, and that is what we are going to do. We have to do that because we need this system to work effectively for everybody, for safety and for economics.

So I want to get to, because my time is going to wind down here, the critical safety functions. And this was something our House colleagues worked on as well and put in civil penalties for violation of disclosure of this information. And what—I guess what I am saying is your process right now is following a tab process.

You know, the same process of oversight and collection by individuals that led us to the MCAS system. That group didn't catch MCAS. And what we have written into law is that we want an integrated system, if you will. Some people call it graybeards.

And we want those people at the beginning of the process. We want them reviewing the critical information and determining whether more oversight needs to be done. So do you think that your tab process is a fulfillment of the law?

Mr. DICKSON. We are adapting the tab process to comport with the legislation. So it is a good starting point, but this integrated project team that you are referring to is definitely a part of what we are doing going forward and how we are organizing ourselves, both for future certification projects and for projects that are ongoing now.

The CHAIR. But we have a certification going on right now.

Mr. DICKSON. Yes.

The CHAIR. So why wouldn't you have made a big priority setting up a critical information certification team now for the ongoing cer-

tification project? The reason I am bringing this up is, again, we have seen two instances here.

We are going to issue a report from whistleblowers before the end of the year. And what we are hearing from whistleblowers is the same that we have heard from the IG and others, and that is that line engineers had early warnings, whether it is the 787 battery issue or whether it was this issue related to synthetic air speeds or the complexity of automation and overload of pilots in the system.

But those line engineers weren't listened to, and that is why we want this critical information system integrated, set up immediately.

Mr. DICKSON. Yes, ma'am. And the voluntary safety reporting program that we have had in place is one mechanism. But the integrated program reviews are ongoing now. And that will be a big part of both existing projects and the new certification projects again going forward.

The CHAIR. I will come back to this, but I want to go to my colleagues. But I just want you to know I am not going to allow the law to be skirted here. This issue is about whether you are going to follow a process that allows us to see the work of the FAA, see that it is completed, and not just hear it is ongoing. Thank you. Senator Wicker.

Senator WICKER. Thank you, Senator Cantwell. Mr. Administrator, let me start off with safety management systems. You mentioned voluntary adoption of these. Can you give us the manufacturers who are engaged in that and making progress in voluntary as SMSs?

Mr. DICKSON. We have currently among the transport category, airframers, and engines, we have Boeing, Pratt and Whitney, and General Electric. And I would have to look, I believe Gulfstream is in there as well. And then there are a number of others in work.

Senator WICKER. A number of others?

Mr. DICKSON. Another—a number of other manufacturers. Six in the pipeline that we have not fully accepted.

Senator WICKER. OK, well, then supply us with those names on the record. There is supposed to be a notice of proposed rulemaking with regard to the mandatory SMSs. When will that notice of proposed rulemaking be issued?

Mr. DICKSON. Senator, we are making good progress on the SMS rulemaking. I anticipate that it will be, the NPRM will be next fall, about less than a year from now. And then we will have it out for public comment. And then we will proceed on from there.

Senator WICKER. Why that long?

Mr. DICKSON. Well, there is a lot of work that has to be done to justify the rule. And we are learning from the implementation of the voluntary programs that are out there now and to make sure that we get it set up correctly and that we are able to adjudicate all the public comments that we know will come in.

We are using that time to make sure that we have got a strong and sustainable SMS for manufacturers and for other segments of the aviation community as well.

Senator WICKER. Let me ask one question that I just have to ask. It doesn't deal with implementation of the statute, but it does deal

with safety. And that is the individuals we may lose from the workforce, because they simply do not intend to comply with President Biden's executive orders that require all Federal employees and Federal contractors to receive the COVID-19 vaccine. It seems to me that there are going to be a large number of individuals who will just lose their job, leave the workforce rather than comply with this.

Could you address what impact this vaccine mandate may have on your safety workforce?

Mr. DICKSON. Well, Senator Wicker, my focus is on safety and on running the safest and most efficient aerospace system in the world. And we have dealt with challenges throughout the COVID 19 pandemic, and we will make sure that we continue to operate safely, and that we manage our workforce appropriately well. And I certainly wanted everyone to—

Senator WICKER. You are going to need numbers, Mr. Administrator, to do that. Do you expect a significant drop in the workforce from Americans who just are not going to be told what they have to inject into their own bodies?

Mr. DICKSON. We are focused on complying with the executive order by November 22 within the agency. And I do not expect to lose a significant portion of our workforce. We will make sure that we are able to satisfy our safety mission.

Senator WICKER. Based on what information do you estimate that you will not lose a significant portion of the workforce?

Mr. DICKSON. Well, again, we, you know, the requirement is there. We are working with our employees as we have throughout the pandemic to make sure they are supported, and they have all the information that they need to make to make the best possible decisions. We have a very well-established process within the agency for handling our people.

Senator WICKER. Let's be mindful of that. With regard to the international engagement, how are the bilateral agreements working? And is there anything we need to do at the Congressional level to help you?

Mr. DICKSON. The bilateral agreements are working well but they do require constant engagement.

With respect to Europe in particular, my counterpart over at the Director General of Transport over in Europe and I held a bilateral summit on aviation safety in June to reinforce the importance and the alignment between the U.S. and the EU on aviation safety issues. As a matter of fact, I saw him again last week in Bogota and we will—we have continued that dialog and we will make sure that there is consistency and alignment across all the aspects of the bilateral agreement.

Senator WICKER. Thank you, Madam Chair.

The CHAIR. Thank you, Mr. Chairman. And Administrator, this is exactly your answer on SMS. Is exactly what I am talking about in skirting the law. It has been long known that we need to implement a mandatory SMS system.

So a voluntary system is not enough. The DOT IG found recently on October 21, 2021, the FAA oversight over SMS was not effective. So I think my colleague's questions here are not about whether you can do a voluntary system.

Again, when there is an oversight of a true SMS system required by an Administrative Procedures Act overseen by the FAA, you will be seen as how you hold them accountable, and we will be able to review that. Anything less is not meeting the letter of the law. Senator Tester.

**STATEMENT OF HON. JON TESTER,
U.S. SENATOR FROM MONTANA**

Senator TESTER. Thank you, Madam Chair and Ranking Member Wicker for holding this hearing. Thank you for being here too—and for your testimony. I am going to start with a kind of leading off where Senator Wicker was, except it deals with air traffic control towers. We have had a hard time of Montana, we have had a hard time getting those fully staffed under the best of circumstances.

And so the question becomes, do you anticipate losing any air traffic controllers once a mandate takes effect? And what are you doing to make sure that we have enough traffic controllers in our towers?

Mr. DICKSON. Well, thank you for the question, Senator Tester. And as I said a moment ago, you know, we have dealt with people issues throughout the pandemic. Safety and health of my workforce is at the top of the list in terms of being able to serve the public and our air traffic control operations.

I do not anticipate—you know, there is certainly potentially progressive discipline in the process, if we get to that point. But at this point, I do not anticipate—I am not hearing about any particular issues with respect to air traffic controllers staffing, but it is something we are focused on on a daily basis.

Senator TESTER. So do you have what percentage of air traffic controllers are vaccinated right now?

Mr. DICKSON. The data is incomplete. The requirement for the controllers to a test is a very manual process and the reporting is uneven around the system. So I don't have an accurate metric to share at this point.

Senator TESTER. So that is a problem. And it is a problem—I don't know, it is a bigger problem if you don't know it and that you don't know what the exposure is here, if you don't know how many people are not vaccinated. Does that makes sense to you?

Mr. DICKSON. That is correct, yes.

Senator TESTER. So what—are you doing anything special that has been effective in encouraging folks to get vaccinated?

Mr. DICKSON. We are. We are conducting—we are working very closely with our labor partners to encourage—we are encouraging broadly. The Secretary and I are sending regular updates and encouraging the workforce to do the right thing and get their vaccines. And we will continue to do that on down to the individual basis.

Senator TESTER. Yes, it is a concern. I think it will be a real train wreck if you are not on top of it. I want to talk about an annual safety culture survey that is required hasn't been done yet, and there was one put out in August 2020. At least—yes, a safety culture assessment report.

That August 2020 report had some pretty alarming statistics in it, 49 percent FAA employees indicated they believe that safety

concerns or instances will not be addressed. 43 percent—this was in August of last year. 43 percent believe the FAA delegates too many certification activities to the industry. 34 percent, the employees said the fear of retribution is one of the reasons employees don't report safety issues.

So we are a year later now, and we don't have that annual safety culture survey. When can we expect it?

Mr. DICKSON. Senator, the safety culture survey was done as a baseline as we set up the Voluntary Safety Reporting Program, and that started in April, and we wanted to let that run for a period of time. So we will be doing the survey in a—within the next few months and then renew it on an annual basis going forward. But that—this really gave us a good baseline for where we are starting from.

Senator TESTER. Yes, so I think it is required by law that—in fact, if you want to go attorney on you, Section 132 of the ACSAA requires it.

Mr. DICKSON. And we will be conducting it on an annual basis. That is correct.

Senator TESTER. But shouldn't it have been done by now?

Mr. DICKSON. Well, we—there is going to be some—it will be more beneficial to do it with the voluntary safety reporting program that we put in place, which is extremely important in terms of driving this kind of transparency and openness that I want and will give us a better baseline on how we are doing with that program.

Senator TESTER. This—not unlike the previous question, this leads me to it—I mean, if you are not serving as mandated, then how can the FAA inform us and the public that the culture is improving?

Mr. DICKSON. We are surveying, Senator. We are going to conduct that survey and we will be doing it on an annual basis.

Senator TESTER. Alright. Thank you, Madam Chair.

The CHAIR. Senator Fischer.

**STATEMENT OF HON. DEB FISCHER,
U.S. SENATOR FROM NEBRASKA**

Senator FISCHER. Thank you, Madam Chair. Administrator, it has been a little over 10 months since the Aviation Certification, Standards and Accountability Act was signed into law, and I was proud to support that legislation that also included key reforms to the aircraft certification process. When does the FAA hope to achieve full implementation of those reforms?

Mr. DICKSON. Well, we are working on those very aggressively now. We have achieved currently 15 out of 19 of the time limited items, but there are others—this work will go on for some period of time with the SMS rulemaking and the surveys that we just talked about.

So there will be a continuous improvement process as we go forward.

Senator FISCHER. So you really don't see an end date because you plan on those other four areas to have a continuous process—?

Mr. DICKSON. Well, the other four areas—one of the four areas was the expert panel for review of Transport Category ODA, and

that required some work with our labor partners. That took a couple of months.

And then we had to determine, we had to put a solicitation out for industry participants to comport with the requirements in the law. And that kind of work is ongoing. It takes a while to do that right. But we are fully committed to doing it and we will see the results of that work here very soon.

Senator FISCHER. Thank you. The Act also directs the FAA to develop a better understanding of the human factors when certifying aircraft, and the bill specifically requires the FAA to account for pilots of all skill levels, both international and domestic pilots. What countries are you working with to better understand the pilot skills that we see across the globe?

Mr. DICKSON. Well, we are working through multiple countries. We start with the states of design for transport category aircraft, particularly Europe, Brazil, and Canada, and the U.S. but we go beyond that. We work through ICAO. We spearheaded—

Senator FISCHER. Which is?

Mr. DICKSON. The International Civil Aviation Organization. And we spearheaded the set-up of a pilot training and licensing panel. We also worked bilaterally and regionally with our aviation safety counterparts around the world.

As I said a few minutes ago, I was in Bogota, Colombia, working with the Latin American regulators, bilaterals with several Latin American regulators last week and talking about the work that we are doing on things like manual flying skills, flight path management training, and also we will, in the certification process, we will require going forward, as we did with the 737 MAX, the use of international pilots of various experience levels and training backgrounds to help with the validation of the operational testing on the aircraft as well.

Senator FISCHER. Has cooperation been good when you are working with these other countries? And I guess, what have you learned from them?

Mr. DICKSON. Well, there are—I think the important thing is that we are leading the efforts on flight path management and use of automation property, use of automation, manual flying skills. I think around the world, some of these issues have not gotten the attention that they need.

Senator FISCHER. What issues?

Mr. DICKSON. The issues around manual flying skills, and also information management in the cockpit. You know, when you think about it, use of iPads, you know, on the flight deck or electronic charting, the way that individuals process information on the flight deck, all of that has changed in recent years.

And so it is very important that pilots are able to maintain situational awareness on their energy state and on the flight path of the aircraft. And that is what we are working on to make sure that we promulgate those issues with regulators around the world.

Senator FISCHER. OK. During your last appearance before the Committee, I asked you if you had concerns about the pilot reliance on automation, and you said, “automation is a benefit, but the individual still has to be engaged with the machine.”

So when you are working with the international partners to establish those training standards, are you comfortable with where we are headed and especially with regards to the automated system? Are the pilots feeling comfortable about that?

Mr. DICKSON. Flight path management is a—is at the core of the concern that I have. And as a matter of fact, we are—we have in draft and we have for public review shortly, a new advisory circular that our chief scientist for human factors has been working with the aviation community on for several years.

And it will address guidance material and potential application to air carrier training programs for flight path management, which is knowing what your clearance is, putting the airplane there, and then monitoring it to make sure that it stays there. Also, manual flying skills and information management that I was talking about before.

So all of these are extremely important to maintain the situational awareness around the aircraft. And we will use this at ICAO, but we will also help regulators around the world implement these principles into their oversight and I think for training programs as well. And that will be an effort that we will undertake here in the coming years.

Senator FISCHER. Thank you, Madam Chair.

The CHAIR. Yes, thank you. Senator Blumenthal.

**STATEMENT OF HON. RICHARD BLUMENTHAL,
U.S. SENATOR FROM CONNECTICUT**

Senator BLUMENTHAL. Thank you, Madam Chair. Administrator Dickson, when the Department of Transportation Office of Inspector General investigated the 737 MAX, it found that the FAA had increasingly delegated to Boeing the assessment of flight controls and stabilizer plans. Part of what we did in response was to seek to end that delegation and improve the certification processes.

I am of a mind that we need to do more. The 737 was certified in the 1960s, but Boeing was able to gain approval for its MAX aircraft under an amendment to an over 50 year old type certificate. And in response to the new law, the FAA waited until September 16, 2021, to issue a one page policy memo limiting delegation, which was one of the root causes of issues found by the Inspector General.

Senator BLUMENTHAL. Section 106 of the law was immediately effective on December 27, 2020, so there was a clear lag between that December passage of the law and the implementation of this one page delegation. And what accounted for the delay?

[The information referred to follows:]



Federal Aviation Administration

Memorandum

Date: September 16, 2021

To: Aircraft Certification Division Directors

From: Earl Lawrence, Executive Director, Aircraft Certification Service **EARL AIR-1**
LAWRENCE Digitally signed by EARL
 A LAWRENCE
 Date: 2021.09.16
 09:33:20 -0400

Subject: Limitation on Delegation Memorandum

The purpose of this memorandum is to provide guidance regarding implementation of Aircraft Certification, Safety, and Accountability Act (ACSAA)¹ Section 106. This guidance is directive for all Aircraft Certification Service (AIR) personnel and is effective upon the issuance of this memo. The Federal Aviation Administration (FAA) is currently developing processes for validating human factors assumptions and will issue updated policy document(s) to reflect the limitation on delegation described below. This memo will remain in effect until these process changes are complete.

Guidance

With respect to a critical system design² feature of a transport category airplane³, AIR personnel must not delegate any finding of compliance with applicable airworthiness standards, or the review of any system safety assessment required for the issuance of a certificate, including a type certificate, or amended or supplemental type certificate, under Title 49 of the United States Code § 44704, until the FAA has reviewed and validated any underlying assumptions related to human factors.

¹ ACSAA Section. 106. Limitation on Delegation. Section 44702(d) of title 49, United States Code, is amended by adding at the end the following: "(4)(A) With respect to a critical system design feature of a transport category airplane, the Administrator may not delegate any finding of compliance with applicable airworthiness standards or review of any system safety assessment required for the issuance of a certificate, including a type certificate, or amended or supplemental type certificate, under section 44704, until the Administrator has reviewed and validated any underlying assumptions related to human factors."

² ACSAA Section. 106. Limitation on Delegation. Section 44702(d) of title 49, United States Code, is amended by adding at the end the following: "(4)(C) critical system design feature includes any feature (including a novel or unusual design feature) for which the failure of such feature, either independently or in combination with other failures, could result in catastrophic or hazardous failure conditions, as those terms are defined by the Administrator."

³ ACSAA Section. 137(6) "transport airplane" means a transport category airplane designed for operation by an air carrier or foreign air carrier type-certificated with a passenger seating capacity of 30 or more or an all-cargo or combiderivative of such an airplane.



Federal Aviation Administration

Memorandum

Date: October 15, 2021

To: See Distribution List

From: Chris Rocheleau, Acting Associate Administrator for Aviation Safety  Digitally signed by
CHRISTOPHER J.
ROCHELEAU
Date: 2021.10.15 13:12:42
+0400

Subject: FAA Assignment of Advisors for Organization Designation Authorization (ODA) Engineering and Flight Test Unit Members (UM) at Boeing, General Electric, and Pratt & Whitney

Memo No.: AVS-2021-PM02

Purpose

This policy prescribes that the FAA Organization Management Teams (OMT) for Boeing, Pratt & Whitney and General Electric must assign FAA advisors for the engineering and flight test UMs of the Type Certification (TC) ODA at these ODA holders.

Background

Section 107 of the Aircraft Certification, Safety, and Accountability Act, Pub. L. 116-260, (the Act) amended section 44736 of title 49 of the United States Code. Specifically, section 44736, *Organization designation authorizations*, now requires that the FAA Administrator assign FAA aviation safety personnel with appropriate expertise to serve as advisors to the ODA UMs that are authorized to make findings of compliance on behalf of the Administrator.

The FAA must assign advisors to UMs at an ODA holder that is a manufacturer that holds both a type and a production certificate for

- (a) Transport category airplanes with a maximum takeoff gross weight greater than 150,000 pounds; or
- (b) Airplanes produced and delivered to operators operating under part 121 of title 14, Code of Federal Regulations, for air carrier service under such part 121.

The requirement for the FAA to assign advisors to ODA UMs also applies to an ODA holder that is a manufacturer of engines for an airplane described above.

Current TC ODA holders that meet the applicability requirements are Boeing, General Electric, and Pratt & Whitney.

Policy

No later than 60 days after the date of this memo, and on an ongoing basis thereafter, the OMTs for the Boeing, General Electric, and Pratt & Whitney TC ODAs will assign the FAA engineering and flight test members of the Core OMT¹ as advisors to the engineering and flight test UMs at these ODAs. Each advisor's name, technical discipline and/or area of responsibility, and contact information will be provided to the ODA administrator. ODA administrators must ensure that this information is shared with each engineering and flight test UM.

Core OMT UM advisors have the following responsibilities:

- a) Serve as an additional resource for technical and procedural questions that cannot be adequately addressed through the ODA administrator and address any specific concerns that the UM has with the technical or procedural direction provided by the ODA holder.
- b) Communicate on an ongoing basis with assigned UMs in their discipline to ensure that the UMs are knowledgeable of relevant FAA policies and acceptable methods of compliance.
- c) Monitor the performance of assigned UMs to ensure consistency with FAA policies and methods of compliance. Monitoring may be through any means appropriate for the complexity of the work performed and the particular advisor's visibility of that work (e.g., project participation, sampling of UM work, or by review of an ODA holder's self-audit records).
- d) Document the need for ODA holder corrective action when UMs performance is not satisfactory.

At a minimum the responsibilities of OMT UM advisors are required in support of engineering and flight test UMs that perform the authorized functions related to TC ODA activities. Further expansion of the advisor role beyond TC ODA activities or to other types of UMs is at the OMT's discretion.

For more information, please contact Kevin Kendall at (405) 954-7074 or kevin.kendall@faa.gov, or Charles Shure at (206) 231-3620 or at charles.shure@faa.gov.

¹ Core OMT members are defined in policy memo no. AIR100-17-160-PM04, *Guidance on Organization Designation Authorization (ODA), Organization Management Team (OMT) Membership* (May 24, 2017).

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General Electric ODA Administrator
Pratt and Whitney ODA Administrator



Federal Aviation Administration

Memorandum

Date: October 15, 2021

To: See Distribution List

From: Chris Rocheleau, Acting Associate Administrator for Aviation Safety

Digitally signed by
CHRISTOPHER J.
ROCHELEAU
Date: 2021.10.15 13:12:00
+0400

Subject: FAA Approval of Organization Designation Authorization (ODA) Unit Member (UM) Selections Made by Type Certification (TC) ODA Holders

Memo No.: AVS-2021-PM01

Purpose

This memorandum requires FAA Organization Management Teams (OMT) to review and either approve or reject all new or expanded ODA UM selections made by TC ODA holders.

Background

Section 107 of the Aircraft Certification, Safety, and Accountability Act, Pub. L. 116-260 (the Act) added section 44741 to title 49 of the United States Code. Section 44741, *Approval of organization designation authorization unit members*, requires the FAA Administrator, beginning January 1, 2022, to review and approve or reject all ODA UM selections made by an ODA holder "...engaged in the design of an aircraft, aircraft engine, propeller, or appliance." This memorandum implements this statutory requirement.

Additionally, FAA Order 8100.15B, *Organization Designation Authorization Procedures*, requires the FAA to review all UM selections made by the ODA holder for at least the first two years after granting an ODA. The objective of this requirement is to ensure that ODA holders develop and follow UM selection procedures, and only recommend UMs that meet FAA qualifications. This memorandum continues, indefinitely, this FAA involvement for TC ODAs.

Policy

Beginning 60 days after the date of this memo, all new UM selections made by a TC ODA holder must be reviewed, and either approved or rejected by the OMT no later than 30 days after the OMT receives notice of such a selection by an ODA holder. An ODA holder may only add a new UM to the ODA holder's UM listing if the UM selection is approved by the OMT. Changes to existing UM authority are considered UM selections under section 44741 and must be reviewed, and either approved or rejected by the OMT under the same conditions as a new UM selection. ODA holders must continue to follow the existing UM application and selection requirements in

8100.15B and select only qualified UMs. The application process required by 8100.15B meets the requirements of 44741(b)(2). The UM qualifications included in or referenced by 8100.15B meet or exceed the qualifications in section 44741 paragraph (c).

The OMT UM selection approval or rejection process also applies to ODA holder selections of individuals who are existing designees (e.g., Designated Engineering Representatives), or UMs at other ODAs. The OMT must document, in writing, its approval or rejection of ODA holder UM selections and provide such documentation to the ODA holder. The ODA holder must provide a copy of the approval or rejection to the UM.

ODA holder prescreening of proposed UMs as part of an ODA holder's UM selection process continues to be required, as is the ODA holder's responsibility for selecting qualified UMs in accordance with the ODA holder's approved procedures. The OMT will continue to oversee UM selections made by the ODA holder, consistent with existing OMT responsibilities detailed in FAA Order 8100.15B.

Within 180 days from the date of this memorandum, all TC ODA procedures manuals must incorporate procedures consistent with the statutory requirement for FAA approval of all UM selections before the TC ODA holder adds the UM to its UM listing. In the interim, when a procedures manual allows selection of a UM without OMT approval, it will not be a procedures manual violation to forward these selections to the FAA for approval as now required by section 44741, and implemented by this policy memo.

Each TC ODA OMT must track their UM review performance to include the number of reviews completed within 30 days, the number of reviews exceeding 30 days, and the number of rejected selections with the reason for each rejection. This information must be provided to the ODA Office, AVS-6, in the form, manner, and schedule established by that office.

If you have any questions, please contact Kevin Kendall at (405) 954-7074, kevin.kendall@faa.gov, or Charles Shure at (206) 231-3620, charles.shure@faa.gov.

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All TC ODA Holders

Mr. DICKSON. Senator, we have used various mechanisms to implement the provisions of the law as quickly and most expeditiously as we possibly can while we go through the formal process of developing orders.

And the direction to restrict delegation without validation of the assumptions for critical system design features actually was in place very early in 2021. So I will have check on the timing that you are referring to.

Senator BLUMENTHAL. Well, the timing of that many months, I think, is symptomatic of broader problems in terms of prompt response to new laws and issue rules and undertaking rulemaking, and a number of my colleagues already highlighted that problem in other areas. Which brings me to the October 20, 2021, Inspector General report finding that the FAA's oversight of American Airlines was not as rigorous or robust as it should have been.

The report states the FAA, "lacks effective oversight controls," to make sure that American is addressing the root causes of problems that they fix. What is the FAA going to do in response?

Mr. DICKSON. Well, Senator, thank you for the question. Our oversight, our internal processes also identified these issues, and we do need, and we have—we are putting in place mechanisms, for example, for professional development of our inspectors so that they can do more effective root cause analysis, which is part of that oversight for safety management system.

So we concurred with most of those recommendations, and we already have plans underway to address them and close those gaps.

Senator BLUMENTHAL. What is the timeline for fulfilling those plans?

Mr. DICKSON. I would have to get back to you specifically. But much of that work is already underway.

Senator BLUMENTHAL. Let me ask you about a similar issue. The original 737, as I mentioned, was certified in the 1960s. I continue to have concerns about the process of modifying the aircraft without a full and robust certification that takes into account the impact of the modifications on the functioning of the entire system. Do you share those concerns?

Mr. DICKSON. We—as required by the legislation and also the various reviews and investigations, we are examining changes to the criteria for what would require a new type certificate.

We want to balance that with beneficial safety improvements during a product service life. We don't want to—we want safety improvements to come to the fore, but we need some criteria on that. And so we are—we have commissioned a mitre to look at the criteria for making those decisions, and we are also working with our international partners. We began meeting with them in July.

We chartered the International Authority Change Product Rule Working Group that is meeting on a regular basis to make sure that these rules are harmonized around the world, regardless of manufacturer.

Senator BLUMENTHAL. Thank you. I look forward to hearing more about what you are doing on all these issues. Thank you, Madam Chair.

The CHAIR. Senator Blackburn.

**STATEMENT OF HON. MARSHA BLACKBURN,
U.S. SENATOR FROM TENNESSEE**

Senator BLACKBURN. Thank you, Madam Chairman. Administrator Dickson, thank you so much for coming back before us today. The FAA issued a safety alert on 5G interference to aircraft, and I want to talk with you about that because according to Bloomberg Government, the agency stated that and I am quoting, "action might be required to address potential interference with sensitive aircraft electronics."

And it is my understanding that there are 39 countries that are currently using the C-band spectrum for 5G services without any interference to aviation. So are you taking this evidence into consideration?

Mr. DICKSON. Thank you, Senator. It is—and I appreciate the question. First of all, my focus is on aviation safety, and I need to make sure that the safety of the public is protected. But I will tell you in no uncertain terms that 5G in this spectrum and aviation, particularly radio altimeters, are the primary concern. They can co-exist. And we are working very closely with the FCC. We have had recent engagement with the telecom companies. And we will figure this out so that 5G and aviation safety can coexist.

Senator BLACKBURN. OK. Well, in Europe, you have got two dozen countries that have been using 5G for 3 years, including in the same spectrum band planned to be used here in the U.S. They have had zero adverse occurrences and zero claims of interference. So how are you working with them to ensure that there are no issues and that you are learning from their experience and maybe even adopting some of their best practices?

Mr. DICKSON. Well, again, it is a great question. The use of that spectrum in terms of power levels and specific deployment locations is different in different parts of the world. So it is a bit of an apples to oranges comparison. But the standard setting bodies, RTCA in the U.S. and EUROCA in Europe are both looking very closely at these issues.

And I do anticipate there will be some modifications eventually over time that will need to occur to some of these avionics. But in the short term, again, we are working very closely with the telecom industry and the FCC to make sure that again the 5G deployment can occur, but that it can be done without an adverse impact to aviation safety.

Senator BLACKBURN. Well, and I would think that there are plenty of lessons that you can learn from Europe since they are using the same band. Is that correct?

Mr. DICKSON. That is correct. Europe, Japan, others. And again, all of these deployments are somewhat different than what is planned in the U.S., but we are certainly learning from each one.

Senator BLACKBURN. Very good. OK. In your testimony, you noted that, and I am quoting now, "it is imperative for the FAA to take steps to accelerate and expand the deployment of new technologies in order to reduce barriers and actively promote innovation." So I want you to elaborate on this. What specific steps are you taking to reduce barriers and promote innovation within the FAA?

Mr. DICKSON. Well, I think a good example is our AUS Office. It works across—which does our drone integration. As you know, we have the rulemaking them around remote identification. We have engaged the industry on the next step in that rulemaking, which is beyond visual line of sight.

But what we need to do is work across the various lines of business. In other words, air traffic, aviation safety, airports, maybe even commercial space. And that is an enterprise approach that, across disciplines, that has not been as necessary with traditional manned aviation.

And so we are really taking a data driven enterprise approach and our AUS Office will help us do that in terms of breaking down those barriers between disciplines at the FAA.

Senator BLACKBURN. Excellent. Thank you. I yield back.

The CHAIR. Thank you, Senator Klobuchar.

**STATEMENT OF HON. AMY KLOBUCHAR,
U.S. SENATOR FROM MINNESOTA**

Senator KLOBUCHAR. Thank you very much, Madam Chair, and thank you for holding this important hearing. Thank you for being here. I also wanted to express my sympathies and appreciation to Nadia and Michael Stumo, who are here with us today. They lost their daughter, as we know, Sammy Rose, in the crash in Ethiopia. We also lost a Minnesotan in that crash, and I want to acknowledge him as well, Codd Hussein from St. Cloud, Minnesota.

I am glad that we passed this bill. It was really, really important to pass this bill, and I want to thank the chairwoman for her leadership. But now we have to make sure it gets implemented. That is always the trick. We can pass whatever bills we want, but we want to make sure that it gets done.

Mr. Dickson, in your testimony, you highlighted a voluntary safety management system for manufacturers, and I know that you noted that several manufacturers, I think you said four, are voluntarily adopting SMS. Does the FAA have plans to make SMS mandatory for manufacturers?

Mr. DICKSON. Yes, Senator. We have rulemaking underway, and we expect the NPRM to be out for public comment next year.

Senator KLOBUCHAR. OK. And when do you think that will get done?

Mr. DICKSON. It will depend on the administrative process associated with rulemaking. But we are learning a lot from the programs that we have out there now. SMS has been very successful in the air carrier community and applying it to manufacturers is a somewhat different paradigm.

And so we are using that data and interaction and the oversight that SMS enables to make sure that we get the best possible initial proposed rule out there.

Senator KLOBUCHAR. OK. I will ask another question on the record, but I know that Senator Cantwell asked about workforce and how important it is to have a qualified people to do that. I will ask you that on the record.

What steps has the FAA taken to establish international safety standards for foreign pilots? And how will you ensure that pilots and airlines are complying with those standards?

Mr. DICKSON. It is a great question. We have spearheaded the implementation of a pilot training and licensing panel at the International Civil Aviation Organization. We did that about 2 years ago.

The FAA chief scientist for human factors is providing leadership as well as one of our top training subject matter experts, and that group continues to work to this day. But we also take what we have done in the U.S. with upset prevention and recovery training, which is required for U.S. carriers now, and then we are promulgating that around the world.

And as I said, I had several bilaterals with my Latin American counterparts last week. We will work with them to help them implement the kinds of beneficial training improvements that we undertake in the U.S.

Senator KLOBUCHAR. Do you have a timetable for that?

Mr. DICKSON. It will be ongoing work. The next—I think the next significant step is at the ICAO assembly, which is coming up next August, and that will—but there will be work that will be ongoing between now and then.

Senator KLOBUCHAR. In your testimony, you noted plans to update FAA policies in order to prevent fraud in the self-certification process. How can we trust that the updated self-certification process will not lead to cost saving shortcuts that endanger passengers?

Mr. DICKSON. I have made—Senator, I have made it very clear from day one that safety cannot be compromised. It has to be our top priority. And we have to make sure both within the agency and those that we oversee, that business pressures, production pressures, operational pressures do not overcome safety.

And so that is what we are all about, making sure that we use the information that we get from our workforce and that they do the same thing to drive beneficial transparency and safety improvements.

Senator KLOBUCHAR. Do you agree this is a bill—I believe the Safe Skies Act, but do you believe the cargo pilot should operate under the same fatigue rules as commercial airline pilots? This is a bill I have with Senators Cantwell, Blumenthal, Markey and Gillibrand.

Mr. DICKSON. Well, there is no question that appropriately managing fatigue among pilots is critical to safety, and we have a requirement for fatigue risk management plans that have to be submitted every 24 months. We are not seeing anything in the data with the safety systems there.

As you know, that happened a number of years ago. So it is something that we would certainly be interested in working with you on.

Senator KLOBUCHAR. And you need to be concerned on that. And then finally on cybersecurity. As we see across industries, there is more and more concern about what is going on, whether it is the electricity grid, whether it is aviation.

Do you believe the FAA currently has sufficient resources and workforce to protect data, defend the national airspace system from the growing number of cybersecurity threats?

Mr. DICKSON. I receive regular updates and I have been out to our command center several times on our cyber capabilities. And

we are well-positioned currently, but it is something that we need to be constantly vigilant about to make sure that we reduce our attack surface, and we can continue to serve the public.

So I think we are well-positioned now, but it is an area of focus for us to make sure that we continue to bring on the workforce that we need in that area.

Senator KLOBUCHAR. OK. Thank you.

The CHAIR. Senator Sullivan.

**STATEMENT OF HON. DAN SULLIVAN,
U.S. SENATOR FROM ALASKA**

Senator SULLIVAN. Thank you, Madam Chair. Administrator Dickson, good to see you. And I want to thank you and commend you for the work you and the FAA did on commissioning the FAA Alaska Aviation Safety Initiative. And as you know, sir, this came out of the February 2020 NTSB report in the February—which looked at a 10-year period and noted the very high accident rates in Alaska, the high fatality rates in Alaska relative to any other communities, any other parts of the country.

So I want to ask, although it is not a budget document, the Aviation Safety Initiative report, as it relates to Alaska, certainly points out features in which we need improvement. And I always like to say yes, it is expensive to help smaller communities like mine, but I have over 200 communities that aren't even connected by roads. If the Federal Government helped us build roads as opposed to shutting down our ability to build roads, we wouldn't need this kind of infrastructure.

But as you know, we need it dramatically and it is all about safety. So how will you use that Alaska Aviation Safety Initiative report to prioritize funding initiatives to be put in the budget with the FAA?

Mr. DICKSON. Well, thank you, Senator. And I—you know, as you and I have discussed, I understand the importance of aviation to Alaska, and Alaska to our economy and our aviation system. The answer to your question is the FAASI will help inform us on our resource decisions and what our resource needs are. We have identified funding, just as one example, for the equipment takeover that the state has requested, and look forward to working with you and the state to address long-term capital needs even beyond what is in the report itself.

Senator SULLIVAN. Good. I appreciate that. Again, I want to thank you for your focus on this. It is very much needed for my constituents, but anyone who comes up to Alaska, right. I mean, unfortunately, we have too many crashes. And so, Madam Chair, I am looking forward to working with this committee and the State of Alaska and the FAA on these important budgetary prioritizations. Let me mention another one.

You know, Alaska laid the groundwork for the nationwide deployment of ADSB, known as NextGen. And yet the majority of Alaska is without coverage in airspace that is not classed to require coverage, even in congested areas where there has been some concerns in terms of airspace like in the Bethel region.

Do you think it is time for the FAA or Congress to revisit options in that area with regard to NextGen to provide aircraft owners

with the avionics equipment that is needed, particularly in places that I mentioned that don't have the coverage?

Mr. DICKSON. Well, Senator, I want to tell you, you know, safety is certainly a shared priority. And again, I realize the unique aspects of aviation in Alaska with the number of aircraft and how communities rely on aviation to survive. And I know the stakeholders, I am aware that they have asked for a second capstone project, as you talked about. And I think the first one was a great success. You can use as a template, and we look forward to working with you and the stakeholders up there to see what that might look like.

Senator SULLIVAN. Yes, it was. Let me ask one final question in—I have been trying to determine an exact comparison of how a safety related infrastructure funding makes it to the Alaska region as compared to the rest of the U.S.

And my staff has reached out on an accounting of receipt expenditures, budget, proposed expenditures for air traffic organizations' facilities and equipment, and was surprised to hear that the FAA doesn't track ATOF and e-spending by state or even by service center. And, you know, our FAA in Alaska, as you know, they do heroic work not just for Alaska, but for the country as planes are flying over to Asia.

We have 586,000 square miles of land and almost 2—close to 2.5 million square miles of airspace. But there has been no accounting—it has been difficult to get accounting for the funding of just the Western service area. Do you have or can you provide for a future a breakdown of where those costs and dollars are being spent? I think it is important for us in the Congress to be able to see comparisons with regard to different regions, at least regions, if not states.

Mr. DICKSON. Well, I am aware of the request, and we are working on it. Look forward to working with you. Obviously, it is a Federal system and expenditures are not tracked normally by jurisdiction. But I think that there is a way to get you the information.

Senator SULLIVAN. Do you think it is useful information? We—I mean, I think it would be useful.

Mr. DICKSON. I think if anyone on the Committee, yourself included, think that it is useful information, we will endeavor to provide an information that is useful to you.

Senator SULLIVAN. Great. Thank you very much. Thank you, Madam Chair.

The CHAIR. Yes, thank you. Senator Baldwin is next and then followed by Senator Duckworth, who was on remotely, unless one of our colleagues from the other side of the aisle appears. I am going to run and vote, and I thank Senator Baldwin for taking over the Chair while I am gone.

**STATEMENT OF HON. TAMMY BALDWIN,
U.S. SENATOR FROM WISCONSIN**

Senator BALDWIN. Yes. And I want to thank you, Chair Cantwell, for holding this hearing today. And thank you, Mr. Dickson, for your appearance here. This committee passed necessary legislation last year in response to the Boeing 737 MAX crashes. And it is

critically important that we follow through with oversight as the FAA continues to implement the new law.

Mr. Dickson, about a month ago, the Federal Aviation Administration announced that airports are no longer required to use firefighting foam that contains PFAS. However, that announcement is limited in its effectiveness as the FAA has not authorized the use of alternative foams. Airports in their neighboring communities in my state see this as an empty gesture.

I believe it misses the intent of Congress's direction in FAA reauthorization. Residents in these communities deserve more immediate action to protect their drinking water. So what are the FAA's next steps to ensure that airports are able to transition to PFAS-free firefighting foam? And on what timeline can we expect that to happen?

Mr. DICKSON. Thanks for the question, Senator Baldwin, and this is a very important issue that we have been working very diligently. And we fully respect the intent of Congress in the legislation, and we are working to do this as rapidly as we possibly can.

We have got to balance the effectiveness of the firefighting foam, which is really important for public safety in the event of a fuel fire, along with the removal of the PFAS or free foams. To that end, we built a test facility, and we were interrupted somewhat by COVID because of an inability to be able to get onsite for some period of time. But we have already conducted over 400 tests of 15 types of foam. We have not found one yet that has adequate performance.

I have actually seen, witnessed some of these tests myself, and it would be very concerning to use any one of these because it is just not as effective at putting the fire out. So in the meantime, we have taken steps that basically free airports from the use of PFAS foam for any, you know, testing certification.

We have got recapture equipment out there where it doesn't need to be discharged anymore. And we will continue to do that. Really, the only occasion where PFAS would need to be—PFAS foam would need to be used is for an actual aircraft fuel fire. For hot brakes, anything else, they don't discharge anything. We are also working very closely with the DOD because this is based on a military specification.

And I am optimistic that we will have new standards set by January 2023 and working very closely with DOD on the research. We do the effectiveness part of the research, and they do the chemical composition.

Senator BALDWIN. Mr. Dickson, in previous hearings, we have discussed my bipartisan American Aviator Act. That legislation seeks to expand flight training programs for veterans who are seeking jobs as commercial airline pilots.

Senator Hoeven and I secured \$10 million in the Fiscal Year 2020 and 2021 appropriations bills for our Veteran Pilot Training Program. I am concerned that the FAA has yet to make these funds available. While I was pleased to see FAA recently move forward with other aviation workforce development grants, it is beyond time that we put this available funding for Veterans Pilot Training Grant Program to use.

So could you provide me with an update of when you can—when we can expect to see the notice of available funding for Veterans Pilot Training Grant Program?

Mr. DICKSON. Thank you for the question, Senator Baldwin. This is something that is really important, and we have—this is a novel grant program for us, and it took some time to set up the specific parameters. We are making good progress.

With respect to the veterans pilot training grants, we are driving to issue the first grant solicitation within this calendar year. So I anticipate that you will see the first snowfall within the next few weeks.

Senator BALDWIN. Very good. Alright. Senator Moran, I will now recognize you for questions.

**STATEMENT OF HON. JERRY MORAN,
U.S. SENATOR FROM KANSAS**

Senator MORAN. Thank you, Chairwoman. Appreciate the recognition. Administrator Dickson, welcome to the Committee. Welcome back to the Committee. We have had a long history in regard to the 737 MAX and its relationship to Kansas in particular. This goes back to the decertification of the MAX in 2020.

As of now, the 737 MAX is in commercial operation in 31 airlines flying in 179 countries, and it has completed more than 206,000 commercial flights since that December. However, China and Russia remain the only civil aviation authority yet to approve the Boeing 737 MAX's return to service.

Given the global regulatory community has broadly approved the MAX for operation, what is the outstanding issues for China and Russia, and what role is the FAA playing in resolving this?

Mr. DICKSON. We are meeting with the Chinese and Russian civil aviation authorities on a regular basis and have provided them all the technical information that they need. So I am confident that on a technical level, we are in good shape, and they will make the decisions that they need to make within their systems.

Senator MORAN. What you suggest is that the technical information is there. There may be other factors utilized by China and Russia in making a determination?

Mr. DICKSON. Yes, sir.

Senator MORAN. Administrator Dickson, a handful of universities, including one in Kansas, Wichita State University, were selected to carry out 124 of the 127 ACSAA related safety system human factor analysis.

Specifically, Wichita State is conducting a review of an analysis of human error, methodologies framework, taxonomies that could be used by industry during the design and evaluation. You have a comment on the value of that kind of work.

Mr. DICKSON. That is extremely valuable. And again, it helps add perspective and invaluable research to our efforts on human factors and some of the issues that we have talked about this morning.

Senator MORAN. What is the FAA oversight in that regard, and what is the time-frame for the results of that university research work?

Mr. DICKSON. I am not sure the precise timeframe. But, you know, again, this is ongoing work and very important to our existing human factors work.

Senator MORAN. OK. Finally, I am hearing concerns, Administrator, about significant delays in the FAA's ability to issue regulations, guidance, and policy. I know there are lots of new demands on the agency and there is new innovation and automation and even the demands that are included in the Aircraft's Certification, Safety and Accountability Act. But it is really important for the FAA to be able to do its work in a timely, although appropriate and adequate manner, with near perfection. What are you doing, what can you do to reduce the backlog in that work?

Mr. DICKSON. Well, certainly, you know, there are multiple factors here. If you are talking about rulemaking, obviously there is the requirements for public comment and the Administrative Procedures Act process, which requires us to have safety data and a positive cost benefit business case there as well.

We are—there has been some COVID impact that has led to some backlog. We are in the process of—we have expanded work hours and we are looking at some additional resources within our chief counsel's office to be able to bring these things forward more expeditiously and make sure that any chokepoints that might be in the process are addressed.

Senator MORAN. One of the things that you didn't mention is staffing. Any comments in that regard?

Mr. DICKSON. So it is something that we are always focused on to make sure that we are adequately resourced. And again, I don't know that that is the central issue, but it is something that we need to look at, both with our inspectors and the rest of our workforce as well.

Senator MORAN. My understanding is that the vaccine requirements have been visited in this hearing this morning. I am sorry, I wasn't able to hear any of your answers, but I would ask, do you perceive a challenge in the near future with employees being discharged or no longer able to work because of noncompliance with that mandate?

Mr. DICKSON. Again, we—I am not hearing anything at this point, but it is something that we are focused on a daily basis to make sure that we can complete our mission, both the operational and the safety aspects of our mission.

Senator MORAN. Administrator, I look forward to further conversations with you. Thank you. Chairwoman Baldwin, thank you.

Senator BALDWIN. Thank you. Next, joining us remotely is Senator Duckworth.

**STATEMENT OF HON. TAMMY DUCKWORTH,
U.S. SENATOR FROM ILLINOIS**

Senator DUCKWORTH. Thank you, Chairman Baldwin. And also thank you for Chairwoman Cantwell for holding today's hearing. I want to thank the Committee and Ranking Member Wicker for leadership—their leadership on last year's aircraft certification bill that included multiple provisions that I worked on.

Mr. Dickson, as you know, the Department of Transportation's Inspector General recently published a report that revealed poten-

tially unsafe airline maintenance practices and raised some real serious questions over FAA's oversight of major U.S. carriers. For example, 92 percent of cases sampled by the IG found that FAA inspectors accepted the airline's analysis rather than identifying the root causes themselves.

To me, this is really another example of FAA's often too cozy relationship with industry partners, which fosters an institutional mindset and I think a culture of complacency that left at—if we leave it unchecked, can lead to deadly consequences for flight crews and passengers alike.

Mr. Dickson, what specific mitigation strategies has FAA implemented to address institutional oversight concerns and improve the technical capabilities and regulatory knowledge of the FAA workforce?

Mr. DICKSON. Well, thank you for the question, Senator Duckworth. And you know, the issues that you are bringing up are not acceptable, and we need to do better in terms of the career development and the ability of our inspectors to identify and address root cause analysis in particular. We agreed with the bulk of the IG findings.

We are implementing improvements to those processes to address the issues. Those are already in work and underway. We had actually identified similar findings through our regular internal review processes, and we are in the process of putting those improvements in place. So some of this was not—were not issues that we were aware of. We already had improvement plans in place.

Also, we know that our oversight responsibilities—you know, in this hearing, we are talking a lot about manufacturers, but this goes into the continued operational safety of a product, how crews are being trained, how airplanes are being maintained because it is a continuous loop. So we have embraced that input. We have—we are putting those improvements in place.

And again, when I talk about resetting the relationship, it is not just with Boeing, it is with all of the companies that we oversee.

Senator DUCKWORTH. Does the resetting of that relationship include an update to your policy so that you prohibit closing a compliance action before the carrier has implemented the necessary corrective action? Because I feel like if you close the compliance action and they haven't done the corrective action, then there is no real incentive for them to complete that corrective action. Has this been part of the updates to your policies?

Mr. DICKSON. It is a good point. We actually just stood up this summer a compliance program, executive council, and steering committee and they are—they are taking that into consideration. And it is something that we will look very closely at going forward as to how the entire spectrum of compliance works all the way up to enforcement.

Senator DUCKWORTH. OK. I would like to review that with you at a later time, because I do think you need to update your policy.

Mr. DICKSON. We would be happy to do that.

Senator DUCKWORTH. Thank you. On Part 147 implementation, the new law that our committee is examining today includes the bipartisan Part 147 Act, which I was very proud to help develop

and pass in partnership with our fellow aviator, someone who has far more hours than I do, Senator Inhofe.

For years, we have heard from students and schools and employers that the FAA's regulations are decades out of date and undermine significant investment students make in pursuit of careers in aviation. Our bipartisan bill requires that FAA make sure schools have the flexibility to teach core curriculum that reflects modern technical advances and innovations across the aviation industry.

And Mr. Dickson, nearly a year has passed since the Part 147 Act was enacted. What is the status of the FAA's efforts to update aircraft maintenance technician curricula as Congress directed, and with the interim final rule to be issued this year?

Mr. DICKSON. Well, Senator, I share your frustration and how long this process takes, and I appreciate your interest and your focus on this. We are—we continue to actively work through this rulemaking. And I know that we missed the deadline in the bill, but I want to emphasize to you and really everyone on the Committee that we are fully committed to it. I think that we are going to be in a position to issue the interim final rule in the coming year, but I would love to stay in contact with you and your office as we proceed.

Part of what happened here is we had some issues to resolve, some professional debate within the agency on the best methodology to approach this process, and that was something that took some time to work out. But we are fully aligned now. All those issues have been resolved and we are proceeding to meet the intent of the law as soon as we can.

Senator DUCKWORTH. Well, I hope that occurs in the first quarter of next year and no later than the summer of next year. But we will stay in touch with you as you move forward with it. Thank you. I yield back.

The CHAIR. Thank you. Senator Cruz.

**STATEMENT OF HON. TED CRUZ,
U.S. SENATOR FROM TEXAS**

Senator CRUZ. Thank you, Madam Chair. Administrator Dickson, welcome. Thank you for being here today. Thank you for your words for the families of the victims of the Lion Air and Ethiopian Airlines accidents. It is critical, even as we have these discussions about things like certification, delegated authority, and what reforms are needed in statute and regulation, that we not lose sight of the victims—the 346 souls lost in the Lion Air and Ethiopian air crashes. And I thank those that are here drawing attention to those victims. As you know, last year we passed the Aircraft Certification, Safety and Accountability Act. That law included a number of my amendments, and I think it represented meaningful reforms which will help keep the flying public safe. But I also recognize that more work may need to be done in the next FAA authorization, next Congress.

And I look forward to working with my colleagues and with you and the FAA in those efforts. Administrator Dickson, in your testimony, you discuss how the FAA is transforming its relationship with manufacturers, and I am glad to hear that. Agency capture, regulatory capture is something I have been and remain deeply

concerned about, and something on which I think there is strong bipartisan concern.

In your judgment, how is the industry, and specifically how has Boeing, reacted to this culture change and to the implementation of the new requirements that were part of the aviation safety bill?

Mr. DICKSON. Well, Senator Cruz, again, culture change requires daily focus. It requires regular focus. You can't just change a process or boxes on the org chart and expect for the kind of beneficial changes that this law provides for, and that we are undertaking in terms of our own work, to stick. So it is really important, you know, within the agency that we are transparent. The—Boeing is not the same as it was 2 years ago, but they have more work to do.

And the voluntary SMS program that they have in place is giving us quicker information about issues that they face, but we have—we have put more engineers on the shop floor in their factories. We have put more inspectors. We have put more rigorous oversight on them, and we will continue to do that. We have also restricted what is delegated in terms of anything that implicates human factors has to be validated by the agency before the manufacturer can proceed.

And any critical safety system, we have retained a delegation on that. And we are also, with the 737 MAX, we have retained the issuance of the airworthiness certificates on each individual airplane as it is produced. And so it will take some time, but we are on the path that we need to be, but it requires continuous vigilance and attention.

Senator CRUZ. So staying on the topic of safety in our airspace, I was glad to see the FAA yesterday finally issued a notice of proposed rulemaking to require commercial balloon pilots to hold a valid second class medical certificate. The 2016 hot air balloon crash in Lockhart, Texas, which took the lives of 15 passengers and the pilot, and which remains the deadliest hot air balloon crash in the history of the United States, was a horrific tragedy made worse by the fact that it was completely avoidable.

Although I am not pleased that it took the FAA almost 3 years to follow the law and implement the legislation that I authored, Commercial Balloon Pilots Safety Act, which had a statutory deadline of 180 days, I am glad that the medical certificate loophole that allowed the pilot to fly that day in 2016, while he was high on a cocktail of prescription drugs that included Ritalin, Valium and Oxycodone and was as impaired as a drunk driver according to the NTSB, will finally be closed.

Administrator Dickson, how quickly can this regulation be finalized, and this loophole for commercial hot air balloon pilots be dealt with once and for all?

Mr. DICKSON. Well, Senator, well, we will have to see it through, the rulemaking process, as you are aware. It is frustrating how long it takes, but we have the draft, the NPRM out there and as soon as we get the public comments back, we will adjudicate them as quickly as we can, push it up through the department, and through OIRA, and get the final rule out there.

Senator CRUZ. So let me ask you another topic, which is, what is the impact of Federal vaccine mandates been on airline pilots and air traffic controllers?

Mr. DICKSON. The—at this point, no impact. I mean, it is something that we are focused on, certainly complying with—

Senator CRUZ. Your sworn testimony is vaccine mandates have had zero impact on pilots and air traffic controllers today?

Mr. DICKSON. We have had—I have not seen anything in our system that would indicate—

Senator CRUZ. So, we have seen in recent weeks thousands upon thousands of plane flights canceled. I was told by a senior leader in the aviation industry that one of the causes of it was a very significant number of air traffic controllers in Jacksonville engaged in a sick out and refusing to go to work because of the vaccine mandate. Is your testimony that that is not correct and that didn't happen?

Mr. DICKSON. We don't have any evidence of that, Senator. That particular event that you were referring to was one segment—I have looked at the numbers, one sector within Jacksonville center that happened to be co-located with where there was convective weather and extensive military activity. So it did create a choke point, but it was not any kind of organized activity or sick out. It was availability on one particular shift.

Senator CRUZ. And your testimony is you believe vaccine mandates have zero impacts on pilot availability? I will tell you, I have met with the pilot unions. That is not what the pilot unions are telling me. And your testimony is that the vaccine mandates have zero impact on air traffic controllers? That is also not what I am hearing from the Air Traffic Controllers Union. So, are they not telling the truth or what are the facts here?

Mr. DICKSON. Well, Senator, I am saying at this point in time, I am not seeing any impact from that. We work very closely with our union partners. I met with them within the last week or so, and we are not seeing any indication that there has been any impact on our staffing up to this point.

Senator CRUZ. Well, passengers across the country are having their flights canceled by the hundreds and by the thousands, might have a different perspective on that. Thank you.

The CHAIR. Thank you, Senator Cruz. And I want to thank you for your leadership in help in forming the legislation that we passed last year. As the Subcommittee Chairman at the time, very much appreciate your input on that.

And we are going to have another aviation hearing, forget the date, but in the near future that is going to review obviously our actions on the various COVID related bills, and I think it will be an appropriate time to ask about the issues you brought up today. So thank you. We have Senator Warnock and then followed by Senator Thune.

**STATEMENT OF HON. RAPHAEL WARNOCK,
U.S. SENATOR FROM GEORGIA**

Senator WARNOCK. Thank you so very much, Madam Chair. This week I introduced the Arrow Act, to expedite the development and

adoption of sustainable aviation fuel and other emissions reducing aviation technologies.

I could not be more proud that Georgia companies like Lanza, Jet, Delta Airlines and Gulfstream down in my hometown of Savannah, Georgia, have helped these aviation emissions reduction efforts take off.

As we see a rise in exciting new technologies that increase fuel efficiency and reduce harmful carbon emissions, it is important that our safety oversight body has the resources and the technical expertise to allow for the quick and safe deployment of these new innovations.

Mr. Dickson, do you agree that having the right in-house expertise will be crucial for FAA to successfully collaborate and partner with industry on new sustainable products and ensure that these technologies are deployed safely without unnecessary delays?

Mr. DICKSON. Well, thank you, Senator Warnock. It is good to see you. And the answer to your question is yes. You know, we recognize how critical sustainable aviation fuel is and very much want to be a partner with Congress as people consider ways to expedite its use and deployment at scale.

Within our Office of Energy and Environment, there is a team of people who are dedicated to working on how best to make staff a more routine source of aviation fuel, so we definitely want to partner with you. To your specific question, which I think is related to Section 104?

Senator WARNOCK. That is correct.

Mr. DICKSON. We have initiated the review consistent with the bill and are making—working very closely with our labor partners to execute on that review. And it is more in depth than we originally thought, but we are determined to make it a comprehensive review.

At the same time, we have completed some concrete items, including already a comprehensive review of our Senior Technical Experts Program, which we call our STEP Program, and that included benchmarking it against comparable programs throughout industry, including NASA and the European Union Aviation Safety Agency.

And we have engaged in some active recruiting on our chief scientist and technical advisor positions. And I can tell you from personal experience, we have got a very capable chief scientist within our environmental group that look forward to leading those efforts.

Senator WARNOCK. So as you move forward in this review, can you say more about how you plan to address any identified shortfalls in the short term and in the long term as we prioritize trying to expedite these innovations in a way that is safe for the public?

Mr. DICKSON. Well, we have to critically—you know, we have to critically evaluate the review and ensure that we take the necessary steps, as you said.

And any existing shortfalls that we have, as well as those gaps that can hinder our ability to understand and oversee new our innovative technologies in terms of staff will be really important because we need to engage not only the aviation community, but the producers as well.

Senator WARNOCK. Well, I appreciate that and know that I am going to continue to push the Arrow Act. I think it is important that we do everything we can to move forward on sustainable aviation technologies.

You know, this is an important part of creating a sustainable, and safe future and having adequate levels of experienced personnel and technical support at the FAA is critical to the success of these efforts, so that we can have skies that are safe in every sense of the word.

Thank you so much, and I look forward to working with you on this issue.

Mr. DICKSON. Thank you, Senator.

The CHAIR. Senator Thune.

**STATEMENT OF HON. JOHN THUNE,
U.S. SENATOR FROM SOUTH DAKOTA**

Senator THUNE. Thank you, Madam Chair. Administrator Dickson, thank you. Welcome. And let me just start with an issue that is important in my home state of South Dakota and that deals with Ellsworth Air Force Base, which is prepared to host the future B-21 bomber, which will train in the Powder River training complex.

Ellsworth currently flies the B-1 bomber and host large force exercises in the PRTC airspace, which requires occasional altitude waivers, and I appreciate the FAA's efforts to expedite coordination with the PBFA in this space. Looking ahead more broadly, we have to ensure that our advanced military aircraft have the expanded airspace volumes in the time that they need the training.

Technology modernization will be critically important to improving management of the national airspace system, particularly as new entrants such as UAS technology increasingly interact with general and commercial aviation traffic. The implementation of Next Gen, which has been hampered by the pandemic, will be crucial in the coming years. These investments will allow the United States to better utilize existing infrastructure, increasing the capacity and efficiency of the NAS.

Could you speak to the status of Next Gen implementation, particularly how the agency plans to make up for pandemic related delays? And then second, how is the FAA incorporating concepts like adaptive or dynamic airspace in its Next Gen initiative to meet the growing demands on the national airspace system while maintaining safety for current users and new entrants?

Mr. DICKSON. Well, Senator, it is a great question about Next Gen. We have about 70 percent of the technology fielded for Next Gen, and the challenge that we have now is to integrate those technologies between data communications, the ADSB surveillance, which we successfully implemented across the entire system in January 2020, and also the performance based navigation aspects as well.

So what we really need and where the pandemic set us back a bit is operationalizing these capabilities and integrating them within our air traffic facilities, because we need to have the controllers and the facility managers actually involved in those implementations by facilities.

And because of COVID, we had to get everybody out of the facility who wasn't involved in that daily operation, because it is very, very difficult to socially distance and we didn't want to expose any more of our employees than necessary to that public health risk. Now that we have various public health measures in place, we are back in the facilities doing more training and then more of this operational implementation, so I expect that the pace is going to pick up considerably here in the coming months.

With respect to dynamic airspace management, I know that my chief operating officer has met with you and your staff recently, and I agree with you that this is extremely important to us. We have demands being put on the airspace now with commercial space, drones. We need to make sure traditional civil aviation is protected, and of course, military and National Security needs are at the core of all that.

So we will continue to work through those issues. I know that we had some success here with the most recent exercise, and we will continue to build on that.

Senator THUNE. Thank you and we appreciate all your help along the way and are going to need your continued assistance in that space as the B-21, is hopefully before too long, enters that airspace for training purposes, along with all the other air assets that are involved in a large force exercise.

And so we thank you for your cooperation and hope that you will continue to be able to assist us there. As you know, the FAA issued a notice of policy September 2020 determining that certain UAS may be type certificated as a "special class of aircraft," and I appreciate your commitment to advancing the integration of UAS into the national airspace system.

However, I am concerned that the agency has since not made more progress toward establishing generally applicable standards for type certification of a UAS, which will provide certainty to the industry while maintaining the highest level of safety.

So could you talk about whether the FAA remains committed to establishing generally applicable standards for UAS type certification and what actions of the FAA taken related to establishing generally applicable standards for certification of special classes of UAS since the publication of this notice?

Mr. DICKSON. Well, Senator, the—you raise a very important issue, and we are actively collaborating internally and with the UAS industry on the approval process. As a matter of fact, I have met with several stakeholder groups here over the last couple of months. And we are developing an integrated schedule template that will identify the critical paths, including the environmental elements, which will better inform applicants for certification throughout this process.

We will use a risk-based approach to certifying an unmanned aircraft. We think that our existing rules will be able to accommodate any near-term operations, but we are also looking toward the future. I think, as you know, we have got our MOSAIC, Modernization Special Airworthiness Certificates, rulemaking process underway, and that will help us move to the next step of specificity out there for all of our stakeholders, so they know exactly with more

granular detail what the requirements are going to be for these systems as they come to market.

Senator THUNE. Thank you. Thank you, Madam Chair.

The CHAIR. Thank you, Senator Thune. Senator Hickenlooper.
[Technical problems.]

**STATEMENT OF HON. JOHN HICKENLOOPER,
U.S. SENATOR FROM COLORADO**

Senator HICKENLOOPER. Your testimony and especially the difficult times we have right now with the divisions in the country that I think are causing such disruptions in many ways. The FAA data that we saw demonstrated 5,033 unruly passenger incidents this year, 227 of these resulted in enforcement cases being initiated.

In August, you wrote to all U.S. airport officials saying that many of these passengers, many unruly passengers, were interviewed by local police and released without criminal charges of any kind. And you wrote, “when this occurs, we miss a key opportunity to hold unruly passengers accountable.”

Can you describe how clearly incidents are reported by FAA to DOJ and law enforcement? And how could that process maybe be improved to spur more enforcement actions and make people aware that this is a serious issue?

Mr. DICKSON. Well, thank you for the question, Senator. And you know, this has been something that has been—I have been laser focused on for really the entire year this year. Unruly passenger incidents are nothing new, but we have seen a several fold increase in them. As you know, we have we have been successful at driving the rates down, but we still have ways to go.

And it is very much a team effort. And what we are focused on now is closing the seams between how airlines and airports and law enforcement and the Federal Government to handle these issues. And so that is—we have made a good bit of progress, but we have got more to go.

And we have referred a number of cases that we give the investigative packages to DOJ, but there are instances where at some airports where there will be a Federal law enforcement response—this actually happened with one event that was in the news a couple of weeks ago.

So I think we are making good progress, but there is certainly more to be done, and it really does require the cooperation of all those private sector stakeholders, including the airports, as well as the various aspects of the Federal Government, FAA, TSA and DOJ. And we will continue to stay focused on that.

Senator HICKENLOOPER. Right. Absolutely. And that there was one where the unruly passenger last week broke flight attendant’s nose. They had to divert the flight into Denver. Obviously, those issues that are so egregious, there has got to be a better way that as we do hold that violent passenger accountable, we get it into the media, so the people hear that this isn’t something that is not a, you know, just a passing news item, but they understand that is how serious it is.

Mr. DICKSON. Well, Senator, I have been on social media, I have been on news reports. My face is at every airport in the country.

I think not something that I wouldn't necessarily want to be remembered for.

We are pulling out the stops. We have done memes. We have done everything that we can. I have even been on TMZ, which I never thought I would be, to make sure that the public is aware of the importance of following crew instructions. The crews are there for passenger safety. And this is about a behavior that is not appropriate in an aviation environment, and we need to get it under control.

Senator HICKENLOOPER. Absolutely. And I think obviously COVID has played a big role in this. I think that the fact that it is so hard to find employees and the TSA is still operating with significant less than a full force so that the waits are very long. I fly out of Denver all the time, but I flew out of Atlanta earlier this week and it was equally long, long lines.

And I think that is frustrating people so when they get in the plane—and I realize that you don't control TSA. Let me switch and just quickly, in February, a Boeing 777 made an emergency landing in Denver because the Pratt Whitney engine caught fire mid-flight. Debris from the engines scattered across Northern Metro in Denver.

Preliminary NTSB report faulted an engine blade for causing the engine fire. In May, FAA required strengthening of blades in order to make sure we prevent this in the future. Do you have an update on the investigation or what implementation of safety measures you would—or are being suggested?

Mr. DICKSON. Yes, Senator. We are doing—taking several actions here. We are increasing the inspection frequency of the fan blades, and we have also recently approved a new inspection technology, which is more effective in detecting internal cracks in these titanium blades. So that ultrasonic fan blade inspection process will now be the primary process. It is much more effective.

We will still use it in combination with what had been used before the thermal acoustic imaging, which had been used before. Our chief scientist for propulsion and the U.S. Air Force Research Lab collaborated on this and so we think that will be very beneficial. In conjunction with that, we should not have debris falling off of an airplane.

That is not acceptable. So we are—in our certification, we have actually aligned our engine in airframe certification within the same division to make sure that we are more tightly coordinated, and we are requiring the airplane manufacturers to strengthen the cowlings and the design. And that work will have to be done before those airplanes can take to the skies again.

Senator HICKENLOOPER. Right. Mr. Dickson, you have got one of the toughest jobs in the country right now, and I appreciate you taking some time out to share the facts of these issues and what is being done with all of us. I yield back to the Chair.

The CHAIR. Thank you. We have Senator Sinema, then Senator Scott, and then Senator Rosen, and I see Senator Peters. So we are all filing in here.

**STATEMENT OF HON. KYRSTEN SINEMA,
U.S. SENATOR FROM ARIZONA**

Senator SINEMA. Thank you, Madam Chair, and thank you, Administrator Dickson, for your testimony today. Today, this committee is examining the implementation of the Aircraft Certification, Safety and Accountability Act and the current state of aviation safety. I was proud to support this bipartisan legislation to address significant concerns with our aircraft certification system.

Arizonans rely on a safe aviation system for business and leisure travel to bring tourists from all over the world to Arizona, to ship Arizona products to customers, and even to take scenic flights above our stunning landscape.

And as the Chair of the Aviation Subcommittee, a safe, secure, and healthy aviation system is critical to my work. Over the past years, our Subcommittee has held hearings on the tragic Boeing accidents, the state of aviation during the COVID 19 pandemic, and the crucial need to improve our Nation's airport infrastructure for the 21st century, while developing bipartisan legislation to continue to improve safety. I appreciate the work the FAA has done to help improve safety, but more needs to be done, and I encourage you to keep working quickly to fully implement the certification statute.

Now, Administrator Dickson, as you probably know, general aviation is an important part of Arizona's aviation system. Arizona is home to 4 of the 10 busiest general aviation airports in the country, and thousands of Arizonans participate in general aviation flights.

Tragically, on October 1, there was a midair collision between a small airplane and a helicopter near the Chandler Municipal Airport that resulted in two fatalities. The NTSB is investigating the collision. As we consider the safety of our entire aviation system, what steps is the FAA taking to continue to improve general aviation safety in Arizona and across the country?

Mr. DICKSON. Well, thank you for your question, Senator Sinema. You know, general aviation is absolutely critical. It is the—we have the largest general aviation segment of any airspace in the world. And several years ago, the FAA had set the goal of reducing the fatal accident rate for GA to less than one fatal accident per 100,000 flight hours.

And this was actually a goal that was set to be met by 2018, and we were able to surpass that goal. And so in 2019, we resnapped out of the line for an additional 10 percent reduction by 2028. And up to this point, we are exceeding those projections—so it is good.

We have done this by partnering with the General Aviation Joint Steering Committee, which is the general aviation counterpart to CAST, the Commercial Aviation Safety Team. The GAJSC helps us analyze the accident trends and undertake appropriate safety interventions when elevated risk is identified.

And over the last 8 years, we have actually adopted 47 safety enhancements that are aimed at addressing the root causes of loss of control and engine failure accidents, which are the primary causes. And those have been adopted over the past 3 years. We are also working on enhancements to the Airmen certification system and

working with aviation stakeholder groups to improve testing and training standards as well.

And finally, on the subject of midair collisions, certainly there are beneficial technologies such as TCAS that can be implemented within GA as well.

Senator SINEMA. Well, thank you, Administrator. In August, the Senate passed the bipartisan Infrastructure Investment and Jobs Act, and our legislation invests \$25 billion over 5 years for our Nation's aviation system, with \$20 billion for airports and \$5 billion for improving air traffic control facilities.

So this airport funding will modernize runways, aprons, taxiways, and safety areas at every airport in the United States. And the legislation also creates a new airport terminal improvement program for airports to improve their terminal facilities, gates, and intermodal connection facilities.

Besides improving the efficiency and passenger experience our airports, once this bill is passed, it will also improve safety. Can you describe how the \$20 billion for airport improvements will increase airport safety?

Mr. DICKSON. Sure. Well, the infrastructure improvements with respect to airports would definitely improve the safety and efficiency of our air transportation system. And, you know, we already estimate a need of—in excess of \$8 billion in airport projects, and these requested projects exceed existing FAA resources annually.

You know—as you know, our AIP budget is normally in the range of about \$3.3 billion. So in addition to terminals, we will be able to do things like runway rehabilitation projects, which, as you know, can cost in the tens of millions of dollars each and are multi-year projects as well. So that is one specific improvement that we would be looking at with that infrastructure money.

Senator SINEMA. Thank you. Madam Chair, my time has expired. I yield back. Thank you.

**STATEMENT OF HON. RICK SCOTT,
U.S. SENATOR FROM FLORIDA**

Senator SCOTT. Administrator Dickson, how are you doing? You have seen all these videos of families being kicked off airplanes because their young children can't keep their mask on for a long time, and I have heard lots of stories of people that have decided just not to fly because they have young children they know that they are not going to be able keep their mask on.

So can you talk about, you know, why the FAA supports a policy that basically forces these airlines to kick these young families off planes because a young child just can't do it? I mean, I don't know if you have young children or grandchildren, but you know they are not great at keeping their masks on.

Mr. DICKSON. Well, Senator, the—you know, I can't speak to public health in particular, but obviously we all want to get through the effects of the COVID pandemic and that we support, we certainly support what the public health authorities have put in place in terms of a combination of mitigations.

But that is not an FAA requirement. Really, the important thing to me is aviation safety and making sure that passengers on commercial aircraft follow crewmembers instructions. And if those re-

quirements are in—and whether they are FAA requirements or not, in this case, they are not, we really need to whatever requirements, whether company policies or Federal requirements, passengers need to comply with them.

Senator SCOTT. You have seen the reports, first Southwest and then you hear about the air traffic controllers in Jacksonville, and the latest is all the American Airline flights have been canceled. And you know, it is your peers, it is going to continue to get worse.

And then you watch, you know, people are just completely concerned about this unconstitutional vaccine mandate by the President that is going to impact jobs in this country. And you have got the Federal Reserve reports that these vaccine mandates are causing a low labor supply and issues with hiring and retention.

So tell me what do you think is causing these pilot shortages? What is causing these cancellations of all these flights, which are impacting people's jobs all across the country?

Mr. DICKSON. Well, Senator, I have spoken with the air carriers and with several of the pilot union leaders as well as our own leaders within the agency, and at this point in time, I am not seeing any staffing impact from the vaccine mandate itself.

The event that we had a few weeks ago with Southwest down in Florida was due to a combination of factors. The difficulties that we are seeing with some airlines operations right now, frankly, is, in my estimation, is due more to changes in consumer behavior. You know, all of the algorithms that they use to plan their schedules were disrupted in March 2020. And leisure demand, I think as you well know—Florida has been—there has been a lot of demand for leisure travel into Florida and those, that very close in demand signal is different from what the airlines had seen before.

And so they are—they probably don't have as much buffer in their schedules as they had had previously or as they would like. I know that one of the airlines talked about they had a number of a couple of thousand flight attendants who were in the process of being recalled from furlough.

And so these kinds of things are just taking some time to catch up on the system. And it is creating more operational exposure when there are disruptive events such as convective weather in the system.

Senator SCOTT. So do you think that the vaccine mandate by the President is going to cause any staffing shortages at all where you think it is going to have any impact on anybody, which is going to impact the safety of travel in the United States?

Mr. DICKSON. Senator, my absolute focus, what I can guarantee you is that we will have a safe aviation system in the U.S. And we are focused on—

Senator SCOTT. Excuse me for a second. Does that mean you will have to shut down flights because you won't have enough air traffic controllers? You will still be safe, but you just won't have the flights.

Mr. DICKSON. We have robust contingency plans in place. We have always, and we have ways that we can make adjustments as we need to. But at this point in time, I am not seeing any impact on safety, and we will work to make sure that the airspace is open and available for the traveling public.

Senator SCOTT. How many jobs in the aerospace industry are in, you know, any agencies you deal with—air traffic controllers that are going to be lost because of the vaccine mandate, do you have any idea?

Mr. DICKSON. I couldn't speculate.

Senator SCOTT. Alright. Thank you very much. I turn it over now to Senator Rosen.

Mr. DICKSON. Thank you.

**STATEMENT OF HON. JACKY ROSEN,
U.S. SENATOR FROM NEVADA**

Senator ROSEN. Well, thank you, Senator Scott, appreciate that. And thank you, Administrator Dickson, for being here today. I want to talk a little bit about international information sharing and how we use that to enhance pilot training because I would like to follow up on an issue I raised 2 years ago when this committee was investigating the problems that led to the 737 MAX 8 accidents.

As you may know, in 2017, the Brazilian National Civil Aviation Agency came to the U.S. to test the Boeing 737 MAX 8, and they determined that the changes made to the aircraft from the previous models were substantial enough to warrant request to Boeing for more information about the plane's systems.

As a result of this, additional information from Boeing and the Brazil—when the Brazilian National Civil Aviation Agency published its updated pilot training requirements, they were able to flag MCAS as one of the changes that the pilots needed to account for when they were flying the MAX 8.

When he testified before this committee in October 2019, I asked Boeing CEO why this information was not flagged for other customers who had a 737 MAX in their fleet for more information sharing, and he didn't respond. And so more information sharing in this case could have been extremely beneficial.

So Administrator Dickson, FAA is the global leader in aviation safety, and as such, we have a responsibility to share critical information about aircraft systems with the international community. In the case of Brazil, better communication between national civil aviation agencies, well it could have saved lives.

So I would like to ask, if FAA were in the exact same position as Brazilian Civil Aviation Agency, as was with MAX 8, what would we have done had we received information about a new aircraft so important that it led to significant changes in pilot training requirements, wouldn't we share that with others? Is it policy and practice at FAA to make such information available to the international community?

Mr. DICKSON. Well, Senator Rosen, I can say unequivocally, yes. And I think that one of the positive aspects of the journey that we have been through over the last couple of years is the collaboration and the work between states of design and aviation authorities is stronger than it ever has been.

So we would absolutely share any relevant information that we had regarding pilot training or information that needed to be provided to flight crews with other authorities. And I will emphasize also that the changes that we are putting in place are designed to

make sure that no single point of vulnerability or no single individual can lead to a failure of the system.

We want to have those additional layers of redundancy putting in here—put into the process. And what you are pointing out is right in line with what I am talking about.

Senator ROSEN. And I appreciate that. Have you set up—is there any set up for collaborating and sharing this kind of important information between countries? I mean, I know we would do it, and that is great. But are other countries going to respond the same? Is there a forum for that? And if there isn't, should there be, and how do we make that happen?

Mr. DICKSON. Yes, there is a forum. It is called the CMT, the certification management team, and it consists of the four countries that are involved—that certify transport category aircraft. And that construct is—has actually been greatly strengthened because of the collaboration that we have executed here over the last couple of years as part of going through this process.

Senator ROSEN. Thank you. I appreciate that. I would like to just quickly ask about FAA's certification workforce. Of course, a 2015 audit found that the FAA at the time lacked comprehensive process for determining aircraft certification service staffing needs critical for effective ODA oversight and other certification activities.

I would just kind of like to go quickly to the question. I would like to build on that discussion. Administrator Dickson, what can you tell us about today's FAA current certification workforce needs, and how can Congress better work with you to meet those needs? We need to have a robust certification workforce to prevent any injury or loss of life.

Mr. DICKSON. Well, as I mentioned earlier, we have nearly doubled our number of human factors' experts. We will continue to need data scientists and will need to continue to have those engineers in new and emerging technologies and disciplines, software engineers, so that the ability to be able to adequately—there is much more of these systems are software driven now. So that is certainly a need that we are currently well-resourced for, but we will need to work very closely with the Congress to make sure that we stay ahead of developments as we move forward.

Senator ROSEN. STEM education and training is key. I see my time is up. I believe that, not sure if anyone's there, but I think Senator Peters, you were after me, if I heard that correctly.

The CHAIR. Not sure if Senator Peters is available.

Senator ROSEN. Oh, sorry. Oh, it is Chair Cantwell. I didn't know you were back. Sorry about that.

The CHAIR. You are doing a great virtual job of chairing. Thank you so much. If Senator Peters is available, we would certainly call on him, but maybe he stepped away to go to the last vote. Senator Markey.

**STATEMENT OF HON. EDWARD MARKEY,
U.S. SENATOR FROM MASSACHUSETTS**

Senator MARKEY. Thank you, Madam Chair, very much. I first—Madam Chair, I want to recognize the victims of these crashes and their families, including Michael Stumo and Nadia Milliron of Massachusetts, who are here today and whose daughter Samya Stumo,

was tragically killed in the Ethiopian 737 MAX crash. These families are here for justice, not just for themselves, but for every other family that was involved in protections for any other family that ever gets on a plane in our country.

And we thank you for being here. We thank you for standing vigil for all of those families. And, again we are so sorry for the tragic loss, and we are going to work hard to make sure that your message is heard at the FAA and here in Congress. Thank you. After more than two years of investigations, it is clear that Boeing abused the authority delegated to it by the FAA to certify its own aircraft.

Boeing not only cut countless corners to maximize profit at the expense of safety, it also intentionally misled the FAA in order to avoid more rigorous scrutiny of new technologies installed on the 737 MAX, including the flight control system that caused both tragic nosedives in Indonesia and in Ethiopia. This Committee's passage of the Aircraft Safety and Certification Reform Act was a necessary first step toward making sure that this can never happen again. But as today's hearing makes clear, this new law is not fully implemented and the danger of self-certifying aircraft remains even today, which is unbelievable. It is also clear that Boeing has not truly learned its lesson.

After giving its former CEO, who oversaw a production of the MAX a \$60 million golden parachute, Boeing offered its new CEO a \$7 million bonus for rushing the MAX back into service. These decisions do not reveal a company that has learned to prioritize safety and accountability over profit, and that is why I stand with the families of the victims of these crashes, who recently sent a letter calling for the FAA to suspend Boeing's delegated authority to certify aircraft until trust is fully restored.

We thank you for your letter and I know you have included it in the record, and I think it is just so important that this become part of our history—

The CHAIR. It will be part of the record.
[The information referred to follows:]

October 19, 2021

The Honorable Pete Buttigieg, Secretary
Department of Transportation
1200 New Jersey Ave SE
Washington DC 20590

Stephen M. Dickson, Administrator
Bradley Mims, Deputy Administrator
Federal Aviation Administration
800 Independence Avenue SW
Washington DC 20591

Re: ET302 victim's families request for ODA Termination

Dear Secretary Buttigieg, Administrator Dickson and Deputy Administrator Mims:

The undersigned families of the Ethiopian Airlines flight 302 crash request that the Federal Aviation Administration terminate Boeing's Organization Designation Authority (ODA). It has become clear that Boeing is not a company that can be trusted with the public safety responsibilities conferred by the ODA. Just as the European Aviation Safety Agency (EASA) suspended GE Aviation's Design Organisation Approval in Czech last March due to problems, FAA should do the same for Boeing unless and until trust, competence and freedom from interference is solidly demonstrated.

Section 7-2(c) of the Order 8100.15B, Organization Designation Authorization Procedures, states that an ODA can be terminated due to misconduct, lack of care or judgment or failure to implement needed corrective action.

Boeing cannot be trusted to perform authorized safety functions because it has engaged in the following misconduct which requires FAA action to terminate its ODA:

1. deceiving the FAA about the nature and the power of the maneuvering characteristics augmentation system (MCAS) added to the Boeing 737 MAX 8 (MAX) by way of misleading statements, half-truths and omissions as admitted in its January 21, 2021 deferred prosecution agreement;
2. deceiving the FAA about whether simulator training was required for pilots to fly the MAX;
3. creating an ODA culture that applies undue pressure to engineering personnel so they are not able to exercise independent judgment free from organizational conflicts of interest;
4. wrongly approving the original 737 MAX design when it failed to comply with several 14 CFR Part 25 regulations and required Airworthiness Directives (ADs) for the resulting unsafe conditions;
5. failing to notify FAA that not all MAX aircraft were equipped with a functional AOA disagree alert;
6. failing to manage the ODA in a competent manner that would detect and correct employee and/or management misrepresentations and dishonesty that compromises safety while benefitting Boeing's profit goals;
7. failing to conduct realistic system safety assessments on critical systems;
8. failing to insulate the ODA from Boeing's profit motives;
9. crafting arbitrary and unscientific assumptions, such as pilot response times, to avoid implementing safety measures;
10. failing to conduct proper system safety assessments after the Lion Air crash to determine problems, check incorrect assumptions, and fix the problems;
11. failing to recognize catastrophic failure due to novel design in flight controls and implementing a failsafe mechanism per FAR requirements;
12. falsely stating that the Boeing board safety committee was fully briefed and engaged after the Lion Air crash when that body did not meet and failed to discuss or take any action to correct the flaws in the MAX;
13. failing to spend resources to quickly fix the MAX after the Lion Air crash and instead raising dividend's by 20 percent and authorizing a \$20 billion stock repurchase program for shareholders;
14. doubling down on the safety of the MAX, rather than fixing the MAX, by issuing post-Lion Air crash press releases stating:
 - "We are confident in the safety of the 737 MAX" (11/21/18);
 - "As our customers and their passengers continue to fly the 737 MAX to hundreds of destinations around the world every day, they have our assurance that the 737 MAX is as safe as any airplane that has ever flown the skies." (11/27/18)
15. selling and delivering more defective MAX aircraft to more airlines after the Lion Air crash without fixing the problems.

The FAA, the Department of Justice, the House Committee on Transportation and Infrastructure and a Delaware judge have all affirmatively found that Boeing lied and concealed problems relating to the MAX. Other Boeing commercial problems have also raised concerns, including the 787 (on board fires) and the 777 (quality and certification issues).

In 2013, a report from NATCA recommended that the Boeing Safety Office be structured along the lines of the more traditional Gulfstream office in Atlanta. That recommendation was ignored. Part of the justification was that there was not sufficient labor resources available in the Seattle office, even though subsequently it was found that the number of projects handled by the office was stable.

Another report in 2017 prophetically stated this problem clearly:

"The ODA organization makes certification decisions, not the AR. This leads to a potential decision making process influenced by a "Group Think" mentality. There is no personal accountability or monetary motivation for ARs to contradict Company management positions that do not support expenditures to upgrade noncompliant designs or do testing needed to demonstrate compliance. ARs are reluctant to take contradictory positions or bring up issues within the ODA for fear of retaliation. In several cases ARs have refused to answer compliance related questions when in meetings with the FAA and ODA management. This reflects their fear of retaliation if they express a view that contradicts the company position." (Pre-Decisional Involvement (PDI) report, addressing Aircraft Certification Transformation, February 6, 2017)

The ODA system in general, and Boeing's use of ODA in particular, invites undue influence and interference rather than resists it.

For these reasons, FAA should terminated Boeing's ODA so that FAA performs the safety functions under standard certification procedures.

Sincerely,

Victim	Signatory
Matt Vecere	Megan Hoover, I am a friend of the victim.
Samya Stumo	Liza Grandia, friend of the family
Danielle Moore	Owen Campbell, I am the friend of Danielle Moore
Micah John Messent	Amber Tansky, Sister of victim
Max Edkins	Emily Harris, I am the friend of the victim
Matt Vecere	Matthew Baiamonte, Friend
Stéphanie Lacroix	Dominique Lacroix, Sister
Stephanie Lacroix	Michael Moscarello, I am a cousin of the victim.
Micah Messent	Glenda Wray, Friend
Graziella de Luis Ponce	Isabel de Luis, I am the niece of the victim.
Samya Rose Stumo	Ahmed Ali, I am a friend of the victim
Matt Vecere, Samya Stumo	Michael Stumo, father
Melvin Riffel	Carol Shrout, Family friend
Bennett Riffel	
Angela Rehborn	Glenn Tibbett, Family friend
Melvin Riffel	Nicholas Reissr, Family friend
Melvin Riffel	Jim McCoy, Very close family friend of the victims
Bennett Riffel	
Angela Rehborn	Melissa Tibbett, Neighbour of the victim
Jess Hyba	Jeff Curry, I am a friend of the victim
Melvin Riffel	Molly Abraham, Aunt
Bennett Riffel	
Danielle Moore	Idit Papular, I am a family friend of the victim
Danielle Moore	Kimberly, Family friend of the victim.
Samya Stumo	Kristine Wahlers, I am a friend of the victim's family.
Melvin Riffel	Carly Bollinger, Cousins
Bennett Riffel	
Melvin Riffel	Marilyn Koutnik, I am a friend of the victims
Bennett Riffel	
Danielle Moore	Jodie Layne, Friend
Angela Rehborn	Julie Kramer, Friend of victim's mother
Danielle Moore	William Hedges, Danielle knew me as Grandpa
Camille Geoffroy	Pascale Perez, Mother's friend
Matthew Vecere	Grace Traa, Friend of the victim
Micah Messant	Nelsen Spickard, Cousin
Bennett Riffel	Sydney Malain, Friend
Samya Stumo	Chrys Hutchings, friend of Samya's parents
Jackson Musoni	Huguette Debets, Father of my children
Micah Messent	Amy Chow, Friend
Samya Stumo	Lydia Littlefield, friend
Stephanie Lacroix	Kim Bazinet, Family friend
Samya Rose Stumo	Lou McNeil, Friend
Melvin Riffel	Susan Riffel, I am the mother of these victims.
Bennett Riffel	Ike Riffel, Father
Melvin Riffel	
Danielle Moore	Laura Reid, I am the Godmother of the amazing, talented, lovely Danielle Moore
Melvin Riffel	Anne Robertson, I am the cousin of these victims.
Bennett Riffel	

Victim	Signatory
Matt Vecere	Sander Banta, Friend
Samya Rose Stumo	Sharon Krogman, I am the cousin of the victim.
Sam Pegram	Natalie Eacersall, Friend of a relative.
Stephanie Lacroix	Cassidy Howell, Friend
Angela Rehborn	Curt McCullough, Family friend
Samya Stumo	Barbara Dean, Friend
Danielle Moore	Chúk Odenigbo, Friend
Melvin Riffle	Susan Janes, I am a family friend of the victims' family
Bennett Riffle	
Samya Stumo	Raffik Lopes, I am the cousin of the victim.
Samya Rose Stumo	Lois Fuller, Friend of the victim's family
Melvin and Bennett Riffel	Tammy Fisher, Cousin
Angela Rehborn	Annette Vincent, I am the aunt of the victim.
Melvin Riffel	Brittney Riffel, Spouse and Sister-in-Law
Bennett Riffel	
Samya Rose Stumo	Robert Holmlund, Great Uncle
Matt Vecere	Jenna DiGenni, Friend
Oliver Vick	Ben Coakley, Friend
Melvin Riffel	Katherine Zahner, Friend
Paolo Dieci	Elena Dieci, I am the niece of the victim.
Marie Philipp	Julia Rubio Gamero, Best friend of the victim
Danielle Moore	Cynthia Abenir, Niece
Max Thabiso Edkins	Julian Kubel, I am the friend of the victim
Bennet Riffel	Sandra Niemann, Family friend
Paolo Dieci	Estella Dieci, Niece
Marie Christin Philipp	Doris Fuchs, I am the aunt
Wolfgang Eigner	Bettina Eigner, I am the mother of the victim
Danielle Moore	Janet Hedges, Aunt
Marie Christin Philipp	Heike Baumann, I am the aunt of the victim
Samya Stumo	Grantt Lopes, Cousin
Melvin Riffel	Pao Tane, Friend
Bennett Riffel	Deborah Najera, Family Friend
Melvin Riffel	Deborah Najera, Family Friend
Josefin Augusta Ekermann	Madelen Maria Ekermann, Mother
Stéphanie Lacroix	Susan Lamarche, I am the maternal aunt of the victim.
Samya Rose Stumo	Melisse Bouziane, I am a cousin of the victim
Samya Rose Stumo	Paulina Polanco, I am the friend of the victim.
Sam Pegram	Melanie Cremona, Friend
Mel Riffel	May Saeteurn, Friend of victim
Bennett Riffel	
Clémence Boutant	Pernille Kjaer Porte, I am the friend of the victim.
Hussein Swaleh M'tetu	Feisal Swaleh, Son of the victim
Anne Feigl	Anna Caroline Feigl, Sister in Law
Sam Pegram	William Pegram, Grandfather
Melvin Riffel	Diana Officer, I am the friend of the victims
Bennett Riffel	
Camille Geoffroy	Aude Breton, Friend
Derick Kivia Lwugi	Gladys Kivia, Wife
Camille Geoffroy	Dominique caumes, Niece
Stephanie Lacroix	Lizzie Muyawa Dube, Very very good friend. How I miss her daily
Sautner Christoph	Johannes Pernkopf, Friend
Angela Rehborn	Phyllis Robertson, Friend

Victim	Signatory
Samya Stumo	Cheryl Engel, Very close friend
Xavier Fricaudet	Vincent Edith, Friend
Jonathan Seex	Noah Seex Svalin, I am Jonathan's nephew.
Anne-Katrin Feigl	Lars-Peter Feigl, Sister
Camille Geoffroy	Thérèse Rouget, Aunt of the victim
Camille Geoffroy	Dominique Verdugo, I am a friend of the victim's family
Gatchi de Luis	Jihane Sfeir, Friend
Jonathan Seex	Pär Schroeder, Brother in law
Marcelino Rassul Tayob	Mario Rassul, Brother
Marcelino Rassul Tayob	Elisangela Rassul, Uncle
Danielle Moore	Kathy E. Martorino, Friend of the family
Virginia Chimenti	Angela Maria Farioli, I am the friend of the victim
Danielle Moore	Carol Moore, Aunt
Wolfgang Eigner	Kerstin Bashir, We grow up, studied and worked together
Christoph Sautner	
Armin Schietz	
Jonathan Seex	Joanna Seex, I am the sister of Jonathan.
Micah John Messent	Joy Camp, Aunt
Ollie Vick	Keri Powell, Friend
Marcelino Rassul Tayob	Emmanuel Rassul, Uncle
Micah John Messent	David Camp, Uncle
Jonathan Björn Seex	Britt-Marie Seex, I am the mother of the victim.
Clémence Boutant	Mathieu Chaumeil, Friend
Samya Stumo	Helen Fodnaess, I am a friend of the victim.
MARIA PILAR BUZZETTI	AILA MOHRHOFF, FAMILY FRIEND
Sam Pegram	Vslerie, Grandmother
Marcelino Rassul Tayob	Hugo Leal, I am the friend
Xavier Fricaudet	Nadine Raimondo, I am one of the parents' friends
Micheal Ryan	Tiarnan, brother
Abiodun Bashua	Mariam Bashua, Daughter
Abiodun Bashua	Hyro Bashua, Grandson
Anne-Katrin Feigl	Hans-Joachim Feigl, I am the father of the victim
Marie Philipp	Julia Simonsberger, friend
Anne-Katrin Feigl	Sieglinde Rink-Feigl, I am the mother of the victim
Camille Geoffroy	Abel Orain, I am a cousin of the victim
Camille Geoffroy	Eric Deschoenmaecker, Former employer
Clémence-Isaure Boutant	Emma O'Leary, I am a colleague and friend of the victims
Willm	
Sam Pegram	
Clémence Boutant	Lucie Viver, Friend
Graziella de Luis	Martínez Gregorio, I'm a friend of the victim
Samya Rose Stumo	Kristina Louise Hetherington, I am a friend and colleague of the victim.
Clémence-Isaure BOUTANT-WILLM	Jean-Louis MICHEL, Friend
Gachi De Luis	Patricia Rooke Crossley, I am a friend and colleague of victim
Marie Philipp	Susanne Radtke, I am the friend of the victim.
Gachi de Luis	Tom Afton, Friend
Alexandra Wachtmeister	Anna Wachtmeister, Cousins
Anne Katrin Feigl	Catherine Hubert, Friend
Camille Geoffroy	Henri Virol, I am the friend of the victim
Anne Katrin Feigl	Jack Davies, Friend
Graziella De Luis	Anita Guerra, I am a friend of the victim
Gachi de Luis	Françoise Point, I am a friend of the victim

Victim	Signatory
Gachi de Luis	Gilda Calleja, Close friend
Maria Pilar Buzzetti	Dalma Reka BERES, Colleague
Mick Ryan	Fergus Gleeson, Friend
Josefine Ekermann	Susan Saado, Friend
Camille Geoffroy	Marie-Claire Ribeiro, I am a friend of Véronique Geoffroy, Camille' aunt.
Josefin Ekermann	Alejandro Conde Geli, Exboyfriend
Matthew Vecere	Jason McClain, I am the cousin of the victim.
Anne Katrine Fiegl	Marcello GOLETTI, friend and colleague
Stef Lacroix	Lauren Webber, Roommates
Karoline Aadland	
Éric Prieur	Sandra Prieur, He was my brother
Christoph Sautner	Marlies Wohlmuth, Friend
Camille Geoffroy	Juliette Rouéssé, friend
Max Thabiso Edkins	Anne Lyons, Friend
Clémence Boutant	Isabelle Charré, Friend
Max Tabiso Edkins	Dennis Bailey, Uncle
Maxc Thabiso Edkins	Gillian Mary Bailey-Edkins, Auntie
Josefin Ekermann	Lia Hen, My best friend
Graciela De Luis Ponce	Rosita Castro Dominguez, Friend
Graciela Luis	Alejandra Safa Barraza, Friend
Kadija Cathy Hamani	Hamani, Colleague
Michael Ryan	James Spinelli, Friend
Camille Geoffroy	Jerome Bichot, Family friend
Camille Geoffroy	Olivier Peyre, I am a friend of a cousin of the victim.
Clémence Boutant-Willm	Pascale Vulliez, I am the friend of the victim
Michael Ryan	Giulia Serrelli, Friend
Sara Gebre Michael	Ababu Yetbarek, Husband
Samya Stumo	Cássio Lopes, I am the cousin of the victim.
Samya Stumo	Penny Owen, Friend of Family
Samya Stumo	Bradley R Krogman, Cousin
Marie Philipp	Angelika Begerow, I am the friend of the victim
Danielle Moore	Stacey Troster, Family Friend
Samya Rose Stumo	Christina Donnelly, Friend of the victim
Graziella De Luis	Stefanie Santa, Friend of the victim
Sam Pegram	James Killen, Friend of the victim
Xavier Fricaudet	Yvette Le Gall, I am the mother in law of Xavier Fricaudet's brother
Clémence-Isaure Boutant-Willm	Violaine Willm, Sister
Gachi de Luis	Jorge Tagle, Friend
Samya Stumo	Josh Webb, I am a friend of the victim
Samya Stumo	Allyson Steele, Friends of a friend
Gachi de Luis	Claire Farrimond, Friend
Samya Stumo	Jilian O'Neill, Friend
Joanne Toole	Michael Rodgers, I am a cousin of the victim
Amma Tesfamariam	Solomon Tezera, Husband
Sintayhu Shafi	Yewubnesh Asnake, cousin
Camille Geoffroy	Guenièvre Darbord, Friend
Graziella de Luis y Ponce	Becky Padera, I am a friend of the victim
Sintayhu Shafi	Yewubnesh Asnake, cousin
Samya Stumo	Lara Mittaud, Friend
Paolo Dieci	Elizabeth McCarthy, I am Paolo's sister in law
Max Edkins	Teboho Edkins, I am the Brother of the victim.

Victim	Signatory
Oliver Vick	Tasha Slaise, Olly was a dear friend and our son's beloved god-father
Olly Vick	Kirsty Norton, I am the friend of the victim
Danielle Moore	Pierre Royer, Uncle
Mel Riffel	Megan Golden, Cousin
Bennett Riffel	
Danielle Moore	David Lawless, Partner
Micah Messent	Heather Wilson, I am Micah Messent's aunt.
Stephanie Lacroix	Victoria Woodhouse, Friend and colleague
Angela Rehhorn	
Danielle Moore	
Micah Messant	
Danielle Moore	Gabrielle Mills, Friend
Samya Stumo	Jill Frankel, Friend
Matthew Vecere	Tracey Young, Friend
Angela Rehhorn	Bryce and Linda Vincent, Aunt and Uncle
Stephanie Lacroix	Micheline Geoffroy, Friend of the family
Danielle Moore	Elizabeth Nagel, I am the friend of the victim
Daniel Moore	Asma Azhar, Friend
Matt Vecere	Jeff and Nancy Vecere, Matt was our nephew
Melvin Riffel	Ryan Bennett, I am the cousin of the victims.
Bennett Riffel	
Samya Rose Stumo	Paige Kimble, friend in solidarity with the Stumo/Milleron family
Micah Messent	Diane Gershman, I am Micah's aunt
Danielle Moore	Siobhan Takala, I am a friend of the victim.
Samya Stumo	Ludwika Dec, Family friend
Denielle Moore	Marciana Alfaro, Niece
Virginia Chiemienti	Mateo Mancheno, Friend
Samya Stumo	Judith Saathoff, Samya is the granddaughter of my cousin
Graciella de Luis Ponce	Maria Regina Ponce Laviada, first cousin
Samya Stumo	Sarina Ricketts, Friend
Samya Rose Stumo	Brian Hubbard, I am a friend of the victim's family.
Samya Stumo	Ari Cardillo, Childhood friend of victim
Danielle Moore	Tim Cruickshank, Roommate
Joanna Toole	Joan Spruce, I am the aunt of the victim.
Angela Rehhorn	G. Smith, Friend of the family
Samya Stumo	Osamah Khalil, Friend of the Family
Danielle Moore	Alexandra Bonham, Friend
Samya Stumo	Christina Santala, Friend of the victim's mother
Micah Messent	Lucy Wilkie, I am a friend of the 2 victims
Danielle Moore	
Micheal Ryan	Cristin Ryan, Sister
Mel Riffel	Chante Hettinger, Friend
Camille Geoffroy	Luigi Flora, Camille's mother's partner
Micah Messent	Mike Gershman, First cousin
Camille Geoffroy	Nicolas Merle, friend of the victim
Samya Rose Stumo	Deborah Conner, She was my husband's cousin
Ghislaine De Claremont	Melissa Mairesse, Daughter of the victim
Danielle Moore	Richard Sweetman, I am a family friend.
Melvin Riffel	Katie Niccum, Cousin
Bennett Riffel	
Sebastiano Tusa	Alessandra Iovine, I am the friend of the victim's niece
Samya Rose Stumo	Carolyn Souaid, I am a cousin of the victim.
Danielle Moore	Karen Bourne, I am the friend of the mother of the victim

Victim	Signatory
Stéphanie Lacroix	Philippe Leroux, I am a friend of the victim
Stéphanie Lacroix	Lucie Miron-Leroux, I am a friend of the victim.
Micah Messent	Laurie Spickard, Cousin
Melvin Riffel	Joe LoGiudice, Step son-in-laws
Bennett Riffel	
Samya Stumo	Amy Alpert, Friend of the family
Alexandra Wachtmeister	Carl Nordlander, I am an uncle of the victim.
Derick Lwugi	Angel Kivia, I am the daughter of Derick Lwugi.
Matthew Vecere	Linda Ha, Partner
Samya Rose Stumo	Tom Leatherman, I am a friend of the victim
Lexi Deighton	Lexi Deighton, A friend
Xavier Fricaudet	Solange Lamy, Friend
Olly Vick	Simon Tilbury, Close friend
Josefin Ekermann	V Leigh, Friend
Oliver Vick	Rebecca Vick, I am sister to one victim, friend and 'sister-in-law'
Jessica Hyba	to the other
Micah Messent	Caroline Rutledge, Friend
Angela Rehorn	S Mark Vincent, Uncle
Melvin Riffel	Alexandria Kealey, I am friend of victims mother.
Bennett Riffel	
Angela Rehhorn	Ryan Rehhorn, Brother of Angela
Xavier Fricaudet	Marine Capron, I am the sister in law of the victim.
Samya Stumo	Lloyd Baroody, friend of family
Danielle Moore	Courtney Schreiter, Friend
Camille GEOFFROY	Catherine BERTHET, I am the mother of the victim
Melvin Riffel	Larissa felch, Melvin riffel was my brother in law
Jessica Hyba	Gregory Kovacs, Brother
Jessica Hyba	Allan Kovacs, step father
Melvin Riffel	HEIDI PRICE, My sons best friends
Bennet Riffel	
Jessica Hyba	Karol Kovacs, Mother
Angela Rehhorn	Petra MacKay, Cousin
Samya Stumo	Nina Anderson, friend of parents
Max Thabiso Edkins	Marianne Gysae-Edkins, I am the mother
Andrea Carol Anderson	Andrea Anderson, I am the grandmother of the partner of Micah's brother.
Micah Messent	Natalie Gates, friend
Hoda Bandeh-Ahmadi	Hoda Bandeh-Ahmadi, Friend/colleague of Samya Stumo.
Danielle Courtney Moore	Betty Moore, I am the paternal Grandmother of the victim
Samya Rose Stumo	Karen Carreras-Hubbard, Friend
Samya Stumo	Ann Perry, family friend
Max Edkins	Inga Coleman, Cousin
Stéphanie Lacroix	Joanne Belanger, Aunt
Alexandra Wachtmeister	Wilhelm Wachtmeister, Father of Alexandra
Graziella De Luis	Sofia Diaz, I am the niece of the victim.
Joanna Toole	Natalie Fullick, Friend
Samya Stumo	Lisa Markowitz, I am a friend of the victim.
Danielle Moore	Gualberto Abenir Jr, Niece
Danielle Moore	Gualberto Abenir Jr, Niece
Gachi de Luis	Maya de Luis, She was my aunt
Clémence-Isaure	Vincent WILLM, I am the brother of the victim
BOUTANT	
Stephanie Lacriox	Connie Labreche, Cousin of the victims father
Baleker, Sintayehu Shafi	Konjit Baleker, I'm the sister of the victim

Victim	Signatory
Oliver Vick	James Vick, Father
Matt Vecere	Colleen Menz, Aunt
Olivert Vick	Cheryl Vick, I am the mother of the victim
Graciela de Luis	Alejandro suarez larrinaga, Nephew of victim
Oliver Vick	Cheryl Vick. (Previously misspelt), I am the Mother of the victim
Oliver Vick	Cheryl Vick, I am the Mother of the victim
Samya Rose Stumo	Noor Jdid, I am the friend of the victim
Graziela de Luiz	Margaret de Vanssay, Close friend
De Luis	Christian Klacko, Friend
Danielle Moore	Lindsay Butt, I am a friend of the victim
N/A	Arlene Tolopko, I am the friend of the victim
Samya Stumo	Patricia Frank, Second cousin
Mick Ryan	Rodolfo, Friend and work colleague.
Pilar Buzzetti	
Zhen Zhen Huang	
Oliver Vick	Charles bennett, Friend
Marie Philipp	Helmut Schmidt, I am the friend of the victim.
Marie Philipp	Monika Schmidt, I am the friend of the victim.
Joanna Toole	Nicky McNaughton, Best friend
Micah Messent	Erica Greenup, best friend
Micah Messent	Frank Messent, I'm his older brother
Graziela de Luis	Javier, Brother of victim Graziella de Luis
Clemence boutant WILLM	Eddy Willm, my cousin
Clemence boutant WILLM	eddy willm, my cousin
Samya Stumo	Leila Baroody, friend
Melvin Riffel	Christina Felch, Mother in law to the victim.
Stéphanie Lacroix	Emma Belanger, Cousin
Micheál Ryan	Christine Ryan, I am the mother of the victim
Stéphanie Lacroix	Alain Lacroix, I am Stéphanie's father.
Michéal Ryan	Siobhan Brassil, Sister
Danielle Moore	Chris Moore, Father
Melvin Riffel	Clara LoGiudice, Son in law
Melvin Riffel	Zach Niccum, I am a friend/family of the victims.
Bennett Riffel	
Melvin Riffel	Kaylynn Campbell, Family member of his widow
Samya Stumo	Cheryl Williams, My daughter friend of victim
Angela Rehhorn	Tara Reid, Friend of the victim
Samya Rose Stumo	Philip Palmquist, I am the cousin of the victim
Stéphanie Lacroix	Sylvie Lamarche Lacroix, I am the mother of Stéphanie Lacroix
Danielle Moore	Lita Venezuela, Friend of the victim
Stephanie Lacroix	Alanna Clark, Cousin
Stephanie Lacroix	Nathalie Robillard, Cousin
Stéphanie Lacroix	Carole Girard, Friend
Stephanie Lacroix	Line Robillard, Aunt to victim
Stephanie Lacroix	J Caron, Cousin
Micah Messent	Suzanne Camp, I am Micah Messent's mother
Stephanie Lacroix	Faith Neale, Friend of victim
Stéphanie Lacroix	Michael Moscarello, I am the maternal cousin of the victim.
Stéphanie Lacroix	Buczowski, I am a friend of the victim.
Stephanie Lacroix	Stephane Belanger, I am the uncle of the victim
Stephanie Lacroix	Lucie Lambert, Friend of family
Stephanie Lacroix	Christopher Lamarche, Cousin
Stephanie Lacroix	Helene Lacroix, I am the grandmother of the victim
Micah Messent	Deborah Fitzsimmons, Auntie

Victim	Signatory
Stephanie Lacroix	Brigitte Castonguay, Friend
Stephanie Lacroix	Doris Blouin Harrison, Friend
Samya Stumo	Torleif Stumo, I am the brother of Samya.
Stéphanie Lacroix	Cameron Caron, I am cousin of the victim
Stephanie Lacroix	Jennifer Finniss, Friend
Micah John Messent	John Joseph Messent, Father of victim
Danielle Moore	Clariss Moore, I am the mother of Danielle Moore
Danielle Moore	Rodilla Abenir, I am the grandmother of Danielle Moore
Danielle Moore	Fanny Abenir, I am the aunt of Danielle Moore
Samya Stumo	Matthew Kreta, Childhood Friend
Stephanie Lacroix	Anne Vien, Friend
Chunming Wang	SiyueWang, I am the daughter of the victim
Stephanie Lacroix	Micheline Gervais, Friend of family
Steph Lacroix	Shannon lafrance, Friend
Micah Messent	Kidston Short, I am Micah's girlfriend
Micah Messent	Nancy MacPherson, Sister-in-law
Graziella De Luis	Attilia Fracchia, I was a close friend of the victim
Xavier Fricaudet	Bernard Vinot, a dear friend
Stéphanie Lacroix	Linda Falardeau, Friend's daughter
Joanna Toole	Mark Toole, Uncle
Stéphanie Lacroix	Caleb, Friend of the victim.
Sam Pegram Sarah Auffret	Rhiannon Griffiths, I was a housemate of the victims at different times
Melvin Riffel	Charlotte Wood, Friend of the victims
Bennett Riffel	
Melvin Riffel	Charlotte Wood, I am the friend of the victims
Bennett Riffel	
Mel Riffel	Ashley Jorgenson, I am a friend of Mel
Stephanie Lacroix	Michel Robillard, I am the uncle of the victim
Stephanie Lacroix	Mariane Piché, Friend of victim's parents (Alain and Sylvie Lacroix)
N/A	Eric Pagoada, Friend of a friend
Stephanie Lacroix	Joanne Quinn, I am a friend
Stephanie Lacroix	Kris Picard, I am a friend of the victim
Stéphanie Lacroix	Diane Caron, Cousin
Stephanie Lacroix	Johanne Lamarche, cousin
Stephanie Lacroix	Barb Hogan, Colleague and friend
Stéphanie Lacroix	Pierrette Lachance, I am a friend of the victim.
Danielle Moore	Jesslene Jawanda, I am the friend of the victim
Danielle Moore	Gualberto Abenir Jr, Neice
Clémence-Isaure Boutant-Willm	Élisabeth Willm, I am the mother of Clémence-Isaure.
Stephanie Lacroix	Jocelyne Dubien, My cousins daughter
Danielle Moore	Julie McDonald, Friend
Stephanie Lacroix	Gabrielle Gauthier, Former work friend
Samya Stumo	Rami akhrass, Friend of family
Danielle Moore	Kelly Ambrose, Friend
Danielle Moore	Kathy Martorino, Moore Family friend
Danielle Moore	Albert ajemian, Friend
Danielle Moore	Lori Kinch, Friend of victim's family
Danielle Moore	Laura Ward, I am a cousin of the victim~Danielle Moore
Danielle Moore	Joanne Cerdan, Family friend
Danielle Moore	Cameron Ure, Friend
Danielle Moore	Dagni Ziedins, Friend of the victims family

Victim	Signatory
Stéphanie Lacroix	Line Fogal, Friend
Danielle Moore	Colleen Duffey, Family friend
Danielle Moore	Da Chen, I am the friend of the victim
Tamirat Mulu	Fasika Mulu, Brother
Danielle Moore	Richard Hedges, I am the uncle of the victim.
Stephanie Lacroix	Jenny Sutton, Friend
Stephanie LaCroix	Sarah Forrest, I am the friend of the victim.
Xavier FRICAUDET	Roseline FRICAUDET, I am the mother of the victim
Stephanie Lacroix	Suzanne Labelle, I am an aunt to the victim
Danielle Moore	Rob Del Mundo, Friend
Danielle Moore	Chuchi Mangubat, niece
Samuel Pegram	Seamus Harland, Friend
Anne Katrin Feigl	Juan Carlos Llorens Rojas, I am the friend of the victim
Micah Messent	Ross Camp, Uncle
Stephanie Lacroix	Hélène chartier, Friend
Camille Geoffroy	Valerie Serres, friend
Danielle Moore	Cynthia Abenir, Niece
Dawn Tanner	Hunter Tanner French, I am the son of the victim.
Danielle Moore	Cynthia Abenir, Niece
Danielle Moore	Lyn Abenir, Niece
Matt Vecere	Caroline McClain, I am the cousin of the victim
Danielle Moore	Mark Uzer, Niece
Danielle Moore	John Uzer, Niece
Jonathan Seex	Nadege Dubois—Seex, I am the wife of the victim
Jonathan Seex	Alexandre seex, I am the son of the victim
Mick Ryan	Andy Jackson, Friend
Jonathan Seex	Antoine Seex, I am the son of the victim
Danielle Moore Micah Messant	Leah Luciuk, Friend of victims
Jonathan Seex	Adeline seex, I am the daughter of the victim
Boutant wilm Clémence	Christine Falcand, A Friend of the victim
Stephanie Lacroix	Jennifer Doucet, Cousin
Danielle Moore	Victoria, I am the friend of the victim's parents
Paul N's wife, two children and his mother-in-law	
Mick Ryan	Rohit Kumar Pokharel, Colleague
Joanna Toole	Adrian Toole, I am Father
Mick Ryan	Clodagh Finn, Friend of the victim
Danielle Moore	Troy Sabaot, Goddaughter
Mick Ryan	S.M. Tanbir Uddin, I am the colleague of the victim.
Danielle Moore	Natasha Perera, Friend
Paolo Dieci	Luca Dieci, Brother
Paolo Dieci	Maria Luisa Mattioli, Wife
Paolo Dieci	Nella Dieci, Sister
Marie Philipp	Sophia Baumann, Cousin
Micah Messent	Emma Spickard, I am the cousin of the victim.
Danielle C Moore	Betty Moore, Grandmother of the victim
Mick Ryan	Michael Brassil, Brother-in-law
Stephanie Lacroix	Nicole Dumouchel, Friend
Danielle Moore	Alexandra Dufort, I am a friend of the victim
Samya Rose Stumo	Geraldine Ieka, Friend
Samya Stumo	Alexander Tripp, Godfather to Samya
Stephanie Lacroix	Maya McDonald, I am a friend of the victim.

Victim	Signatory
Danielle Moore	Kim Lawrence, Friend of the victim's family
Melvin Riffel	Marlina Riffel, I am the Aunt of the victims
Bennett Riffel	
Mick Ryan	Stephen Cahill, Friend and co-worker
Samya Stumo	Sharrie Brooks, Cousin
Ekta Adhikari	Samir Nepal, Colleague
Mick Ryan	Finbarr Geaney, I am the friend of the victim.
Graziella de Luis	Jean Kwo, Sister-in-law
Matt Vecere	Joyce Courter, I am a friend of the victim.
Micah Messent	John Camp, Uncle
Alexandra Wachtmeister	Agneta Westman, Alexandra's aunt
Micah Messent	Jade Ballard, I am the eldest sister of the victim.
Mick Ryan	Roy Crabb, Friend and kindred Spirit
Micah Messent	Darryl Gershman, I am the uncle of the victim
Stéphanie Lacroix	Rebecca Young, I am a friend of the victim
Stephanie Lacroix	Monique, I am her aunt
Micah Messent	Cathy Camp, I am the Aunt of Micah Messent
Micah Camp	Keshia Chutter, I am the cousin of the victim
Mick Ryan	Jennifer McAuliffe, I am the cousin of the victims wife
Danielle Moore	Clariss Moore, I am the mother of Danielle Moore
Micah Messent	James Fitzsimmons, I am the uncle of the victim.
Mick Ryan	Stuart Zimble, I am a close friend
Michael Ryan	Declan O'Mahony, I am a friend of the victim.
Mick Ryan	Eadin O'Mahony, Friend
Stephanie Lacroix	Rosemary Quinn, Family friend
Samya Stumo	Caitlin Hotaling, I am the friend of the victim.
Stephanie Lacroix	Stephanie Kennedy, I used to go to school with the victim.
Mick Ryan	Orla Clinton, Friend and colleague
Mick Ryan	Helen O'Dowd, I am a Friend of the family of victim Mick Ryan
Samya Rose Stumo	Paul and Patricia Nimchek, We are friends of the victim and her family.
Stéphanie Lacroix	Christina Callingham, Friend
Stephanie Lacroix	Darla Bennison, Friend of Mother and Father and extended families of the victim.
Stephanie Lacroix	Darla Bennison, Friend of the Mother and Father and extended families of the Victim
Stephanie Lacroix	Marc Caron, Uncle
Samya Stumo	Tom Connell, Family friend
Stephanie Lacroix	Mélanie Martin, Friend
Steph Lamarche	Rachelle Helin, I am a friend of victim's mother.
Mick Ryan	Ahmad bin Zakaria, He was my honorable chief
Danielle Moore	David Moore, I am the brother of the victim
Ekta Adhikari	Praneet Shrestha, Fiancee, Colleague
Mick Ryan	
Marie Christin Philipp	Ellen Philipp, I am the mother of the victim
Marie Christin Philipp	Klaus Philipp, I am the father of the victim
Danielle Moore	Annabelle Cerdan, Niece and good friend
Melvin Riffel	Elena Riffel, I am the Aunt of the victims
Bennett Riffel	
Anne-Katrin Feigl	Katharina, Close friend
Graziella de Luis	Mariana Cristellys, Friend
Michael Ryan	Conor O'Sullivan, I am a friend of the victim
Oliver Vick	Ilaria Gandossi, Father of my children
Danille Moore	Aurie Narvaez, Friend

Victim	Signatory
Danielle Moore	Kathryn Brimson, Cousin
Danielle Moore	Sydney Brimson, 2nd Cousin
Joanna Toole	Dennis Spruce, Uncle
Marie Philipp	Christiane Ulrich, Family friend
Samya Rose Stumo	Diane Holmlund, I am a second cousin of Samya
Michael Ryan	Mari Turashvili, Friend
Danielle Moore	Alexander Cake, Cousin
Micah Messent	Jacqueline Messent, Cousin
Stephanie Lacroix	Julie Balasalle, Friend and coworker
Mick Ryan	Catherine Clark, Friend and colleague of the victim
Anne-Katrin Feigel	Nicole Blu, I am a friend of the victim.
Daniella Moore	Wilson Lee, I am the friend of the victim
Mick Ryan	Lucie Jouanneau, friend
Samya Stumo	Theresa Williams, family friend
Peter deMarsh	Michèle Ashby, I am a friend of a victim's sister. And I fly!
Alexandra Wachtmeister	Nane Annan, I am a friend of the victim
Mick (Micheal) Ryan	Aodhnaid Connolly Lennon, Sister in Law
Amma Tesfamariam Woldeesenbet	Bruck Tesfamariam Woldeesenbet, Brother
Danielle Moore	Honor Hedges Royer, aunt
Danielle Moore	Lora Meseman, Mother-in-law
Isabella Beryl Achieng Jaboma	Allan Jaboma, She was my sister
Graziella De Luis	Maya AlChidiac, Dear friend
Samya Rose Stumo	Pilar Vera Palmés, I am the Chair of the Air Crash Families Federation International (ACVFFI)
Mick Ryan	Morgan Connolly, I am the father-in-law of Mick Ryan
Mick Ryan	Maire Connolly, I am the mother-in-law of the victim
Stéphanie Lacroix	Natalie, Dear family friend
Max Edkins	Til Kreuels, I am a friend of the victim.
Mick Ryan	Naoise Connolly Ryan, Wife of Victim
Danielle Moore	Kathy Martorino, Friend of Moore family
Samya Stumo	Nico Tripcevic, Family friend
Angela Rehborn	Catherine Vincent, I am the Aunt of the victim.
Angela Rehborn	John Vincent, I am the Uncle of the victim
Sintayehu Shafi Baleker	Liul Baleker, I am the brother of the victim
Michael Ryan	Robert Jackson, Friend
Mick Ryan	Sile Geaney, Family friend
Matt Vecere	Patricia Vecere McClain, Aunt of victim
Marie Christin Philipp	Laura Vendt, Friend
Samya Stumo	Jurgen Vsyh, I am a friend of the victim.
Danielle Moore	Glenn Gundermann, I am a friend of the victim's family.
Samya Rose Stumo	Marjorie Aelion, I am the friend of the victim.
Samya Stumo	Laila Mokhiber, Cousin
Danielle Moore	Olivia Allen, friend and colleague of the victim
Stephanie Lacroix	Joy Wahba, Friend
Daniel Moore	Matthew Miller, I am a friend of Daniel and Micah
Micah Messent	
Abiodun Bashua	Alem Tebeje, Brother-in-law
Melvin Riffel	Korryll Lave, I am a friend of the victim.
Abiodun Bashua	Yetunde Bashua, He was my father
Stephanie Lacroix	Samantha Demers, I am a friend of the victim
Samya Stumo	Luis Arnal Delgado, Friend
Samya Stumo	Penny Owen, Family friend

Victim	Signatory
Max Thabiso Edkins	Jennifer Anderson-Ochoa, I am a friend of the victim.
Samya Rose Stumo	Harriett Northcutt, A friend
Samya Stumo	Laudison Lopes, Cousin
Stephanie Lacroix	Lucille Martin, Friend of the family
Samya Rose Stumo	Gail Brinkmeier, friend of victim
Stephanie Lacroix	Lucille Martin, Friend of the victim
Stephanie Lacroix	Emilie Brule, I am the friend of the victim.
Melvin Riffel	Mackenzie Claver, I am the best friend to the victims
Bennett Riffel	
Melvin Riffel	John Fisher, I am married to a cousin of the victims.
Bennett Riffel	
Samya Stumo	Carrie Olson, Cousin
Matt Vercere	Matthew Baiamonte, Friend
Samya Rose Stumo	Nadia Milleron, I am Samya's mother
Stephanie Lacroix	Lauri-Ann Loreto Neal, I am a friend of the victim's mother.
Mel Riffel	ED Duggan III, Friend
Carol Diehl	Carol Diehl, I am a friend of the family
Samya Rose Stumo	linda sawaya, friend of victim's family
Bennett Riffel	Terri Sherman, Friend
Melvin Riffel	
Samya Stumo	Helen A Hellmers, Friend
Samya Rose Stumo	Pat Brooks, I am a friend of the victim's maternal Grandmother, Professor Laura Nader
Samya Stumo	Judy Metro, I am a friend of the family.
Samya Rose Stumo	David Teisler, She was daughter of my daughter's GodMother and a great friend
Samya Stumo	Suzanne Murray, Family friend
Samya Stumo	Mirna Mercado, I am a friend of Samya
Samya Stumo	Laura Flores, my niece
Samya Rose Stumo	Gabrielle Paese, I am the friend of the victim
Alexandra Wachtmeister	Anne-Margrete Wachtmeister, I am her mother
Micah Messant	Nelsen Spickard, Cousin
Stéphanie Lacroix	Michel Monette, Friend of the victim
Riffel	Tonia, Friend
Samya Stumo a d Bella	Hayley Freedman, Friend
Samya Rose Stumo	E Shaker, Cousin
Camille Geoffroy	Diane de Schoutheete, I am an aunt of Camille Geoffroy
Danielle Moore	Honor Hedges Royer, Aunt
Angela Rehborn	Jeremy Harbinson, Friend
Samya Rose Stumo	Renée Betar, Friend of the victim
Samya stumo	Janet Domenitz, Friend
Micah Messent	Caroline Willis, I am a family friend.
Samya Stumo	James Holmlund, Samya is my grand niece
Samya Stumo	Anne Marie Papandrea, Family friend
Danielle Moore	Lita Venezuela, Friend if the victim
Angela Rehborn	Mary Eleanor Vincent, I am the Aunt and Godmother of Angela
Angela Rehborn	Kaitlin Thatcher, Friend
Angela Rehborn	August Pokotylo, I am the Uncle and Godfather of the victim
Angela Rehborn	Rowena Fonseca, Friend
N/A	Shira Drossos, N/A
Samya Stumo	Marilyn J Holmlund, Samya was the granddaughter of my cousin Mary Holmlund Stumo
Danielle Moore	Bryan Sison, I am the friend of the mother of the victim
Samya Stumo	Emily Crawford, I am a friend of the victim.

Victim	Signatory
Samya Stumo	Karen Lundeen, Family friend
Mick Ryan	Giacomo Re, Friend and colleague at WFP
Camille Geoffroy	Veronique Geoffroy, Aunt
Samya Rose Stumo	Cari borja, Close Friend of grandmother
Marie Christin Pfilipp	Michael Baumann, I am the uncle of the victim
Samya Milleron	Nola Frick, Relative
Samya Stumo	Karen Hoyt, Friend of the victim
Marie Christin Philipp	Doris Fuchs, I am the aunt
Samya Rose Stumo	Mette Linnet, Friend
Wolfgang Eigner	Carmen Sigl, Friend
Max Edkins	Friederike Gysae-Schnurre, I am his aunt
Mariapilar Buzzetti	Davide Picistrelli, friend
Immaculate Odero	Victor Mwau, Close friend
Jonathan Seex	Maria Petersen, Cousin
Wolfgang Eigner	Jennifer Stefanits, Friend
Armin Schietz	
Christoph Sautner	
Stefanie LaCroix	Lauren Webber, Malawi roommate
Sam Pegram	William Pegram, Grandfather
Micheal Ryan	MP O'Brien, brother-in-law
Camille Geoffroy	Nicolas Tsioukis, I am the friend of the victim
Oliver Vick	Jonathan Haines, Cousin
Xavier Fricaudet	François Fricaudetxa, Father
Pilar Buzzetti	Angelo, Friend
Samya Stumo	Lucy MacGillis, Friend
Arnold	Chria, Friend
Paolo Dieci	Silvia Guglielmi, I am the niece of the victim.
Marie Christin Philipp	Doris Fuchs, I am the aunt
Mercy NDIVO	Beatrice Kimuyu, I am mother and Mother in-law of the two victims
Jared Babu	
Ollie Vick	Tim Bond, Friend
Jessica Hyba	
Max Thabiso Edkins	Andrea andersen, I am the cousin of the victim
Immaculate Achieng Odero	Eliakim, Sister
Xavier FRICAUDET	Olivier FRICAUDET, I'm the cousin of the victim
Sintayhu Shafi	Yewubnesh, cousin
Harina HAFITZ	Stéphanie COSTERG, I am the friend of the victim.
Xavier Fricaudet	René Hautier, ami
Josefin Ekermann	Norah Elena Ekermann, Sister
Joanne Toole	Tanya Hucklesby, Friends with her sister Karen
Graziela de Luis	Alejandro, Nephew
Marie Philipp	Hendrik Philipp, I am her brother
Michael Ryan	Dene Cairns, I am a friend of the victim
Olly Vick	Harriet Tarnoy, Friends
Jessica Hyba	
Alexandra Wachtmeister	Fredrik Wachtmeister, Brother
Jonathan Seex	Pär, Brother in law
Graziella de Luis	Isabel de Luis, sister
Sam Pegram	Val Pegram, Grandmother
Sebastiano Tusa	Alberta Pongiglione, I am a friend of the victim
Marie Philipp	Laura Petrak, Best friend
Oliver Vick	Rifet Arapovic, I am the friend of the victim.
Anne-Katrin Feigl	Gabriele Haldenwang, I am a friend of the family of the victim

Victim	Signatory
Pilar Buzzetti	Richard Culley, I am the friend of the victim
Immaculate Otero	Sally, Sister-in-law
Oliver Vick	James Vick, I am the father of the victim
Oliver Vick	Cheryl Vick, I am the Mother of the victim
Immaculate Otero	Christabel Were, Friend
Sam Pegram	Scott Hetherington, I am the friend of the victim.
Michael Ryan	Darragh Mcdonagh, Friend
Jessica Hyba	George Ghikas, Friend
Oliver Vick	George Ghikas, Friend
Anne Feigl	Anna Caroline Feigl, Sister in law
Anne-Katrin Feigl	Katharina Peters, Close friend
Immaculate Achieng Otero	Denis Adhoch, Husband
Xavier Fricaudet	Rossi Hadzhieva, I am a friend of the victim
Samya Stumo	Diane Sykes, Family friend
Max Thabiso Edkins	Donald Edkins, I am the father of Max Thabiso Edkins.
Danielle Moore	Bobbie alfar, Cousin
Samya Rose Stumo	Joan, I am a friend of the victim
Samya Stumo	Carol Conner, Family Friend
Samya Stumo	Matthew Caemmerer, Friend
Angela Rehborn	Lorna Nickerson, Family friend
Paolo Dieci	Estella Dieci, Niece
Marie Philipp	Julia Schmidt, Friend of family
Jonathan Seex	Linda Poidnakk, Friend
Danielle Moore	Mo Phung, Closed friends.
Micah Messent	
Jonathan Seex	Gunilla Larsson, Jonathan was the son of a very good friend and I had known him since he was a baby. It still hurts that this beautiful person is no longer because of greed and negligence!
Danielle Moore	Jacqueline Miller, I am the friend of the victim.
Joanna Toole	Paul Heydon, Friend of a Friend of the victim
Samya Stumo	Linda Miller, Friend
Jonathan Seex	Nadja Chekhov, I'm the friend of the victim's mother
Stephanie Lacroix	Julie Lacourse, I am a friend of the victim.
Melvin and Bennett Riffel	Cheryl hess, Cousin
Jonathan Seex	Johan Hartzell, Wifes cousin
Immaculate Achieng' otero	Princess Piro, I am a very close family & childhood friend & neighbor
Samya Stumo	Arlene Tolopko, I am a friend of the victim.
Camille Geoffroy	Valerie serres, friend
Sebastiano Tusa	Sofia Ambrogio, I am the niece of the victim
Danielle Moore	Gualberto Abenir Jr, Niece
Clemence Boutant	Ian HENSTOCK, Friend/former colleagues
Samya Rose Stumo	Kristen Brookes, friend of the family
Michael Ryan	Helen Maree, I am a family member of the victim
Angela Elizabeth Maria Rehborn	Roland Rehborn, Father of victim
Sebastiano Tusa	Carlo Tusa, He was my cousin.
Matthew Vecere	Richard McMullin, I am a friend of the victim.
Jean-Michel Suzanne Barranger	Laetitia Tavernier, I am the daughter
Jean Michel Suzanne Barranger	Marc Tavernier, I am son-in-law
Stephanie Lacroix	Murray Howe, friend of Family
Eric Prieur	Prieur claire, My brother

Victim	Signatory
Danielle Moore	Kathleen Randall, Cousin
Samya Stumo	Deveney williams, Friend
Samya Stumo	Amy Alpert, Family friend
Cedric Galia Asiavugwa	Alex Kubasu, I am the friend of the victim
Samya Rose Stumo	Sheryl Lechner, family friend
Bennett Riffel	Lorraine Micke-Hayden, I am the cousin of the victims.
Melvin Riffel	
Oliver Vick	Kirsten Young, Friend
Samya Stumo	Jennifer Brown, I am a friend of the victim.
Johanna Toole	Elisa Canalini, I am a colleague of the victim
Samya Rose Stumo	Steven Souaid, I am a cousin of the victim
Samya Stumo	Robbyn Swan, Friend
Samya Stumo	Sandra K Holmlund, Great Niece
Angela Rehborn	Jacob Oberfrank, Partner
Clemence Boutant-Willm	Claire FABING, I am a colleague of the victims
Samuel Pendam	
Stephanie Lacroix	Michelle BeaudrySeguin, Close friend
Steph Lacroix	Jamie Lafrance, Friend/former roommate
Xavier FRICAUDET	NOUVION Marie, famille
Samya Rose Stumo	Thomas Leatherman, Friend and Colleague
Melvin Riffel	Melissa Duralia, I am the friend of a victim
Graziella de Luis y Ponce	Maria Tauber, Friend
Marie Philipp	Angelika Begerow, I am the friend of the victim
Jonathan Seex	Anne-Marie Petersen, Aunt
Camille Geoffroy	Sophie Le Bret, Family's friend
Michael Ryan	John Maree, Concerned engineer family friend
Anne-Katrin Feigl	Sam Eifling, I'm a friend of the victim
Samya Stumo	Michelle Wolfensperger, Cousin
MELVIN Riffel	Rebecca Richardson, I am a friend of Ike and Susan Riffel
BENNETT RIFFEL	
Matt Vecere	Stephen Dintino, Friend
Dawn Tanner	Brian Kobiero, Spouse
Anne-Katrin Feigl	Regina M. Buono, Friend
Immaculate Achieng Odero	Emmy, Sister
Allan Chacha	Allan Chacha, Friend
Samya Stumo	Joseph Kreta, Childhood friends
Mick Ryan	Jack Connolly, Uncle Inlaw
Melvin and Bennett Riffel	Carl J. Koutnik MD, friend of family
Immaculate Achieng Odero	Judith Otsieno, Friend
Mick Ryan	Lee Wassem, Family member
Mick Ryan	Deirdre Connolly, I am the wife of Jack Connolly—Micks uncle in law
Suzanne Barranger	Barranger Sebastien, I am the son of the victim
Jean Michel Barranger	
Paolo Dieci	Harlan Downs-Tepper, I am the friend of the victim.
Juliah Mwash	Florah Mwash, Sister
Juliah Mwash	Ivy Nduta, Mother
Juliah Mwash	Joy Ayuma, Mother
Xavier Fricaudet	Virginie Fricaudet, I am the sister
Jonathan Seex	Karen McDougall, I am a childhood friend of the victim.
Melvin Riffel	Susan Mears, Family Friend
Bennett Riffel	
Xavier Fricaudet	Jean-Luc Moreau, I am friend of the victim

Victim	Signatory
Clémence Willm	Céline Grimault, I am a friend of the victim.
Mick Ryan	Alan Connolly, Relative
Stéphanie Lacroix	David Finniss, I am the friend of the victim.
Joanna Toole	Bridget Harris, Close family friend and best friend of my niece Katy Harris
Samya Stumo	Laura Zabriskie, I am a friend and parishioner of Samya.
Matt Vecere	Tomra Vecere, Sister
Matt Vecere	Charles Sinesi, Brother in law
Clémence-Isaure Willm Boutant	Emma Boutant, I am the step-daughter of the victim.
Danielle Moore	Colleen Duffey, Family friend
Samya Stumo	Evelyn Kreta, I was her friend and church school teacher.
Matt Vecere	Rachel Condon, Niece
Samya Stumo	Sylvia Lewis, I am a family friend.
Oliver Vick	Lucy Bowers-Wilddblood, Friend, chosen family.
Oliver Vick	Lucy Bowers-Wilddblood, Friend, chosen family.
Danielle Moore	Nick Cake, Cousin
Michael Ryan	Hayley Dowsing-Connolly, Family friend
Samya Stumo	Karen Hubbard, Friend
Samya Rose Stumo	Matilde Guillen, I am the host mother in Peru of the victim
Samya Rose Stumo	Gustavo Justo, I am the host father in Peru of the victim
Emmaculate otero	Susan, Friend
Immaculate otero	Ephie, Sister
Mick Ryan	Mai, Colleague and Friend
Xavier Fricaudet	Harm van Duin, Friend
Sam Pegram	Mark Pegram, Father
Ekta Adhikari	Noel Griffin, Colleague and friend
Maria Pilar Buzzetti	
Virginia Chimenti	
Harina Hafitz	
Zhen-Zhen Huang	
Michael Ryan	
Djordje Vdovic	
Alexandra Wachtmeister	Anna Wachtmeister, Cousin
Immaculate Achieng Odero	Hermaton Nalyanya, A friend to the victim
Agnes Mary Wangari Gathumbi	Ian Kabaara, I am a friend of the children of the victim
Sam Pegram	Melanie Cremona, Friend
KARIM SAAFI	Mohamed Najeh Saafi, BROTHER
KARIM SAAFI	DRISS SAAFI, Uncle
KARIM SAAFI	ELYESS SAAFI, Uncle
Saafi Karim	Ingrid de Viennay, Je suis son ancienne belle soeur.
KARIM SAAFI	INESS SAAFI, Uncle
Max Edkins	Kathleen McCarthy, Friend
Angela	Shantel Rehborn, Sister
Angela Rehborn	Joan Vincent, Mother
Samya Stumo	Deirdre Hatch, I am a friend of the victim
Samya Stumo	David Hatch, I am a friend of the victim
Stephanie Lacroix	Glen Levacque, Cousin
Immaculate otero	Ephie otero, Sister
Riffle Brothers	Ericka Allio, Family friend
CLEMENCE-ISAURE BOUTANT	Denis Boutant, I am the husband of the victim
Joanna Toole	Jerome Toole, I am the cousin of the victim.

Victim	Signatory
Samya Stumo	Jenelle Pierce, Cousins daughter passed away in the plane.
Emmaculate Achieng Odero	Clifford Odero, I am the brother of the victim.
Samya Stumo	Georgia Usry, Close friend of the family
Jonathan Seex	Johanna, Friend
Samya Stumo	Susan Lockwood, I am a friend of the victim
Oliver Vick	David Haines, I am the victim's uncle.
Danielle Moore	Mark Uzer, Cousin
Danielle Moore	Mark Uzer, Cousin
Samya Stumo	Joni Cushing, Friend
Jessica Hyba	Susan Olszynko, Close friend
Michael Ryan	Lynn Dowsing-Connolly, He was my cousin's husband
Samya Rose Stumo	Fr. John Kreta, Spiritual father
Samya Rose Stumo	Erika Wainwright, I am the friend of Samya Stumo
Graciela De Luis Ponce	Noemí Laviada, Friend
Samya Stumo	Hollis Starks, friend of the victim
Jonathan Seex	Torben Rune, Friend of victim
ZHEN ZHEN HUANG	WEI XIONG, I am the husband of the victim
Graziella De Luis	Anita Guerra, I am a friend of the victim
Max Thabiso Edkins	Gillian Mary Edkins Bailey, I am the auntie
Mick Ryan	Thalia Maree, Cousin of Mick's wife Naoise
Maygenet Worku	Eyasu Teshome, Husband
Anne-Katrin Feigl	Michele Pasquale, I am the friend of the victim.
Sam Pegram	Tom Pegram, Brother
Camille Geofroy	Amelie Jourdier, I am the aunt
Mick Ryan	Séanna Connolly, Brother in law
Michael Ryan	ciamha hurst, i am a friend
Mick Ryan	Tina O'Flynn, I am a friend of the victim
Micheal Ryan	Silvia Rodriguez Barbado, A friend of the victim
Graziella de Luis y Ponce	Susan Draz, Friend
Michael Ryan	Eoin Daffy, Friend
Marie Christin Philipp	Wiebke Hörmeyer, I am a friend
Ines Michaela Gans	Bernd Gans, My daughter
Virginia Chimenti	Vincenzo Maggiore, Colleagues
Pilar Buzzetti	
Harina Hafiz	
Karoline Aadland	Knut Ingvar Aadland, I am the father of the victim
Samya Rose Stumo	James Carter, Friend of Friend
Samya Rose Stumo	Katherine Preston Cory, I am a friend of the victim.
Samya Stumo	Tierney Simpson Jutzi, Friend of a Friend
Carlo Spini	Andrea Spini, I am the son of the victims
Gabriella Viciani	
Samya Stumo	Joseph Homs, Friend
Abiodun Bashua	mena tebeje, I am a wife of the victim
Clémence Wilm	Marine Rudant, friend
Samya Stumo	Carol McFadden, Friend of friend
Xavier Fricaudet	Yvette Le Gall, Xavier is the brother of my son in law
Stehanie Lacroix	Chantale and Real Boissonneault, daughter of our friends
Josefin Ekerman La Torre	Michael, Cousin
Samya Stumo	Alyssa O'Connor, Close Friend
Samya Rose Stumo	Andres Justo, I am the friendo ir the victim
Stephanie Lacroix	Sara Lefebvre, Classmate
Samya Rose Stumo	Lucia Justo, I am the friend of the victim
Samya Stumo	Maria Sofia Justo Guillen, I am the friend of the victim

Victim	Signatory
Samya Stumo	April Cain, She was the close friend of a young friend of mine
Micah Messent	Isabella Morgan, Friend
Samya Stumo	Stuart Robinson, Friend
Sam Pegram	Deborah Pegram, I am Sams Mum
Xavier FRICAUDET	Isabelle REBILLARD, I am a friend of the victim's family
Oliver Vick	LUcinda Pullinger, Long term friend
Melvin Riffel	Mary Ann Tangney, Nephews
Bennett Riffel	
Michael Ryan	Pádraig McCarron, I am the friend of the victim
Harina Hafitz	Arnaud Sournia, Friend of the family of the victim
Virginia Chiementi	Mateo Mancheno, Friend of the victim
Micheal Ryan	Brian McDonagh, I am the friend of the victim.
Samya Stumo	Ben Webb, Close friend
Jonathan Seex	Björn Ölund, Friend
Samya Rose Stumo	Lucia Guillen, I am the friend of the victim
Samya Rose Stumo	Sandra Sermini-curtiss, Friend of family
Matt Vecere	Warren McClain, I am the uncle of the victim
Mel Riffel	Thomas Tangney, Uncle
Bennet Riffel	
Sergey Vyalikov	Alex Fikhman, I am the uncle-in-law of victim.
Marie Philipp	Derek Hagen, Friend
Camille Geoffroy	Laura Couillet, Freind
Samya Rose Stumo	Andrew Souaid, Cousin
GEORGE KABAU	PAUL KABAU, BROTHER
Max Edkins	Leonita Louw, Friend
Eric PRIEUR	Fabrice CRABIE, brother in law
Mick Ryan	Morgan F Connolly, Brother-in-law
Michael Ryan	Theresa Stack, Friend of the family
Sergey Vialikov	Dmitrii Vialikov, Brother
Sergey Vialikov	Nadya Vialikova, SON
Anne Karanja,	Dr. Karanja, Mother, sister, nephew and niece
Caroline Nduta Karanja,	
Ryan, Kellie and Rubby	
Mick Ryan	Ian Connolly, Cousin in law
Mick Ryan	Sam Woolhead, My partner is a family Friend
Karim SAAFI	Abdel-Jawad Jellad, Nephew
Jonathan Seex	Carola Schröder, I'm mother in law to his sister
Joanna Toole	John Paul Rodgers, Cousin
Jonathan Seex	Carola Schröder, I'm mother in law with his sister
Samya Stumo	Clarice Faber, Friend

Senator MARKEY.—that Congress relies upon. Administrator Dickson, will you suspend Boeing's delegated authority until Congress aircraft certification bill is fully implemented and Boeing has conclusively proven that it has changed its ways?

Mr. DICKSON. Senator Markey, thanks for the question. We have reset the relationship with Boeing in no uncertain terms. And we have limited delegation of various items. As I said a moment ago, the airworthiness certificates, we are retaining full control over that. One of the improvements that has been put in place is Boeing's safety management system. That is revealing issues much earlier than they were previously. And we are seeing results, and it is making our oversight more effective and more systematic. We

conduct regular performance reviews with them, and we will continue to drive those improvements.

Senator MARKEY. I would just say this, honestly limiting delegation is just not enough. We cannot trust Boeing until the systems that enabled and caused these tragedies are fully fixed, and I urge you to take back the FAA's full certification authority. Just take it all back. Should be in your hands, and that is just the bottom line on this, Mr. Administrator.

I also want to strongly urge you to finish implementing two overdue Congressional mandates from the FAA Reauthorization Act of 2018. First, while I am glad the FAA has finally published its proposed rule to increase the required amount of flight attendant rest hours, you must finalize this proceeding without further delay.

And second, the FAA needs to rapidly advance a requirement to install secondary cockpit barriers on new airplanes, which will protect our crews and passengers from anyone who may rush the flight deck. It is simply time to get these essential rules done. Administrator Dickson, will you complete them in the near future?

Mr. DICKSON. We are fully committed to completing them, and I share your frustration, Senator, at how long these processes take.

Senator MARKEY. Have you prioritized those two rules?

Mr. DICKSON. Yes, we have.

Senator MARKEY. So what is your time-frame for finishing those rules?

Mr. DICKSON. We are—as you said, we are moving forward with the—we have the NPRM out on the flight attendant rest period. We are in the process of finalizing the proposal on secondary barriers and that will—that NPRM should be out in the coming months. It is a good bit more technically complicated, but we want to make sure that we are able to account for as much data as we can on the front end because it will actually get us to the destination.

Senator MARKEY. Well do them right, but do them fast. There is a lot depending upon it.

Mr. DICKSON. I share your urgency and your emphasis.

Senator MARKEY. And we also have to address aviation cybersecurity. Our airplanes are increasingly computerized and new software is being rolled out every single day. These technologies offer enormous potential to improve safety and efficiency, but it will only take one hacker to cause a disaster. And that is why I will soon reintroduce my cybersecurity standards for aircraft to Improve Resilience Act or the Cyber Air Act.

This bill will require the disclosure of information relating to cyberattacks on our aviation system, as well as build strong cybersecurity standards directly into our air carrier and aircraft certification processes. Administrative Dickson, do you agree that we need to require enhanced cybersecurity in aviation before tragedy strikes, yes or no?

Mr. DICKSON. Yes, Senator, I do.

Senator MARKEY. Well, I thank you for that. But ultimately, I think we are going to need to pass legislation. Have you had a chance to look at my legislation that would mandate this?

Mr. DICKSON. I have not seen the specifics, but we currently have protocols in place for avionics. But this is again an evolving area.

Airplanes are much more software driven, as you state, these days, and so we need to make sure that the adequate layers of protection are in there. So I look forward to working on it.

Senator MARKEY. OK. Airplanes today are just flying computers, and they are totally hackable. And to the extent to which this is not a subject that has been addressed properly yet, we are just in a very dangerous period of time. So again, I urge you to move quickly, and I think as well, it should be backed up with legislation that mandates that this occur. Thank you, Madam Chair.

The CHAIR. Thank you, Senator Markey. I am not aware of other members. I know Senator Peters joined us shortly on video, but I am not sure if these returning were anyone else. So while I will tell members that I am going to do a second round here and we will see if anybody else appears for questions. If not, we will close out the hearing.

Administrator, one of the issues that we have heard a lot about in the certification process and it has come up a couple of times is the fact that the law requires on the change product rule to change the process. And yet I think you are saying it is going to take years to do that by a rulemaking.

And yet we still have a process underway for certifying planes. And so what are you putting in place now to make sure that you have the workforce and the people to review that process while a change product rule is in development? Shouldn't the FAA produce like policies to close the loophole in the meantime?

Mr. DICKSON. Senator—Chair Cantwell, absolutely. And we are working this on two tracks. We have MITRE doing a study for us on the criteria for significant changes for the change product rule to drive that—those decision criteria. And we have also stood up the International Authorities Working Group.

They have already met several times and they will continue on should provide recommendations to us by next summer on harmonizing the change product rule across all States of design, so it is consistent regardless of where equipped—

The CHAIR. I am a little more worried about the right now. I mean, this was a pretty big change in the system that allowed technology to outpace our focus on it, and we don't want to see that happen again. So we don't need anything else to happen to know that we need to put something in place, and it was already asked to be put in place, so that we would have it today.

So this is the issue, if you are producing a plane that is a derivative of a product. And this is the challenge that we face. We were very clear in the law. We said everybody, every plane has to go through a systems analysis on anything that is different. So we—

Mr. DICKSON. Chair Cantwell that is actually happening now. So any critical design component requires validation, anything that touches human factors, and the additional human factors folks that we have got in the agency are focused, laser focused on that issue. We are also involving them throughout the process not just to design approval, but also for continued operational safety once the airplane is actually out there flying.

So that data is actually coming back and informing the certification process where it wasn't to such a degree before.

The CHAIR. Well, back to Mr. Won, because I do—you know, I think he is trying to get the information in his May 13th letter, where he basically said that there was not enough information on the 777-9 on their core, a common core system, their communication system. When you look at this quote from the letter, it is, “an integrated modular avionics architecture that provides a set of shared computing, networking, input-output resources to support the computing and system interface needs for multiple airplanes.”

So it sounds very similar to us saying we want to understand what the software does, similar to the MCAS system. So my question is, here is somebody who is doing what we asked—and just, you know, for the context, there are more than, I think, 1,600—I am sorry, thousands of SPIA members. These are professional engineers. In the Northwest, they are our friends, they are our neighbors.

These are people that are working and putting their name behind their product, or let’s say they would like to put their name behind their product, but they need this backup of the FAA. And here we have someone on the ground who is saying, yes, I am going to make sure that we slow down and look at this.

But when we look at the fact that the Boeing Oversight Office, the aviation FAA office overlooking the Boeing manufacturing has basically been at a static engineering level for decades, how do you expect that we are going to be able to do this oversight and be able to really understand and keep pace with this technology?

Mr. DICKSON. Well, Chair Cantwell, it is again the—we have increased engineering resources within the BASOO, but we are also integrating the Certificate Management Office at Boeing, which oversees the production side of the house. And all the operators that operate Boeing aircraft, we are integrating them so that we can leverage all their expertise in these processes and make sure that the BASOO is able to be more effective in its process. In this particular letter, part of what we are dealing with is the issue of what our expectations are for submissions.

And that is something that was a very early part of my conversations with Boeing leadership. You have got to give us the full picture. You can’t give us a portion of it and then say, well, you will get everything else next week.

So this is just really resnapping that line to make sure that the applicant that we are overseeing is giving us a complete system picture when they ask for us to move to the next milestone in an approval process.

The CHAIR. To Senator Markey’s point, I know that there was an IASA repeal of an ODA authority. At what point would you take that step?

Mr. DICKSON. If—well, at this point we are—if we saw that they weren’t meeting our expectations on a consistent basis or if we saw anything in their safety management systems or their data where they weren’t making the necessary cultural or transparency improvements, then we would go down that path at some point.

The CHAIR. Well, again, I—you know, we are going to have our own report and our own reporting of what we have been told by various whistleblowers, but it is clear that the process has changed, that this process of collaboration and solving problems has now

changed into the—well, at least from what we have heard the FAA not even asking the ODA unit members to produce documentation about testing and information. That literally this, does it comply, yes or no? So we have to build this workforce.

We have to believe in them. They are our early warning system when something is wrong, and you have to back them up. So again, I am asking you because I don't see the workforce improvement at the Seattle office that you are describing. I think we are at a total of 52 people, 32 of which are engineers.

So I don't think that that has changed much over the years. So how have you, since these accidents, improved the Seattle oversight office?

Mr. DICKSON. Well, again, we—I will get you the current numbers, but we have increased our resources. And we are, I know because I have sat down with them personally, our people feel empowered and backed up as they never have been before. And that is helping them to be more effective.

This, which I think was part of what you were really focusing on in the legislation, the appointment of the unit member advisors, is creating a direct communication path to make sure that there is no interference with that line of communication between—

The CHAIR. Not a direct communication path—that simply makes it sound like it is about communication. It is an authority oversight on whether this is going to move forward or not.

Mr. DICKSON. But the awareness in terms of what the issues are and not allowing the employer to interfere with issues that are brought forward directly to the agency, that is going to help us be much more informed and our oversight much more effective.

The CHAIR. Well, I look forward to seeing this list of people that you say that you enhanced to the office with. What do you think the skill level is to do certification oversight? I mean, what is the skill level and background of the person who heads this up for you at the FAA?

Mr. DICKSON. Well, certainly, you know, aeronautical engineers. We need system—we need software engineers. And I think that there is a growing need in that area. That was something that we—that I think with newer platforms where we are seeing how the systems are interfacing with each other, that is more and more a part of the architecture of newer model aircraft.

And so that is an area that we will be focused on, but you are always going to have engineers, mechanical engineers and others in other aerospace disciplines. But it is transforming to a more of a, how do all of these automated systems on newer aircraft interface with each other.

I think as we go into the coming years, we will need to build our workforce on things like auto—artificial intelligence as well.

The CHAIR. Well, you and I might agree on that point about software because I don't think there is enough attention that has been paid to this, either at the skill level of understanding this, particularly from an oversight and certification perspective, but certainly also at the company. And then when it comes to this issue of overload in the cockpit on various alerts and understanding particularly—look, I think we saw this.

I think you saw even in your own private background that you had pilots complain about the automation system and the fact that there was so much happening in these automated systems. So the question is, what do you need to do to make sure that we get this automation right? And I think to me, there seems to be this task that we also outlined in the bill, you know, when you are now doing an oversight of a new software system, that is going to be so critical, I would think the FAA would produce a document that says these are the things that we expect to understand, and that you would get that integrated team that we asked for right now on software stood up and pounding on the kind of questions that you would want answered from that system, so they are not simply relying on, you know, the information presented.

Again, this is a huge transformation that is continuing in aviation, and—but it is not only in aviation. It is happening in vehicles. This committee is struggling with the same oversight as it relates to unmanned cars and other issues.

So it is getting your team and getting people to do that oversight now on the technical skill side and getting the right level of workforce. I just don't see that urgency in the FAA's action. So I would ask you to do that and to make that the number one priority as you move forward.

Mr. DICKSON. Chair Cantwell, it is a very—an extremely high priority and I will get you that additional insight—

The CHAIR. Well, it is essential to fulfilling the law. OK, so I have a larger, broader question, which is just about the process, and this is again a perfect example of it—this 777 issue. So when you are submitting design data to the FAA for a finding of compliance, shouldn't the applicant certify in writing to the FAA that the submitted data complies with all the available and applicable airworthiness standards?

Mr. DICKSON. Yes, that is correct.

The CHAIR. OK. And if the design does not comply with the applicable airworthy standards that a design should be brought into compliance before the FAA certifies the aircraft?

Mr. DICKSON. Yes, that is correct.

The CHAIR. OK. Well, I don't know that that happens. I am not sure that that is what is happening. And so again, if we go back down the system, there were a lot of checks on a list of issues, but not on final compliance with that information. I think that is what is missing in the system, and I think we are going to continue to look at that.

And I would look forward to hearing your thoughts on how we ensure that compliance really does meet that standard. So very much appreciate your answer on that. Thought we had one more question that we wanted to go over. My colleague—there are two issues on the workforce side. Standing up of the air grant program. This is very much similar to the sea grant program. And getting here on the Hill, a professional workforce that is very skilled and knowledgeable in aviation.

I am very proud of my colleagues here today. You can see that many of them have been following this and know specifically, but I would—I think it is easy to say that the oversight of the FAA on

this issue needs a more technical staff here on the Hill in addition, and throughout, you know, throughout the policymaking realm.

I am very pleased with what the sea grant fellows have been able to achieve because they brought a lot of scientific knowledge to our understanding as it relates to our NOAA oversight or fisheries oversight. So what is it going to take to get that stood up?

Mr. DICKSON. We will look forward to working with you on it. It is—I think it is a great idea and something that would, I think, improve the collaboration and the communication with the Committee and make sure that we are more effective in our implementation. And frankly, lay a solid foundation for the future, as you said.

The CHAIR. Yes. OK. And the same, I think one of my colleagues may have asked about the same ICAO involvement of going to ICAO and making sure that we are setting the same international standards.

Mr. DICKSON. Right. On pilot training, is that—?

The CHAIR. Yes, Yes. So that we are not going to allow a slippage of the standards set by pilots on an international basis. That we are going to very much understand the manufacturing of planes with integrated software systems, but we are also going to still have a skilled pilot at the helm, two pilots who know how to fly the plane if those systems are turned off.

Mr. DICKSON. Right. And I think we—ICAO is important, but we can't rely on ICAO. We have got to help authorities around the world to implement the requirements that we are talking about here, because that is going to really raise the bar in terms of not only pilot training but also maintenance programs, and anyone operating—in this case a U.S. product, but any airplane and commercial operation anywhere in the world, we want to work with those authorities.

So things like I have talked about before, upset prevention recovery training, flight path management, as we implement those beneficial changes in the United States, we want to work through ICAO to get the standards set, but then we also have to go to the individual aviation authorities to make sure that they are implemented consistently around the world.

The CHAIR. We want the United States to be a leader on what is required for both the manufacturers and for the skill set that it takes for flying the planes.

Mr. DICKSON. Yes.

The CHAIR. And so we want the FAA to set that standard here, and we want you to be a loud advocate for it on an international basis—

Mr. DICKSON. Could not agree more.

The CHAIR. Thank you. According to my information, the DOT OIG report of February of this year said there has only been one engineer added to the Seattle office since the MAX tragedies.

So I think there is some resolution here of what is really the fact and information, so I will look forward to getting that information from you so that we can—I just firmly believe that having the right staffing and having your integrated team set up to advise you right now, not waiting for their moment, and clarifying this change product rule process will be critical.

OK, but very much appreciate Mr. Won doing his job in standing up. So I think that makes the hearing for us today. The record will remain open until December 1st, 2021. Any Senators that would like to submit questions for the record and for the witnesses—for the witness—should do so by November 17 of this year.

And we ask for responses be returned no later than December 1. So that concludes our hearing again. Thank you, Administrator, for being here today.

Mr. DICKSON. Thank you, ma'am.

The CHAIR. We are adjourned.

[Whereupon, at 12:35 p.m., the hearing was adjourned.]

A P P E N D I X

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. MARIA CANTWELL TO
HON. STEVE DICKSON

Boeing Aviation Safety Oversight Office Staffing Levels. The Aircraft Certification, Safety, and Accountability Act (ACSAA) imposes several new requirements on FAA to improve the aircraft certification process, particularly for Boeing airplanes. Yet, we understand the Boeing Aviation Safety Oversight Office (BASOO), which reportedly had inadequate resources to oversee Boeing before the adoption of ACSAA, has had a net increase of only one engineer since October 2019. While many engineers have been assigned to BASOO, an almost equal number have left this office. According to information provided to the Committee, this has been attributed to the fact that positions in the BASOO are relatively low-paying compared to other AIR divisions that have a less critical role in ensuring the safety of transport airplanes. The result is that senior engineers in the BASOO are constantly training new engineers, who then leave for promotions to other offices. You testified that FAA is “doubling the number of human factors staff within AVS, and realigning the hiring of technical advisors with the necessary technical expertise involved in critical safety decisions.”

Question 1. What factors do you attribute to the poor retention rate at the BASOO? Are BASOO engineers receiving lower pay in comparison to other AIR divisions? If not, why does the BASOO have such turn-over of personnel? What is FAA doing to address staff turnover at the office charged with overseeing the largest Organization Delegation Authorization (“ODA”) unit in the country?

Answer. The FAA acknowledges the gaps identified in past employee retention and is committed to addressing these issues. Since 2018, the BASOO has experienced an increase in the number of employees who either retired, were reassigned, or left Federal service. While some employee movement is expected, a major factor in the BASOO’s turnover rate is recent scrutiny of the work of that office. This scrutiny has added stress to already high-intensity jobs, which has caused employees to look for opportunities elsewhere. Additionally, in the past two years, the BASOO’s ability to hire has also been hindered by geographical requirements. Generally, the FAA has required engineers responsible for oversight of Boeing to be located in Seattle or Los Angeles. When the aviation industry is hiring, as it is in today’s economy, the FAA is typically unable to compete on salary or bonuses offered by aviation companies. The FAA is currently evaluating all available options to overcome this challenge.

Beyond the BASOO, there are several other offices and dozens of FAA employees that are directly responsible for or support Boeing certification, oversight, and continued operational safety duties. The Boeing Certification Management Office (CMO) is responsible for the oversight of Boeing’s production certificate (PC) and its voluntary safety management system (SMS). The CMO currently has approximately 30 engineers and safety inspectors.

Approximately 40 engineers and program managers from the Seattle and Los Angeles Aircraft Certification Offices (ACO) and the Continued Operational Safety Branch support Boeing continued operational safety activities. These activities include assessing in-service events and processing airworthiness directives. Additionally, flight test pilots, human factors and system safety specialists located in various offices within AIR, as well as operational specialists from the aircraft evaluation division, are responsible for supporting human factors and system safety assessment (SSA) reviews and compliance activities for certification programs on an ad hoc basis.

The FAA is addressing staff turnover by offering a number of different incentives. As an example, for the almost 20 job announcements that are currently in process for the BASOO, full permanent change in station (PCS) and a recruitment bonus up to \$25,000 will be offered to attract qualified candidates to the geographical area. To help retain employees, the FAA is considering retention bonuses based on agreed

upon terms of employment, as well as in-band increases or higher grades for current employees.

Question 2. How many of the new human factors staff are assigned to BASOO? If others of these new staff are made available to BASOO, please explain how and under what conditions they assist BASOO. For other referenced newly hired technical advisors, how many are experts in systems safety assessments, and how many of these are assigned at BASOO? For those newly-hired staff assigned to the BASOO, what will FAA do to ensure they have adequate opportunities for advancement at the BASOO?

Answer. There are currently no human factors staff directly assigned to the BASOO. However, specialists and Chief Scientific Technical Advisors (CSTA) across the Aircraft Certification Service (AIR) support human factors and system safety assessments (SSA) as part of the certification process. Flight test pilots, human factors and system safety specialists located in various offices within AIR, as well as operational specialists from the aircraft evaluation division, are responsible for supporting human factors and SSA reviews and compliance activities for certification programs led by the BASOO. Additionally, the Boeing Certificate Management Office (CMO) supports the integration of new design into the production system. The CMO is also responsible for overseeing the production system and the issuance of certificate of airworthiness. These FAA resources are supporting the BASOO on current certification programs and oversight, including the Boeing 737-7, 737-10, and the 777-9.

Sec. 104 Implementation: Certification Oversight Staff. This section of ACSAA requires the FAA to examine and address any shortfall in the agency's certification expertise including engineers, safety inspectors, human factors specialists, software and cybersecurity experts, and other qualified technical experts who perform duties related to the certification of aircraft, engines, and other components. FAA has reported that it has contracted in August 2021 with Booz Allen Hamilton to perform this workforce assessment.

Question 1. When will the FAA's workforce assessment be complete? Will this assessment take into account new safety responsibilities of the FAA and certification staff under the ACSAA, such as responsibilities for direct approval of ODA unit members and the assignment of safety advisors to unit members?

Answer. In collaboration with our union partners, we are in the process of conducting a review of our workforce. We are standing up a workgroup consisting of representatives from AVS, the Office of Human Resource Management, and applicable unions so that this workgroup can collaboratively inform workforce assessments. We anticipate the workgroup will convene in the coming weeks, and complete all workforce assessments by the end of Fiscal Year 2022, which will take into account new safety responsibilities and ACSAA requirements.

Question 2. Will the FAA's workforce assessment of certification staff include a review of the FAA's Boeing Aviation Safety Oversight Office (BASOO) to determine engineer resource and expertise needs, particularly in the areas of systems engineering, human factors, and software development, to both perform certification and oversight work? If not, will FAA commit to performing such an assessment of the BASOO and take action as necessary to provide adequate staffing levels?

Answer. Yes, the workforce assessment will include a review of the BASOO, as well as other FAA offices that are responsible for or support the BASOO in executing its certification, oversight, and continued operational safety responsibilities. These offices include the Boeing CMO, the Seattle and Los Angeles ACOs, the Continued Operational Safety Branch, and other offices within AIR and AVS.

737 MAX Return to Service. FAA approved Boeing's proposed design changes without addressing concerns expressed by foreign authorities and some of its own technical experts regarding Boeing's design retaining continuous distracting alerts, such as the stick-shaker for stall warning, which contributed to both 737 MAX accidents according to some experts. Foreign authorities reportedly only agreed to Boeing's design changes based on a commitment that Boeing would address these issues in future design changes. Furthermore, despite the findings from the accidents that Boeing had not adequately considered human factors issues in the 737 MAX design, FAA continued to allow Boeing not to comply with its latest human factors requirements in 14 CFR 25.1322.

Question. During the 737 MAX's return to service process, did FAA require that Boeing comply with the latest standards and address the safety issues associated with continuous alerts? Prior to the 737 MAX's return to service, did FAA make Boeing comply with the latest human factors requirements in 14 CFR 25.1322? If not, please explain why this was permissible.

Answer. Over the course of 20 months, the FAA engaged in a rigorous and transparent review of the aircraft and ultimately found that Boeing’s proposed design changes met FAA safety standards and supported a return to service of the Boeing 737 MAX. Throughout the return-to-service process, we worked closely with other civil aviation authorities (CAAs) at every step. And we took input from the independent review of a Technical Advisory Board that included experts from other U.S. government agencies.

Details on the FAA’s review and recertification of the flight control system can be found at https://www.faa.gov/foia/electronic_reading_room/boeing_reading_room/

Sec. 102 Implementation: Safety Management Systems. This section of ACSAA requires FAA to issue a final rule within two years to require U.S. aircraft manufacturers to implement safety management systems. In its briefing to congressional staff on October 13, 2021, FAA said it anticipated issuing a notice of proposed rulemaking in 2022. In addition, the DOT Office of Inspector General recently found that FAA had done an inadequate job of overseeing American Airlines’ implementation of its SMS, as required by 14 CFR part 5.

Question 1. In adopting and implementing the regulation required by this section, how will FAA ensure that SMS is implemented in such a way as to ensure compliance with both SMS requirements and other applicable requirements, including airworthiness standards? Does the FAA agree that SMS is not a substitute for a manufacturer’s obligation to comply with airworthiness standards? If so, what measures can FAA take to ensure that SMS complements these compliance obligations?

Answer. The FAA agrees that SMS is not a substitute for compliance with regulatory standards. A properly integrated SMS fosters a fundamental and sustainable change in how certificate holders and manufacturers/design organizations analyze data, make informed decisions, and develop or revise operational methods. In addition, FAA’s promotion of SMS through guidance material and compliance oversight will reinforce this obligation and assure regulatory compliance.

Question 2. In your testimony, you state, “The voluntary programs have enabled the FAA to gain valuable experience on oversight of SMS for design and manufacturing organizations, and the lessons learned will help inform FAA’s SMS rulemaking and policy development.” What are the lessons learned referenced in this testimony, and how are they informing FAA’s rulemaking and policy development?

Answer. Successful SMS implementation and maturation depends on company leadership commitment, a strong safety culture, appropriate industry and FAA resources, and transparency. The FAA Voluntary SMS program has enabled the FAA rulemaking and policy development team to capture a number of lessons learned in these areas to support rulemaking and policy development. Some specific areas include:

- Learning what is necessary for successful organizational and cultural changes to influence future training and policy.
- Understanding the resources necessary to develop a fully operational SMS program. This includes internal process changes for employee safety reporting, problem solving, analysis and management of various safety risks, engagement of labor unions, and revisions to internal and external company communication practices.
- Increasing transparency and open communication of safety issues between the FAA and the company. This will inform the access, availability, and appropriate FAA handling and decision making regarding expanded industry safety data.
- Enhancing coordination between different FAA offices and the company to develop comprehensive SMS programs. Early experience in this area is important as many companies will be implementing a cross-functional SMS.
- Increasing FAA employee competencies to ensure a sufficient level of knowledge regarding SMS. Experience gained through early implementation will be reflected in internal FAA training materials to support the broader upcoming rule implementation.

Section 105: Disclosure of Safety Critical Information. Section 105(a) of ACSAA revises 49 U.S.C. § 44704(e) to require that, as of the date of ACSAA’s enactment, FAA must require applicants for and holders of type certificates for transport category airplanes to submit safety critical information, as defined, including newly discovered information and material design or analysis changes. In its October 13, 2021 briefing to Congressional staff, FAA said it would be issuing three policy statements in 2022 to implement this section, but it is not apparent that any of these statements address this requirement, which applies to safety critical information

both as originally submitted and to later changes. Also under Section 105 of the reform law, FAA is directed to revoke an airline transport pilot certificate held by an individual who fails to disclose safety critical information, including information related to flight control systems, on behalf of a manufacturer. FAA has told the Committee that the agency is developing policy documents to implement these disclosure requirements and expects to issue them in 2022.

Question. Since the revision to revises 49 U.S.C. § 44704(e) was effective upon enactment of ACSAA, please describe what concrete steps FAA has taken to implement these important disclosure requirements that ensure greater accountability in the certification process? Please cite examples.

Answer. The FAA currently requires applicants for transport category airplane type certificates to disclose safety critical information through 14 CFR § 25.1309. The certification process set forth in FAA Order 8110.4C also provides the FAA with information specific to safety via familiarization meetings, project specific certification plans, and type certification board meetings. In order to enhance FAA awareness and understanding prior to issuance of additional guidance, the FAA has instituted cross-organizational program reviews of type certificate applications. The program reviews identify critical design features, the latest project developments and design changes, as well as FAA level of involvement.

To implement the requirements of section 105, the FAA plans to implement policy that encourages applicants for a transport airplane type certificate or supplemental type certificate to submit a single document at the beginning of the certification process to disclose all new systems and intended changes to existing systems, as well as ensure that safety critical information will be kept current throughout the certification process. The FAA also plans to clarify classification of design changes to products in accordance with the requirements of 14 CFR § 21.93(a).

Sec. 106 Implementation: Limitation on Delegation. This section of ACSAA prohibits FAA from delegating transport aircraft certification tasks related to safety critical design features, such as flight control systems, until the FAA has reviewed and verified all underlying human factors assumptions. Based on a status update from FAA's briefing to Committee staff on October 13, 2021, the Aircraft Certification Service (AIR) issued a memo to all employees highlighting the section's requirements and reinforced the need to validate underlying assumptions prior to delegating findings of safety critical systems compliance.

Question 1. Please provide a detailed description of how FAA implemented this requirement across AIR, and how the change differs from FAA practices prior to the requirement. Please include in your description references to published regulatory policy/guidance to understand cross agency application.

Answer. The FAA issued a policy memo on September 16, 2021, which reinforced the requirements of section 106, while formal policy surrounding underlying human factors assumptions is being developed.

The FAA developed a template for applicants to document underlying assumptions for FAA review. This template is being used for the Boeing 737-7 certification and will be used for the Boeing 737-10 certification program. The FAA is finalizing guidance to further institutionalize the requirements of section 106. This guidance will define FAA responsibilities, provide a screening process for applicant submittals (including the system safety documentation to be submitted to the FAA for review), and provide instructions on the functions to be retained by the FAA and what may be delegated to qualified designees or organizations.

This change differs from prior FAA policy, which allowed FAA offices to make risk based determinations regarding the delegation of system safety documents, such as System Safety Assessments (SSA), for a particular company.

Question 2. In your testimony, you state, "We are delegating fewer responsibilities and demanding more transparency from them, and evaluating key assumptions prior to delegating functions in certain areas." FAA's recently issued memo restates the requirements of Section 106: prohibiting delegation until all human factors assumptions are validated. The Committee also understands that FAA is retaining issuance of airworthiness certificates for the 737 MAX and FAA has limited delegated functions for critical design features on the 777-9 and the 737-10 certification projects. Besides those identified limits on delegations, what other changes has FAA made to limit delegation, and how specifically is FAA demanding more transparency?

Answer. On November 26, 2019, the FAA notified Boeing that we would retain responsibility for airworthiness certification for the 737 MAX airplanes until the FAA is confident that Boeing's quality system, including inspection and delivery processes, is stable and producing compliant, conforming, and safe airplanes. Since resuming airworthiness certification of 737 MAX airplanes on November 30, 2020,

the FAA issued certificates of airworthiness for 232 aircraft and continues to retain responsibility for airworthiness certification for the 737 MAX.

The FAA retained airworthiness certification of 787 Dreamliner aircraft as a means to verify Boeing manufacturing and quality control process changes and performance, and this practice will be used again when delivery of 787 Dreamliner aircraft resumes.

The FAA is reviewing SSAs for the 737-7 program before making a decision regarding delegation. The FAA is also implementing a process to address major design changes for Boeing products, which will involve a screening and review process consistent with the ACSAA section 106 requirements.

For the Boeing 777-9 program, the FAA increased technical specialist involvement based on lessons learned from the 737 MAX. The FAA will only consider increasing delegation once the agency has identified an acceptable certification path with clear compliance criteria and has found a demonstrated capability of the Boeing Organization Designation Authorization (ODA) to find compliance consistent with FAA expectations. Examples of areas of increased FAA involvement include:

- New and novel design features such as the folding wing tip; o Test participation and witnessing related to structural tests and flight tests; o Areas of past technical challenge such as fuel system lightning protection, engine failure analysis, and system integration;
- Software development and assurance methodologies; and
- Verification of critical assumptions for system safety analysis and verification that these assumptions have been accounted for in subsequent design, operational procedure, and training program development.

In order to foster transparency, the FAA is leveraging Boeing's Voluntary SMS program to increase agency access to Boeing's performance regarding root cause problem solving and safety risk management assessments. These situations allow the FAA to gain direct insight regarding Boeing's SMS implementation and to provide feedback on where further changes are needed for the SMS to have greater impact.

The FAA pressed Boeing to consider implementation of an Aviation Safety Action Program (ASAP), modeled after the U.S. airline industry program, to support more effective employee identification of safety issues. Boeing is incorporating FAA input and suggestions on how the company's existing employee SpeakUp process can be adapted to better emulate the ASAP program.

Sec. 107 Implementation: Interference with ODA Unit Members. Section 107 of ACSAA requires that, as of the date of ACSAA's enactment, FAA must seek to eliminate or minimize prohibited interference by ODA holders that affects the performance of unit members and must not prohibit communications between FAA personnel and ODA unit members. FAA has said it anticipated publishing policy in February 2022 to prevent interference with ODA unit members and facilitate open communication between unit members and the FAA. For many years, FAA has prohibited ODA holders from interfering with ODA unit members. However, an August 19, 2021 letter from Acting BASOO Manager Ian Won to Boeing shows that undue pressure and associated actions to compromise the independence of ODA unit members persists at Boeing, and requires swift action to ensure similar actions do not occur moving forward.

Question 1. Regarding the two Aviation Safety (AVS) policy documents relevant to Section 107 that were issued by FAA on October 15, 2021, how will these policies be more effective in preventing ODA interference?

Answer. The two policies issued on October 15, 2021 require FAA approval of Unit Members at Type Certification ODA holders and require the FAA to assign advisors for engineering unit members at certain Type Certification ODA Holders. While neither policy is targeted specifically at preventing interference with ODA Unit Members, they both address other requirements under the ACSAA. Assigning advisors will provide another avenue for Unit Members to report possible instances of interference to the FAA. The FAA is working to issue a policy directive—anticipated in the first quarter of calendar year 2022—to carry out the mandate of section 107 and ensure that ODA holders comply with regulatory requirements in 14 CFR part 183 to ensure that Unit Members are not subject to interference.

Question 2. Why will it take over a year after the passage of ACSAA for FAA to issue and implement a policy on ODA unit member non-interference and communications that was required to be effective upon enactment?

Answer. New policy to address the issues of ODA holder interference with a Unit Member and Unit Member communication with the FAA require ODA holders to

meaningfully modify their procedures manual to include procedures for monitoring for interference and investigating allegations of interference. The FAA will post the draft policy for public comment and public comments will need to be addressed prior to issuance.

Question 3. In your testimony, you reference policy changes “aimed at preventing interference with ODA unit members in the performance of their duties.” FAA has had for many years a policy prohibiting such interference, but such interference has continued. What policy changes does this testimony reference and how will they be more effective in preventing such interference?

Answer. 14 CFR 183.57 requires ODA holders to ensure that no conflicting non-ODA Unit duties or other interference affects the performance of authorized functions by ODA Unit Members. FAA Order 8100.15 references the regulatory requirement for ODA Unit Members to be able to perform their duties without pressure or influence from other parts of the company. The new policy directive under development defines interference, including examples, and reinforces the FAA’s expectation that ODA holders comply with their regulatory responsibilities by systemically and proactively monitoring for interference, promptly investigating allegations of interference, reporting allegations of interference to the FAA, and taking corrective action if allegations of interference are substantiated.

Sec. 107 Implementation: Direct Oversight of ODA Unit Members. Section 107 of ACSAA ensures that FAA will be responsible for approving and removing manufacturers’ engineers who act on behalf of the FAA—Organization Designation Authorization (ODA) unit members—beginning on January 1, 2022. This section also requires assignment of FAA safety advisors to a manufacturer’s authorized representatives so that the FAA has direct and ongoing oversight and communication with the ODA unit members responsible for certification activities. On October 15, 2021 FAA issued two policy memos regarding FAA approval of unit members and assignment of FAA advisers.

Question 1. Please provide a copy of the minimum qualifications for ODA unit members to be approved by FAA.

Answer. The qualifications for ODA Unit Members at Type Certification ODA holders are the same qualifications that the FAA uses for individual designated engineering representatives and manufacturing inspection designees. The FAA has reviewed these qualifications and determined that they meet or exceed all specific requirements identified in section 107.

Question 2. To satisfy the provisions of this section of the reform law, FAA will be assigning safety advisors to each of the 1500 unit members at the Boeing ODA, and FAA will be in charge of approving and removing those designees. Does FAA currently have sufficient technical workforce to carry out these obligations? What is the training schedule for FAA safety advisors so that they can start to perform their functions? Please provide a list of the FAA safety advisors assigned to this role. Why did FAA wait until October 15, 2021 to issue a policy memo to implement this key reform?

Answer. The FAA is focused on ensuring appropriate staffing levels for all Organization Management Teams (OMT), including the OMT responsible for overseeing Boeing. The new policy that establishes FAA advisors for ODA Unit Members was effective on December 15, 2021, and the advisors began performing that function on that date. The responsibilities of an advisor overlap with the responsibility of being an FAA Organization Management Team (OMT) member, so the additional workload associated with being an advisor won’t be known until the requirements are implemented and we have a better understanding of how often ODA Unit members reach out to their advisor at the FAA. We intend to monitor that workload and adjust staffing levels as needed to accommodate the outreach from ODA Unit Members.

Sec. 110 Implementation: Appeals of Certification Decisions. Section 110 of ACSAA requires that, within 60 days after the date of ACSAA’s enactment, FAA must issue an order establishing an appeals process for resolving disputes regarding type certification issues that results in a written decision by the Associate Administrator for Aviation Safety that may be appealed to the Administrator for final determination. At the October 13 briefing, FAA said it anticipates issuing “a high level order to define a dispute resolution process” sometime in 2022.

Question. Why is FAA unable to meet the 60-day deadline set forth in ACSAA? What are the steps necessary to issuing the order to implement a dispute resolution process? What is the approximate date for issuing the order?

Answer. Section 110 includes several requirements and mandates issue resolution and appeals processes. The FAA has several existing issue resolution processes, in-

cluding those available to everyone and those that are contractual and applicant-specific, such as Partnership for Safety Plans. The FAA needed to review these processes to ensure that the agency's existing commitments and the rights of applicants, FAA employees, and the public would not be adversely impacted by the implementation of this section. The FAA also had to define new processes that would integrate with these existing processes and work for all stakeholders. The Order establishing new issue resolution and appeals processes is in the final stages of drafting and coordination. It will be posted for a 30-day concurrent internal/external comment period, followed by comment disposition and final coordination with internal stakeholders. The anticipated issue date is the first half of calendar year 2022.

Sec. 111 Implementation: Employment Restrictions. Section 111 of ACSAA prohibits FAA supervisors from being involved in oversight of a type certificate holder if the supervisor was employed by the holder in the preceding one-year period. In its October 13, 2021 briefing, FAA made general reference to its "robust ethics program to ensure FAA employees operate free of conflicts of interest," but said nothing about implementing this prohibition.

Question. Based on the October 13, 2021 briefing to Congressional staff, it is not clear how FAA is implementing the new employment restrictions under ACSAA. Please describe and provide evidence that FAA has taken new steps to implement this prohibition, such as a policy document or order.

Answer. The FAA drafted guidance that will be incorporated into existing FAA policy. The FAA anticipates having updated policy and related training in place by spring 2022.

Sec. 113 Implementation: Voluntary Safety Reporting Program (VSRP). In your written testimony, you state, "Preliminary data on VSRP usage indicates that employees are comfortable using the system and they are regularly using it to raise safety concerns. . . . We will conduct annual internal safety culture assessments that include surveys of AVS employees in order to evaluate the safety culture and the implementation of VSRP programs."

Question 1. Since FAA implemented the new voluntary safety reporting program in February 2021, how many reports have been submitted through the program? What is the current status of these reports? Has FAA reviewed submitted safety reports, identified the root cause of any safety issue, and taken appropriate action to rectify any errors? If so, please provide examples.

Answer. AVS employees filed 387 reports in the Voluntary Safety Reporting Program (VSRP) through November 30, 2021. Of the 387 reports, 311 are currently under investigation, 16 have been closed and 9 were not accepted.

The FAA has taken corrective actions on a number of VSRP reports. Generally, when AVS receives a report, AVS de-identifies it to promote confidentiality, determines whether to accept it, assigns risk, and investigates. AVS then develops and implements a corrective action plan. In some cases, there is no evidence to support the submitter's claims or the submitter is unaware of policies or systems that address the claims.

As an example, a report cited a situation where one company developed a replacement carry-thru spar for an aircraft and the Organizational Designation Authorization (ODA) improperly issued FAA approval documentation before the FAA-approved engineering certification was complete. An FAA Safety Inspector notified the FAA office with oversight responsibility when he discovered the issue. A VSRP report was filed and quickly corrected the discrepancy before the aircraft were operated. The FAA office with responsibility for the ODA has taken corrective action with the company to prevent a repeat of the discrepancy.

Question 2. Given that the deadline for completion is December 31, 2021, when will FAA complete the annual safety culture assessment as directed under section 132 of ACSAA? Additionally, in the past, FAA has significantly delayed releasing the results of its assessments. How soon after conducting the safety assessment can the Committee expect to be provided with its results?

Answer. The FAA anticipates completing the safety culture assessment no later than June 30, 2022. The FAA will brief congressional staff on the results of the assessment during the regularly scheduled ACSAA quarterly briefing that follows the completion and compilation of results of the assessment.

Sec. 118 Implementation: Whistleblower Protections. This section of the ACSAA expands whistleblower protection to include holders of certificates under 49 U.S.C. 44704, i.e., type, production, and airworthiness certificates, and their suppliers and contractors. In its October 13 briefing, FAA said, "The FAA Office of Audit and Evaluation continues to work with whistleblower retaliation claims through the

AIR21 Whistleblower Protection Program.” But the AIR21 program only covered air carriers and their contractors.

Question. How does FAA currently facilitate the AIR21 Program? What are the governing policy documents for the AIR21 Program? What has FAA done to expand the coverage of its whistleblower program to include manufacturers and their suppliers, as required by this section? If FAA has issued a policy to address this expansion of the AIR21 Program, please provide it to the Committee. If not, why not, and when will it?

Answer. AIR–21 assigns statutory responsibility for investigating employment discrimination or other adverse action cases involving aviation industry employees to the Department of Labor’s Occupational Safety and Health Administration (OSHA). The Federal Aviation Administration (FAA) is responsible for investigating the safety-related aspects of each case. The FAA provides OSHA with the results of our safety investigations, but OSHA, as dictated by the statute, independently conducts the wrongful termination/discrimination investigation. It is also important to note that the FAA has no statutory authority to provide whistleblower protection to industry whistleblowers.

As part of a Memorandum of Understanding (MOU) between the FAA and OSHA, the FAA provides to OSHA any complaint information that contains allegations of employment discrimination or other adverse action and appears to meet the AIR–21 case criteria. In addition, the FAA notifies any AIR–21 submitter who has not indicated they have filed their retaliation complaint with OSHA how to do so and provides the submitter a website link (www.whistleblowers.gov).

The FAA facilitates the AIR–21 Program through a dedicated web page on faa.gov for potential submitters (<https://www.faa.gov/about/initiatives/whistleblower/complaint>) which includes an e-mail address designed for questions that a manufacturing worker might have pertaining to AIR21 (faa-air21@faa.gov). Further, the FAA has a 2015 MOU with the Department of Labor/OSHA that requires OSHA to provide the FAA’s Office of Audit and Evaluation with any AIR–21 complaints received, including manufacturing. Each of these case inputs are loaded into the FAA Whistleblower Protection Program database program and evaluated to determine if there is indeed a potential violation of a regulation, order, or standard relating to the manufacture of parts or aircraft for use by U.S. air carriers. FAA Order 1100.167B explains FAA/AE’s responsibilities for execution of the AIR–21 Program. Other guidance documents used in the program include: AIR–21 EWBPP Process, AAE WB Confidentiality Policy, FAA–OSHA WB MOU, and FAA Order 8900.1 Volume 11, Chapter 3 (provides guidance to Flight Standards Inspectors on the conduct of whistleblower investigations).

Following the lead of the Department of Labor Administrative Law Judges, the FAA’s AIR–21 Whistleblower Protection Program has always treated employees of manufacturing entities, including their suppliers and contractors, as covered employees under the AIR–21 Program if their company provided parts/aircraft to U.S. air carriers. Because of this, no expansion of the FAA’s AIR–21 program was necessary nor undertaken. For example, in FY21, AAE referred 8 AIR–21 complaints against manufacturers for investigation, 21 in FY20, 15 in FY19, 8 in FY18, 12 in FY17, etc. These were noted in our annual report to Congress. The FAA will continue to accept inputs from manufacturers and their suppliers as directed under section 118.

Sec. 131 National Air Grant Fellowship Program. In the Committee’s efforts to ensure greater access to information about rapidly evolving aviation technologies, the ACSAA targets areas to better integrate human factors and system safety assessments of aircraft flight control systems into FAA’s overall certification process. Section 131 of the reform law establishes the National Air Grant Fellowship Program to connect students with the FAA and Congress to help advance safety in the U.S. aerospace industry. ACSAA authorizes \$15 million annually for Fiscal Year 2021 through 2025 in new funding for the fellowship program. The program is intended to enable graduate and post-graduate students, with expertise in aerospace-related fields ranging from human factors to software engineering, to help shape the future of aerospace policy. According to FAA status updates, the Committee understands that FAA is anticipating awarding the first fellowships beginning in 2022.

Question 1. What kind of impact does FAA expect the National Air Grant Fellowship program to have on building additional capacity and capability to certify advanced technologies at the FAA?

Answer. The FAA is optimistic the National Air Grant Fellowship Program will attract exceptional candidates to the agency with innovative knowledge of aerospace technologies. Consistent with the enabling legislation, the FAA is hopeful this fellowship will mature with participants from a wide variety of aerospace disciplines

that will yield benefit to our current operational and safety missions, as well as help to shape the future of aviation.

Question 2. Based on information given to Committee staff, is the program still scheduled to award the first fellowships in 2022? In making such awards, what actions is FAA taking to ensure underrepresented minorities and economically disadvantaged students have equal access to being considered and selected for fellowships?

Answer. The FAA took special measures to make minorities and economically disadvantaged students aware of the fellowship opportunity and encourage interested members of those communities to apply. The fellowship was announced using the agency's outreach plan for minority serving institutions (MSI), as well as to employee associations that represent these groups. The FAA is still evaluating applicants at this time, but hopes to award the first fellowships in 2022.

Question 3. How much did FAA request in its latest budget request for funding of the National Air Grant Program?

Answer. The FAA has requested \$857K for the National Air Grant Fellowship program for CY 2023. The amount includes stipend awards/temporary hires to 5 Fellows (\$280.1K), the appointment of a Director of the National Air Grant Fellowship Program and a program assistant (\$226.4K), and for program costs and fees (\$350K).

Federal Preemption. The courts have repeatedly held that Federal preemption of state law is primarily a function of congressional intent. Congress has expressed its intent *not* to preempt state law in providing remedies for damages in the context of aviation accidents in 49 U.S.C. § 40120: "A remedy under this part is in addition to any other remedies provided by law." Yet FAA has argued in legal briefs in civil litigation that, not only are FAA's airworthiness standards preemptive of state standards of care, but the mere issuance of a design approval prevents state courts from examining whether FAA's standards were actually met.

Question. What is FAA current position on Federal preemption of state standards of care and FAA certification of an aircraft design, whether type certification, amended type certification, or supplemental type certification? Does the FAA agree that the FAA type certification does not itself establish or satisfy the relevant standard of care for tort actions, nor does it evince congressional intent to preempt the field of products liability? If not, please explain why and identify the date of adoption of this policy.

Answer. The FAA does not agree with the second question. The FAA position on preemption has existed for decades. For example, in 1993, the FAA took the position that preemption applied in a lawsuit in New Mexico, *Cleveland v. Piper*.

Most recently, the FAA's position concerning Federal preemption on aircraft design is stated in *Brief of the United States as Amicus Curiae*, filed in December of 2019, in the U.S. Supreme Court in the matter of *Avco Corp. v. Sikkelee, et al.*, In summary, the brief stated,

Design standards for aircraft engines are within a "field" that Congress has "reserved for Federal regulation." And where, as here, the FAA has determined that an engine design satisfies the Federal safety standard, a plaintiff's attempt to invoke state law to impose different or higher obligations on the manufacturer is impliedly preempted under principles of both field and conflict preemption. *Brief* pages 12–13. Citations omitted.

The United States stated in its brief, which would apply to aircraft certification in general, where a state law conflicts with Federal law because it would be an obstacle to accomplishing the purpose of Congress or because it would be impossible for the private party to comply with both state and Federal law, implied preemption applies. A uniform, Federal system governing aviation is important to develop aviation and improve safety. As stated in the government's brief, "The FAA has implemented Congress's objectives for the Federal Aviation Act by requiring approval of the design of an aircraft or aircraft engine through the multistage type-certification process, and by requiring a manufacturer thereafter to conform to that design until it is changed using the applicable procedures." *Brief* at page 15.

It is worth noting the limitations of our view on preemption. Again, from the government's brief,

Importantly, Congress's preemption of state-law standards of care for aircraft design does not foreclose all products liability suits arising from allegedly defective aircraft. The Federal Aviation Act's savings clause provides that "[a] remedy under this part is in addition to any other remedies provided by law." 49 U.S.C. 40120(c). That provision entitles injured plaintiffs to bring state-law

causes of action against aircraft manufacturers for alleged violations of the Federal safety standards, as found in the statute and FAA regulations. For example, plaintiffs injured by alleged aircraft defects might assert, among other potentially viable theories of tort liability, that a manufacturer failed to make appropriate disclosures during the type-certification process; failed to obtain the required form of approval for a particular design element on the type certificate; changed the type certificate without the necessary approvals in contravention of the FAA regulations; failed to build an aircraft in conformance with the type certificate; failed to issue needed warnings to consumers or was negligent in issuing a service bulletin; or failed after issuance of a type certificate to adequately monitor its design and to report known or suspected problems to the FAA. *Brief* at page 17. Footnote omitted.

The FAA's position on preemption is long standing and rooted in safety. Many older aircraft are operated safely in the National Airspace System every day. As new technology is developed and integrated into new type designs, those innovations improve safety for the next generation of aircraft.

Data Collection and Analytics Tools. In your written testimony you state, "We are actively expanding our oversight capabilities by advancing data collection and analytics tools to share safety data within the FAA and between industry stakeholders and international partners. These efforts include technological enhancements to the Aviation Safety Information Analysis and Sharing system to integrate new data sources and methods for safety analysis, which will improve data quality and accessibility to support risk-based decision-making."

Question. How will these enhancements improve FAA's certification and oversight of transport airplanes? How else will these enhancements improve risk-based decision-making at FAA?

Answer. ASIAS is developing a repeatable process to prioritize safety analyses across diverse aviation communities to support programmatic decisions. In addition, ASIAS is working to enhance the analysis of safety reports through topic modeling processes to discover emerging safety issues. Enhancing the FAA's data collection and data analytic capability will make data more accessible to support certification and oversight decisions for transport airplanes. These enhancements will provide the FAA workforce with the necessary tools to identify more comprehensive root causes and analyze emerging safety trends. For the long term, ASIAS is planning a new IT system that will allow increased data volumes at faster processing speeds, and enable more advanced analytical capabilities.

FAA Accountability. In your written testimony you state, "we believe incorporating these best practices [from similar offices at other Federal agencies and from the FAA's experience, expertise, and other sources] will improve the effectiveness, efficiency, and transparency of the FAA's investigative processes."

Question 1. While we understand this work is not yet done, what are the lessons learned that FAA has identified to date? How will they improve the effectiveness, efficiency and transparency of FAA's investigative processes?

Answer. The FAA has identified a need to develop a holistic approach to the investigative process. This includes from the time the initial allegation is submitted, to the determination of the final action(s). There is a three-part solution that the FAA is developing to improve effectiveness, efficiency, transparency, and accountability of the investigation program.

1. Consolidate the intake process for all allegations into one central location. Within the Office of Professional Responsibility (OPR) this will involve reviewing, classifying, and tracking requests and allegations and ensuring each is assigned to the appropriate investigative entity within the FAA or partner agency. This will improve efficiency through greater agency accountability and tracking of investigation trends.
2. OPR will review, enhance, and redeliver investigative training, by qualified instructors, to all managers and personnel responsible for conducting investigations and management inquiries. This will help improve effectiveness and consistency through common investigative standards that are utilized across the different entities within the FAA.
3. Establish a Compliance and Oversight Review team led by OPR comprised of personnel from the appropriate FAA offices to ensure investigative standards, recommendations, and final disciplinary decisions are within Federal guidelines. The result will ensure improved effectiveness, accountability, and transparency in the event that a manager fails to take proper disciplinary action.

Question 2. In the past, FAA's processes have been criticized for enabling managers whose decisions are challenged to make the final decisions on the report. How is FAA addressing this problem?

Answer. The changes we are currently implementing with respect to establishing an OPR program will address multiple aspects of this concern. First, the FAA is proposing to change how we currently document the overall findings in our investigative reports by advising managers which violations are currently supported by known facts, versus simply reporting the facts alone. Second, we plan to establish an "Oversight Review Board", which will review all investigative reports meeting the criteria of an OPR investigation, including allegations of retaliation by managers, prior to dissemination to management and the Office of Human Resource Management. The Board will require a response back from the action authority with proposed and final actions taken. It is important to note that the report is distributed to the designated action authority in the subject's chain of command and not to the subject themselves.

In accordance with current FAA personnel policies, final disciplinary decisions lie with the manager. The proposed establishment of the "Review Board" will ensure that managers are on notice that there will be a review of their decisions and should result in an increased awareness when managers fail to take proper action.

737 MAX Service Difficulty Reports. In the questions for the record filed pursuant to a December 11, 2019 hearing before the House Committee on Transportation and Infrastructure, "The Boeing 737 MAX: Examining the Federal Aviation Administration's Oversight of the Aircraft's Certification," Congressman Paul Mitchell asked you the following:

Question. In the submitted written testimony from Mr. Edward Pierson, he noted that during a 13-month time-frame from 5/12/18 to 3/26/19, the Boeing 737 line had 15 emergencies, leading to 2 crashes and 13 incidents.

- a. Is this statistic consistent with the FAA statistics on the 737 line?
- b. If so, how does this record compare with other aircraft types?
- c. If this statistic is an outlier, what accounts for this inconsistency?

You responded, in part:

The FAA's understanding of Mr. Pierson's comments is that he is referring to the two accidents that led to the grounding and current redesign of the 737 MAX, and 13 Service Difficulty Reports (SDR) received on the MAX aircraft. It is not unusual for transport aircraft to have 13 SDRs in the stated reporting time period. The FAA reviewed the SDRs raised by Mr. Pierson and determined that none of them required an Airworthiness Directive (AD) mandating corrective actions for the airplane.

Please provide this Committee with electronic copies of these 13 service difficulty reports and the analysis that concluded ADs were unnecessary to address them.

Answer. See Attachment 1.

FY 22 Strategic Plan. During the Committee's hearing on November 3, FAA released the "AIR FY 22 Strategic Plan." The first paragraph of the Plan states, "AIR's FY22 strategic plan supports the efforts outlined in the 2017 AIR Blueprint and 2018 Comprehensive Strategic Plan." These documents, published before the Lion Air accident and the enactment of ACSAA, envision a certification system that would rely increasingly on industry's willingness to comply with airworthiness standards to "decrease transactional interactions in the certification process." The FY22 plan makes no reference to AIR's responsibilities to ensure compliance with standards and the new emphasis for direct oversight of the certification process called for by Congress in the ACSAA.

Question. Apart from your assurances that FAA takes implementation of ACSAA seriously, how has FAA demonstrated its willingness to reverse its policies of reliance on industry and its recognition that its primary responsibility in the certification process is to issue a type certificate only when "the Administrator finds that the aircraft. . . meets the regulations and minimum standards prescribed"?

Answer. The FAA is committed to improving the certification process, including our oversight of functions delegated to aircraft designers and manufacturers. The agency has undertaken a number of initiatives to address this goal—some of which occurred prior to the enactment of the ACSAA. As you noted, the FAA takes implementation of the ACSAA very seriously. The Act includes over 100 unique requirements, and we will ensure each is implemented. The agency has made progress towards comprehensively implementing these requirements, and, while the work to

fully implement the Act is still in the early stages, we are carrying it out with the urgency that it requires.

Furthermore, the FAA's approach to aircraft certification and safety oversight has changed. The FAA's relationship with manufacturers is evolving. The agency is prioritizing oversight of manufacturers and working to focus that oversight on safety critical areas. The FAA is delegating fewer responsibilities and demanding more transparency from manufacturers, and evaluating key assumptions prior to delegating functions in certain areas. While the FAA continues to value their technical expertise, the agency is also committed to enforcing the highest safety standards for regulated manufacturers.

2020 Safety Culture Survey. The Committee understands that on November 3, 2021, FAA released the results of a 2020 safety culture survey for its Policy and Innovation Division, which showed that high percentages of personnel have little confidence in division leadership. For example, 36.2 percent said the results of the survey would not be used to make the agency a better place to work; 25.4 percent said their talents were not used well in the workplace; and 17.9 percent said they could not disclose suspected violations without fear of reprisal. In addition, the top 3 "Negative Results" categories were #1 "Senior leaders generate high levels of motivation;" #2 "How satisfied are you with information you receive from management on what's going on in your organization;" and #3 "I have a high level of respect for my organization's senior leaders." The results of the survey indicate that personnel in this division, which are some of the most senior engineers in AIR, are generally dissatisfied with their leadership.

Question. To what do you attribute these poor results? What will FAA do to address these results? Do these corrective actions including personnel changes, if necessary? Please provide the Committee with the results of this survey.

Answer. The Aviation Safety (AVS) organization promotes just safety culture. The Voluntary Safety Reporting Program (VSRP) Matrix Team—comprised of management and union representatives—recommended a safety culture survey to establish a baseline for the VSRP. While the results of this survey showed a number of areas for improvement, the survey found that the AVS workforce is passionate and committed to safety. The workforce supported a voluntary safety reporting system as long as they can raise concerns without fear of retribution. Launched in April 2021, the AVS VSRP meets this standard and is consistent with successful, well-established programs in industry and within the agency. AVS will continue to strengthen the program and employee awareness of the VSRP.

The FAA is actively executing the search for the next Associate Administrator for Aviation Safety. This individual will be responsible for building upon efforts to improve our safety culture and break down perceived barriers identified by the survey.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. KYRSTEN SINEMA TO
HON. STEVE DICKSON

Funding for Air Traffic Control in the Infrastructure Investment and Jobs Act (IIJA). In June, I chaired a hearing in my Aviation Safety, Operations, and Innovation subcommittee where we heard from air traffic controllers who shared stories about working long shifts in aging air traffic control towers. For example, at Falcon Field's air traffic control tower in Mesa, the roof lifts off the tower when the wind blows above twenty miles per hour. Arizonans rely on air traffic controllers to keep the skies safe, and air traffic controllers should be able to focus on their jobs and not worry about the safety conditions of their workplace.

Question. How will the five billion dollars for air traffic control facilities in the Infrastructure Investment and Jobs Act help air traffic controllers do their jobs more effectively and improve the safety of our Nation's airspace?

Answer. The FAA's National Air Space (NAS) Facilities physical plant infrastructure is comprised of 21 air route traffic control centers (ARTCCs), 4 combined control facilities (CCFs), and 10 Enterprise Facilities. There are also 348 FAA-maintained terminal air traffic control towers and terminal radar approach control facilities that include 104 federally owned contract towers. In addition, the FAA has approximately 12,000 unstaffed facilities that house navigation, communication, surveillance, and weather systems.

The five billion dollars for air traffic control facilities in the Infrastructure Investment and Jobs Act will help air traffic controllers do their jobs more effectively and improve the safety of our Nation's airspace by replacing aged Airport Traffic Control Towers (ATCTs) and reducing the operational risk associated with the backlog of physical plant infrastructure components that are beyond their service life.

Approximately 50 percent of the funding will be allocated to replacing FAA-owned ATCTs that are over 40 years old at regional and municipal airports that the FAA typically cannot sustain with normal appropriations. These new towers will have improved work areas that address human factors needs such as space, line of sight for Air Traffic Controllers, and provide a suite of new equipment to improve the reliability and safety of operations.

The remaining balance of funding will be used to reduce the operational risk associated with infrastructure backlog. This funding will be used to replace and improve long past end of life building components such as power and Heating Ventilating and Control (HVAC) systems, roofs, etc. across the NAS that can affect airline operations when they fail. In addition, the FAA is planning to replace a significant number of remote facilities across the National Airspace System (NAS). Building system failures at these facilities can also affect operations and replacing them will improve the safety of the NAS.

Oversight and Distribution of FAA Funding in IIJA. As I discussed at the hearing, the bipartisan infrastructure bill includes significant investments in our Nation's aviation sector. To see the maximum benefit from our investments, we need to be sure that the FAA is ready to distribute the funding and also provide the appropriate oversight to ensure the funding is used appropriately.

Question. Can you describe FAA's preparations to ensure the IIJA funding will be distributed appropriately and to ensure effective oversight of the funding?

Answer. The FAA has established strict accounting protocols for the receipt, accounting set up, and distribution and execution of the IIJA funding. The FAA has established a defined budget structure with budget line item detail that is unique to the IIJA funding as well as unique capital investment plan numbers. These unique numbers have been entered into the FAA accounting and work plan management systems and those codes will allow the work to be tracked both nationally and at the individual project site level.

The FAA has established a series of business rules that are unique to the handling of IIJA funding and include practices that prohibit the mixing of IIJA funding with core appropriation funding on any procurement documents. The FAA also has an established process for tracking the progress and completion of work at individual sites around the U.S. through Job Control Numbers (JCNs). The JCN identifier allows all of the financial data for an individual project to be easily collected and reviewed at the national level. The JCNs also allow tracking the scheduled work plan for individual projects and measures progress toward completion of the project.

FAA has established weekly working group meetings that are used to collaborate between the different offices that will be responsible for the execution of the IIJA funding. These meetings cover the up-front work that needs to be accomplished in preparation for a contract award through the final deployment of a program. Risks and concerns are presented and discussed among the working groups and they are also beginning to collaborate on project work locations to allow for targets of opportunity across the FAA and across appropriations. These targets of opportunity will allow FAA to work in an efficient manner by integrating work at a local level among the involved organizations.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. AMY KLOBUCHAR TO
HON. STEVE DICKSON

FAA Technical Workforce. Following the two tragic airplane crashes of a Boeing 737 MAX 8 aircraft in Indonesia and Ethiopia that took 346 lives—including Mucaad Hussein Abdalla from St. Cloud, Minnesota—we worked to pass the bipartisan *Aircraft Safety and Certification Reform Act of 2020* (ACSAA). The bill incorporates critical aviation safety reforms, including requiring manufacturers to adopt an internal set of safety controls and employee reporting mechanisms known as safety management systems (SMS).

Question. In your testimony, you note that the FAA is hiring technical advisors with the expertise to make critical safety decisions. How is the FAA recruiting and retaining talent with the necessary technical expertise to conduct this oversight?

Answer. While the technical skills the FAA needs to respond to evolving technology and innovation exist within a very competitive market, the FAA continues to use all tools at its disposal to recruit and retain workers with the right skills to support its safety mission. The agency uses personnel authorities including direct hire authority, competitive pay, relocation incentives, and recruitment incentives to recruit and retain staff with the necessary technical skills, especially for critical

areas. This includes talent for the Chief Scientist Technical Advisors, Senior Technical Specialists, and other candidates with expertise in fields such as cybersecurity, systems safety engineering, software engineering, manufacturing and industrial engineering, data analytics and science, artificial intelligence, human-machine interface, systems engineering, and international aviation safety standards, to name a few. While the state of the aviation workforce has changed as a result of the pandemic, and will likely continue to evolve as the system progresses back to normalcy, the FAA will continue to evaluate applicant pools for the various areas of need and adjust tactics as needed to meet staffing and technical skills targets.

FAA NextGen Program. The *Federal Aviation Administration (FAA) Reauthorization Act of 2018* included a provision that would provide the FAA with the tools it needs to effectively implement the NextGen program—the FAA-led modernization of the air traffic control system—with improved technologies, including satellites, virtual maps, up-to-date weather reports, and other real-time information to help pilots navigate more safely and efficiently.

Question. In your testimony, you highlight innovation in aviation and the use of new technologies to enhance safety and efficiency. Can you speak to how new technologies will be tested by the FAA to ensure safety?

Answer. As I mentioned in my written statement, the FAA recently established and staffed the Center for Emerging Concepts and Innovation. The Center will facilitate the safe introduction and certification of new aircraft and technologies by providing pre-application engagement with companies to identify a preliminary path to compliance with regulatory standards. We are also taking steps to foster enhanced coordination across the FAA on emerging products and concepts.

Contract Tower Program. Investing in our Nation’s infrastructure and making sure we have the safest skies from airport to airport, both large and small, includes continued investment in the FAA’s contract tower program, which provides critical air traffic control safety benefits to 256 smaller airports across the country, including St. Cloud and Anoka County airports in Minnesota.

Question. What can Congress do to ensure that contract tower airports have the updated infrastructure and facilities they need to accommodate rising air traffic levels?

Answer. The FAA Contract Tower program supports small airports across the country and is an important part of maintaining safety in the NAS. Congress recently recognized some of the infrastructure needs of this program through the Infrastructure Investment and Jobs Act (IIJA) by providing a minimum of \$20 million annually for the next five years for competitive grants to address contract tower construction, rehabilitation, and modernization. This funding is in addition to annual appropriations for the program. The FAA welcomes this added funding and we look forward to working with Congress to address issues that affect the program such as funding for existing facilities and new entrants and identifying modernization strategies for infrastructure and facility needs.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. TAMMY DUCKWORTH TO
HON. STEVE DICKSON

Preserving the “1,500 Hour Rule.” With the travel industry in a post-pandemic upswing, some airlines are requesting that Congress and the FAA reconsider pilot certification and qualification requirements for air carrier operations. As required by Congress in the *Airline Safety and Federal Aviation Administration Extension Act of 2010*, the 1,500 Hour Rule requires pilots working to secure an Airline Transport Pilot (ATP) certificate to obtain a total of 1,500 flight training hours among other criteria. Some industry stakeholders are critical of this important safety mechanism and suggest that pilots should receive less training within a faster time-frame in order to meet corporate objectives.

Question. As international travel bans are lifted and air travel demand returns, is the FAA considering any plans to empower operators to hire pilots with less training and experience by modifying requirements of the 1,500 Hour Rule?

Answer. The FAA currently has no plans for creating any additional pathways to an airline transport pilot (ATP) certificate. The “1,500 Hour Rule” created pathways that allow for military pilots and pilots with specific collegiate academic experience to receive an ATP certificate with reduced aeronautical experience (*i.e.*, less than 1,500 hours), but restricts their privileges to serving as a second in command (*i.e.*, first officer) for an airline only until the 1,500 hours is achieved. See 14 CFR §61.160.

5G and Airline Safety. On November 2, 2021, FAA issued Special Airworthiness Information Bulletin (AIR-21-18) alerting manufacturers, operators and pilots that action might be required to address potential interference with sensitive aircraft electronics caused by new 5G telecommunications technology. I commend both FAA and FCC for recent constructive conversations to address the aviation community's concerns about potential harmful interference to radio altimeters. I also commend the FCC's decision to delay deployment of "C-band" spectrum for 5G purposes until January 2022, allowing for additional time for interagency assessments of potential harmful impacts on aviation safety technologies.

Question. Please describe in detail the FAA's to work with FCC to address and mitigate potential harmful interference to aviation devices related to C-band repurposing.

Answer. The FAA continues to have regular dialogue with the FCC on the 5G radar altimeter issue. Over the last 6 months, FAA leadership and engineers have worked with the FCC to determine process and specific technical details in order to formulate mitigations to this issue, which will then be communicated to wireless carriers. These mitigations are meant to ensure aviation safety on and around airports and heliports, as well as ensure viable 5G wireless network deployment.

The FAA and FCC meet (sometimes on a daily basis) to formulate mitigations using known data sources, such as the RTCA report, to determine 5G impacts to radar altimeters on the airport surface and for approach and departure. These efforts have resulted in multiple proposals, which continue to be negotiated, to ensure safe aircraft operations.

Out of Practice Airline Pilot Errors. The Bureau of Transportation Statistics reports airline travel is up 162 percent compared to last year. As travel restrictions ease and air travel continues to return to pre-pandemic levels, mid-air mistakes are mounting, according to the FAA's confidential Aviation Safety Reporting System. These reports highlight increased pilot errors that are attributable to a reduction in flight hours during the COVID-19 pandemic. Aviation experts recognize that pilot skills and proficiency can atrophy when they are inactive for an extended period of time.

Question. How has data from the FAA's Aviation Safety Reporting System informed pilot training requirements over the past 12 months?

Answer. The FAA uses the data from the Aviation Safety Reporting System and other available databases to examine trends and identify risks. The training requirements are contained in regulations, which have not changed over the past 12 months. In the early stages of the COVID pandemic, the FAA issued exemptions to some of the training requirements and allowed pilots to extend the periods between training and checking events. Those exemptions have expired and all air carriers have resumed training and checking in accordance with the regulations.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. BEN RAY LUJÁN TO
HON. STEVE DICKSON

The FCC began the process of rulemaking and collecting comments on 5G rollout back in 2017. In February, after years of rulemaking and technical coordination, the FCC finalized the C-band Auction.

The special airworthiness information bulletin issued by the FAA on November 2nd on radio altimeter interference raises a variety of concerns on the coordination process across Federal agencies. I was glad to hear during the hearing that you are "working very closely with the FCC" and with telecommunications stakeholders on this issue.

Question 1. What communication did the FAA have with the FCC on potential interference on the C-Band prior to the special information bulletin on interference with radio altimeters? What role did the NTIA play in coordinating these efforts?

Answer. The FAA attempted to communicate with the FCC multiple times before the SAIB publication.

- The FAA transmitted a letter to NTIA, the FCC's spectrum regulator, on September 30, 2019, urging NTIA to put FAA's comments on the FCC record. These comments urged the FCC to consider preliminary radar altimeter test data from AVSI before making a final rulemaking decision. It appears that this letter was not included on the FCC docket.
- The FAA and DOT sent a second letter to NTIA on December 1, 2020, urging the agency to engage with the FCC to defer the C-band auction until the FAA could conduct a comprehensive safety risk assessment as a result of the findings

in the RTCA report. It is unclear if this correspondence was communicated to the FCC.

- After the C-band spectrum auction, the FAA did not communicate with the FCC until April 8, 2021, after a joint meeting with committee staff (majority and minority), FAA, NTIA, and FCC concerning these issues. FCC, NTIA, FAA, and the RTCA report authors held two follow-up meetings (May 17 and June 15) for a technical discussion of the RTCA report.
- On August 12, 2021, the FAA informed the FCC that it would send a letter to the Commission notifying them of operational restrictions to protect radar altimeters from 5G C-band interference in the absence of FCC mitigating actions and information from the wireless community. By September 2021, the three agencies (FAA, NTIA, FCC) started having regular (weekly, sometimes daily) meetings to work out technical mitigations and those meetings have continued to this day.

Question 2. Do you recommend Congress take steps to reform the interagency coordination process with for spectrum management?

Answer. The FAA has longstanding relationships with its interagency spectrum management partners. These relationships have helped to ensure the safety of the National Airspace System (NAS). The FAA also recognizes that the U.S. economy relies heavily on innovation and new technology, which will enable advancements in the communications sector.

Balancing the advancing technology needs of our Nation and the safety of the NAS requires, now more than ever, constant communications, interagency transparency, efficient use of spectrum resources and a combined strategic approach to spectrum management by the U.S. government. These, combined with thorough analysis and engineering, will ensure the private and government sectors can reach amenable solutions moving forward.

Question 3. What technical evidence formed the basis for the November 2nd special information bulletin on radio altimeters?

Answer. SAIB AIR 21-18 was issued to address Risk of Potential Adverse Effects on Radio Altimeters.

As indicated in paragraph 395, Federal Communications Commission Report and Order and Order of Proposed Modification in the matter of Expanding Flexible Use of the 3.7 to 4.2 GHz Band; GN Docket No. 18-122¹, the FCC indicated that the aviation industry is responsible for ensuring protection of radio altimeters from interference associated with 5G C-band emissions.

As identified in the public docket for the FCC report and the order cited above, RTCA submitted a report identifying the potential for significant safety risks associated with this matter. These concerns were corroborated by communications from a wide-range of aviation industry stakeholders in formal letters to the FAA, the FCC, and the Department of Transportation. The FAA also engaged in individual discussions with representatives from multiple radio altimeter and aircraft manufacturers that corroborated an assessment of potential risk of adverse effects.

RESPONSE TO WRITTEN QUESTION SUBMITTED BY HON. ROGER WICKER TO
HON. STEVE DICKSON

Question.. Unmanned aircraft systems (UAS) can be used in numerous new ways, including for leak inspection in oil and natural gas operations. This new use of UAS helps can help reduce the emissions in the oil and gas industry, but these operations can only be conducted [beyond-line-of-site] pursuant to a waiver from the FAA. Given the possibility the FAA may see an increase in waiver requests, is the agency taking any steps to address potential bottlenecks and develop ways to process waivers in a timely and efficient manner?

Answer. Several infrastructure companies in the railroad, electric, oil and gas, and communications sectors currently use UAS to conduct routine surveillance, inspection, and maintenance of their equipment. While most of these operations are beyond visual line-of-sight (BVLOS), applying current regulations to these operations is neither scalable, nor economically viable in the mid-to long-term. However, limited operations today will inform the regulatory updates needed to make them routine in the coming years, which ultimately will result in better performance-based, technology-agnostic rules. These types of operations have been prevalent in the UAS community and the waiver requests have been in place for years so the FAA is prepared to handle an increase in requests.

¹<https://docs.fcc.gov/public/attachments/FCC-20-22A1.pdf>

Furthermore, the FAA announced a UAS BVLOS Aviation Rulemaking Committee (ARC) on June 8, 2021. The UAS BVLOS ARC is co-chaired by the FAA and industry partners and includes over 80 members of the aviation community. The ARC is focused on taking a holistic approach and will provide recommendations for a performance-based, technology-agnostic regulatory framework to normalize safe, scalable, economically viable BVLOS operations. The FAA intends to use the ARC's recommendations to develop a proposed rule for BVLOS operations in the aviation regulatory framework. The FAA will then move to translate the ARC's recommendations into a rulemaking effort that transforms these ideas into regulations, thus creating predictability and normalization for the UAS industry to innovate toward.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. JOHN THUNE TO
HON. STEVE DICKSON

Question 1. I believe that the centralization and expansion of the Organization Designation Authorization (ODA) Office—created by the Federal Aviation Administration (FAA) Reauthorization Act of 2018 (P.L. 115–254)—was crucial to improving the consistency of manufacturer oversight nationwide, and I appreciate your continued efforts to improve that office. Your testimony mentioned that FAA convened an expert panel to review ODA designees and provide recommendations to the agency for improvement.

Could you elaborate on the contents of this ODA review and the timeline for its completion?

Answer. In response to section 213 of the 2018 FAA Reauthorization Act (P.L. 115–254), the FAA convened a 20 member multidisciplinary expert review panel knowledgeable in FAA certification processes and procedures and the Organization Designation Authorization (ODA) program. To address the requirements of section 213, the panel conducted a survey of ODA Holders and program applicants to document and assess FAA certification and oversight activities as they relate to the ODA program. In addition to the survey task, the panel assessed the ODA program and developed recommendations responsive to the requirements of section 213. In December 2020, Congress passed the Aircraft Certification, Safety, and Accountability Act (P.L. 116–260). Section 125 of this Act amended section 213 of the 2018 Reauthorization Act to include additional tasks for the expert review panel. These new tasks included an assessment of ODA Holders to identify and develop best practices to address the prevention and deterrence of undue pressure, to improve communications between the FAA and ODA staff, and to ensure independence between the FAA and ODA Holder. The expert review panel completed its assessment of these additional tasks and drafted a report detailing its findings and recommendations as they relate to the requirements of section 213 as amended by section 125. The final report is expected by spring 2022.

Question 2. As you know, yesterday the FAA issued a Special Airworthiness Information Bulletin regarding the planned deployment of 5G wireless networks in the 3.7–3.98 GHz bands, which recommended that aircraft and altimeter manufacturers, operators, and pilots provide the agency with information related to the potential effects of this deployment on radio altimeters.

Can you describe the steps FAA is taking to work with both the Federal Communications Commission (FCC) and the National telecommunications Information Administration (NTIA) to assess and—if needed—resolve this potential issue?

Answer. The FAA and the Department of Transportation continue to advocate for open dialogue between the NEC, FCC, NTIA, and the aviation and telecommunications industries. We continue to engage in regular (sometimes daily) meetings with the FCC and we are committed to finding a long-term solution that will enable aviation and 5G wireless to operate to their fullest potential—safely. The FAA is in the process of receiving and analyzing data from the wireless industry that we hope will enable us to issue carefully tailored Notices to Air Missions (NOTAMs). We are also engaging with operators to get their help in identifying the capabilities of the radio altimeters in use in their fleets so we can get an accurate picture of the likely impacts. The more specific data we all have, the better we will be able to solve this challenge. Longer term, we are committed to the process of developing more robust avionics that can operate safely in close proximity to the 5G spectrum and we will make it a priority to work with the industry on a lasting solution.

Question 3. Earlier this year, the Director-General of the European Union Aviation Safety Agency (EASA) made comments that appeared to indicate that EASA intends to move away from the established practice of relying on FAA for the certification of U.S. aircraft. While the specific case of the 737 MAX was unique, this

statement appeared to apply to all U.S. aircraft, regardless of practices established under the US–EU Bilateral Aviation Safety Agreement.

If these comments became EASA policy moving forward, it would violate the agreement and undermine the benefits of reciprocity in certification between the two regulators. Has FAA or the Department of Transportation sought clarification from EASA on this matter?

Answer. The United States and the European Union (EU) Safety Agreement remains the framework for aviation safety cooperation between the U.S. and the EU. The FAA–EASA Technical Implementation Procedures (TIP) under the U.S.–EU Safety Agreement include provisions that allow the validating authority to increase their level of involvements in validation projects depending on factors such as the complexity of the design. The FAA and EASA continue to follow the procedures established under the TIP, and the FAA engages EASA regularly regarding validation programs.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. ROY BLUNT TO
HON. STEVE DICKSON

Question 1. Administrator Dickson, the length of the process for government agencies to issue rules is a topic that consistently frustrates Congress. I have heard you discuss this in passing at another hearing, but I think it would be helpful to hear you explain it further. Why is it that FAA is consistently unable to issue rules that meet that deadlines included in legislation? Are there staffing and resources issues?

Answer. The FAA must comply with applicable provisions of the Administrative Procedure Act in promulgating all rules. Compliance with the Act ensures the public is not subject to regulations without first having the opportunity to review a proposed rule and comment on it.

In particular, the Act requires the FAA to develop proposed requirements based on supporting safety data and analysis. Consistent with Department of Transportation policy, which encourages its operating administrations and components to conduct outreach and provide robust opportunities for discussion with stakeholders during the rulemaking process, the FAA seeks information from industry in a variety of ways. Information gathering in compliance with the APA might become time-consuming, but results in balanced rules that are poised to withstand challenges.

Under Executive Order 12866 (Sept. 30, 1993), and successor Executive Orders, the FAA must also determine whether the anticipated benefits of a proposed rule would justify the costs. The FAA seeks cost information from industry to assist the FAA in this determination.

Upon issuing a Notice of Proposed Rulemaking under the Administrative Procedure Act, the public must have the opportunity to submit comments to the FAA concerning the proposed rule. The FAA is obligated to consider all comments and determine whether to make changes to the proposed rule or revisit conclusions about the costs and benefits of a proposed rule. The FAA must explain its conclusions, based on the comments, in a final rule publication.

Question 2. I've heard you mention the process that is very often dictated by Administrative Procedures Act. Can you discuss the requirements under that law, and its impact on your ability to quickly enact rules on issues like secondary barriers or flight attendant rest requirements?

Answer. As indicated above, the Administrative Procedure Act requires the FAA to publish a proposed rule and solicit comments on the proposal prior to finalization and effectiveness. The Act provides only limited exceptions to the requirement for publication: the FAA may refrain from seeking comment only when doing so would be impracticable, unnecessary, or contrary to the public interest. In the absence of such an exception, in order to issue a rule that imposes a requirement on the public the FAA must solicit comments on a proposal that reflects safety data or analysis and assesses the potential benefits and costs of the rule.

Question 3. Administrator Dickson, the certification reform bill came with many requirements and deadlines for your agency, along with some additional resources. But do you have what you need to meet all the requirements in the bill in a timely manner? For example, I know you've increased your workforce around human factors issues, but is it enough?

Answer. The FAA continues to use a variety of tools to recruit and retain technical staff with the right skills to support human factors issues, complete implementation of the Aircraft Certification, Safety, and Accountability Act (ACSAA), and support its safety mission. The agency continues to use personnel authorities/hiring flexibilities, including direct hire authority, competitive pay, relocation incentives, and recruitment incentives to recruit and retain technical staff. We have focused on

including Chief Scientist & Technical Advisors, Senior Technical Specialists, and other candidates with expertise in fields such as cybersecurity, systems safety engineering, software engineering, manufacturing and industrial engineering, data analytics and science, artificial intelligence, human-machine interface, systems engineering, and international aviation safety standards. While the state of the aviation workforce changed as a result of the pandemic, and will continue to evolve as the system returns to normal, the FAA continues to evaluate applicant pools for the various areas of need and adjust tactics as needed to meet staffing/technical specialty targets.

Question 4. It was important for Congress to make needed changes to the aviation certification system, but while we're doing that I want to ensure that as those changes are being made we're not going to hamstring U.S. industry and their ability to compete with foreign competitors by bringing safer and more efficient products into the global marketplace. Is the FAA able to certify the safety and compliance of new products without causing undue or needless delays in the certification process?

Answer. The FAA continues to implement the ACSAA. While some of its provisions include new requirements on the FAA and industry, we are working to leverage current efforts to effectively and efficiently implement the bill without undue disruption to certification and safety oversight efforts. Further, we are working with our international partners toward a harmonized approach to facilitate the global acceptance of aviation products. Harmonization is key to ensure an even playing field for the U.S. aviation industry.

Question 5. Administrator Dickson, the certification reform bill contains language to enable the FAA to provide increased assistance to foreign regulators, and to work through the International Civil Aviation Organization (ICAO) to develop requirements at the international level on pilot training, operational standards, and human factors.

Please describe the FAA's efforts to date in this area, as well as your plans for future engagement and the benefits to the global air travel system that we can expect to see as a result.

Answer. After years of work, the Air Navigation Commission (ANC) voted to establish the Personnel Training and Licensing Panel (PTLP) in June 2020, and the virtual kickoff meeting was in February 2021.

Over the course of several years, the PTLP will review and develop personnel training and licensing requirements across technical disciplines (*e.g.*, pilot, mechanic, air traffic control). The panel will also develop ICAO provisions related to aviation personnel training and licensing, including studies to ensure that proposed amendments to the applicable provisions reflect current and emerging requirements, improvements in training tools and technologies, and new training methodologies while reviewing automation dependency and possible mitigations. The development of new or revised standards, combined with new internationally recognized guidance material, will improve pilot training and performance globally. An FAA team of 20 professionals supports this ICAO work and holds several lead roles in advancing the work program of this panel.

The PTLP U.S.-led Working Group is tasked with determining the scope of automation dependency globally and to provide recommendations for addressing this challenge. This working group meets monthly and anticipates completing its study report by December 2022.

While this work takes place on the international stage, the FAA continues to work on publishing guidance for training program development and operational policies and practices for U.S. operators. In the coming months, the FAA will publish the draft of a new Advisory Circular (AC) for Flight Path Management (FPM) for public comment, which continues to build on recent information and guidance about stall prevention, upset prevention, manual flight operations, and pilot monitoring responsibilities. FPM is the planning, execution, and assurance of the guidance and control of aircraft trajectory and energy. While the guidelines in this new AC are not mandatory, they are derived from extensive FAA and industry study of accidents and incidents where ineffective FPM was either causal or contributory, and are intended to help operators comply with applicable regulations to prevent similar events in the future. This guidance will allow the FAA, separate from the ICAO panel work, to engage with other regulators and share the information more broadly.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. SHELLEY MOORE CAPITO TO
HON. STEVE DICKSON

Question 1. I am pleased to hear about the progress the Federal Aviation Administration (FAA) has already made in implementing the *Aircraft Certification, Safety, and Accountability Act (ACSAA)*. Even though the FAA's work is in the early stages, I am encouraged by the diligence already being undertaken by the FAA. In your conversations with industry, have they provided constructive feedback on the FAA's rulemakings?

Answer. Generally, our external stakeholders have expressed support for the goals of the ACSAA and the FAA's efforts to raise the level of safety by implementing system safety management principles across all segments of the aviation industry.

Question 2. Has the FAA heard of any issues or concerns from the design and manufacturing organizations?

Answer. The most significant issues raised by design and manufacturing organizations involve the scalability of SMS for organizations of different sizes. Affected companies will have an opportunity to comment on the rulemaking.

Question 3. In your testimony, you mentioned that four design and manufacturing organizations have already voluntarily adopted safety management systems (SMS) and six others are in the process of adopting them. Does the FAA anticipate most design and manufacturing organizations adopting SMS regulations?

Answer. The FAA continues to promote the voluntary SMS program and while the agency anticipates participation in the voluntary program will grow, the pending SMS rulemaking would require SMS for design and manufacturing organizations.

Question 4. In your testimony, you mention that even before the implementation of the *Aircraft Certification, Safety, and Accountability Act (ACSAA)* the FAA had already started evolving your relationship with manufacturers. Could you elaborate on the increased transparency the FAA has requested from manufactures?

Answer. The agency is prioritizing oversight of manufacturers and focusing on safety critical areas. The FAA delegates fewer responsibilities and demands more transparency from manufacturers. In the case of Boeing, the FAA leverages Boeing's Voluntary SMS program to increase access to Boeing's performance regarding root cause problem solving and safety risk management assessments. These situations allow direct insight regarding Boeing's SMS implementation, and the FAA can provide feedback on where further changes are necessary for the SMS to have greater impact.

Question 5. As you noted in your testimony, the FAA has already begun hiring additional staff, does the agency anticipate having the staff necessary to implement the Act by FY22?

Answer. The FAA continues to use a variety of tools to recruit and retain technical staff with the right skills to support human factors issues, complete implementation of the ACSAA, and support its safety mission. The agency continues to use personnel authorities/hiring flexibilities, including direct hire authority, competitive pay, relocation incentives, and recruitment incentives to recruit and retain technical staff. We have focused on including Chief Scientist & Technical Advisors, Senior Technical Specialists, and other candidates with expertise in fields such as cybersecurity, systems safety engineering, software engineering, manufacturing and industrial engineering, data analytics and science, artificial intelligence, human-machine interface, systems engineering, and international aviation safety standards. While the state of the aviation workforce changed as a result of the pandemic, and will continue to evolve as the system returns to normal, the FAA continues to evaluate applicant pools for the various areas of need and adjust tactics as needed to meet staffing/technical specialty targets.

Question 6. How has the relationship between the FAA and manufacturers changed?

Answer. The agency is prioritizing oversight of manufacturers and focusing on safety critical areas. The FAA delegates fewer responsibilities and demands more transparency from manufacturers, and evaluates key assumptions prior to delegating functions in certain areas.

While the FAA continues to value the manufacturers' technical expertise, the agency is committed to enforcing the highest safety standards for regulated manufacturers.

Question 7. I joined Chairwoman Cantwell along with Senators Moran and Klobuchar on introducing the *Foreign Civil Aviation Authority Assistance Act* which was included as a part of the *Aircraft Certification, Safety, and Accountability Act (ACSAA)*. I am encouraged by the progress the FAA has made and the FAA's close collaboration with the International Civil Aviation Organization (ICAO) to improve

pilot training. Could you describe the FAA's efforts to date in this effort as well as your plans for future engagement and how this will benefit global air travel?

Answer. After years of work, the Air Navigation Commission (ANC) voted to establish the Personnel Training and Licensing Panel (PTLP) in June 2020, and the virtual kickoff meeting was in February 2021.

Over the course of several years, the PTLP will review and develop personnel training and licensing requirements across technical disciplines (*e.g.*, pilot, mechanic, air traffic control). The panel will also develop ICAO provisions related to aviation personnel training and licensing, including studies to ensure that proposed amendments to the applicable provisions reflect current and emerging requirements, improvements in training tools and technologies, and new training methodologies while reviewing automation dependency and possible mitigations. The development of new or revised standards, combined with new internationally recognized guidance material, will improve pilot training and performance globally. An FAA team of 20 professionals supports this ICAO work and holds several lead roles in advancing the work program of this panel.

The PTLP U.S.-led Working Group is tasked with determining the scope of automation dependency globally and to provide recommendations for addressing this challenge. This working group meets monthly and anticipates completing its study report by December 2022.

While this work takes place on the international stage, the FAA continues to work on publishing guidance for training program development and operational policies and practices for U.S. operators. In the coming months, the FAA will publish the draft of a new Advisory Circular (AC) for Flight Path Management (FPM) for public comment, which continues to build on recent information and guidance about stall prevention, upset prevention, manual flight operations, and pilot monitoring responsibilities. FPM is the planning, execution, and assurance of the guidance and control of aircraft trajectory and energy. While the guidelines in this new AC are not mandatory, they are derived from extensive FAA and industry study of accidents and incidents where ineffective FPM was either causal or contributory, and are intended to help operators comply with applicable regulations to prevent similar events in the future. This guidance will allow the FAA, separate from the ICAO panel work, to engage with other regulators and share the information more broadly.

Question 8. I have raised the concern of the increased usage of automation in the cockpit and pilot training previously. I certainly believe that automation can and has improved aviation safety, but I believe that it is imperative to ensure pilots are properly trained on how to interact with these systems. I appreciate that you address this in your testimony and that the FAA has several initiatives in order to ensure human factors are incorporated into aviation safety policy and oversight. What are the oversight changes being considered at the FAA to ensure pilots become more proficient in managing safety systems?

Answer. The FAA continues to work on publishing guidance for training program development and operational policies and practices for U.S. operators. In the coming months, the FAA expects to publish the draft of a new Advisory Circular (AC) for Flight Path Management (FPM) for public comment, which continues to build on recent information and guidance about stall prevention, upset prevention, manual flight operations, and pilot monitoring responsibilities. FPM is the planning, execution, and assurance of the guidance and control of aircraft trajectory and energy. While the guidelines in this new AC are not mandatory, they are derived from extensive FAA and industry study of accidents and incidents where ineffective FPM was either causal or contributory, and are intended to help operators comply with applicable regulations to prevent similar events in the future.

The initial FPM AC will target operations and training for manual flight operations, managing automated systems, pilot monitoring, and energy management.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. MARSHA BLACKBURN TO
HON. STEVE DICKSON

Question 1. If terrestrial broadband services in the C-Band presents the potential for harmful interference to radar altimeters such that the FAA would issue a safety bulletin, why aren't you concerned about U.S. air carriers flying routes in countries where such operations co-exist today?

How about U.S. passengers flying on European air carriers in those specified areas?

Answer. The radio altimeter is an important aircraft instrument, and its intended function is to provide direct height-above-terrain/water information to a variety of aircraft systems.

Commercial aviation radio altimeters operate in the 4.2–4.4 GHz band, which is separated by 220 megahertz from the C-Band telecommunication systems in the 3.7–3.98 GHz band. These transmitters are expected to emit significantly stronger signals than those used in other countries, which would heighten the likelihood of interference with sensitive aircraft electronics.

Question 2. In the hearing, you mentioned the importance of the UAS Integration Pilot Program. Can you please bring me up to date on the latest initiatives FAA has spearheaded under this program?

Answer. The UAS Integration Pilot Program (IPP) was established by a presidential memorandum on Oct. 25, 2017. The program concluded on Oct. 25, 2020. The IPP accomplished a significant amount of work to support integration of UAS into the national airspace system (NAS). Many integration challenges remained after the program concluded, including a need for technological standards and a more robust regulatory framework.

BEYOND began on Oct. 26, 2020, to continue the IPP mission. The program focuses on operating under established rules rather than waivers, collecting data to develop performance-based standards, collecting and addressing community feedback, understanding the societal and community benefits, and streamlining the approval processes for UAS integration. BEYOND would enable beyond visual line-of-sight (BVLOS) operations without visual observers that are repeatable, scalable, and economically viable across rural, suburban, and urban environments. Specific emphasis will be placed on infrastructure inspection, public aircraft operations, and small package delivery, along with analyzing and quantifying the societal and economic benefits of UAS operations, and ensuring robust engagement with communities. Since the beginning of the program in October 2020 through October 2021, the participants have logged more than 5,900 flights beyond the visual line-of-sight of the pilot-in-command to complete package deliveries and infrastructure inspections.

