

**STATEMENT OF EDWARD F. PIERSON
BEFORE THE
HOUSE TRANSPORTATION AND INFRASTRUCTURE COMMITTEE**

December 11, 2019

Chairman DeFazio, Ranking Member Graves, Members of the Committee, good afternoon. Thank you for holding this hearing and inviting me to testify today. My name is Ed Pierson and I am a former Senior Manager at Boeing's 737 Factory in Renton, Washington. Before I provide my substantive testimony, I need to provide my heartfelt condolences to the families and friends who lost loved ones on Lion Air Flight 610 and Ethiopian Airlines Flight 302. Your loss and grief are truly unimaginable.

I am here to discuss the alarming state of Boeing's 737 Renton, Washington factory in 2018. During this period, the factory produced hundreds of aircraft, including the two 737 MAX planes that crashed in October 2018 and March 2019. I witnessed a factory in chaos and reported serious concerns about production quality to senior Boeing leadership months before the first crash. I formally reported again before the second crash. No action was taken in response to either of my reports.

I. My Background

I worked for Boeing from 2008 until my retirement in August 2018. In my last assignment I served as a Senior Manager in Boeing's 737 Renton, Washington Factory. In this role, I worked within the Production System Support organization and oversaw production support for 737 Final Assembly, P-8 and Wings manufacturing operations. Before assuming this position, I served as a Senior Manager in the Boeing Test & Evaluation organization, which is responsible for flight testing newly manufactured planes. In addition to my work at Boeing, I

served honorably in the U.S. Navy for 30 years, including as a Squadron Commanding Officer, earning the rank of Captain. I am a graduate of the U.S. Naval Academy, Navy Flight School and George Mason University. My resume and military biography are attached as Exhibits 1 and 2.

II. The State of the Renton, Washington Factory in 2018

The 737 is the flagship of Boeing's Commercial Airplanes division. Boeing currently manufactures all of its 737 planes in Renton: the 737 MAX, the 737 Next Generation, and the P-8 Poseidon, a military variation of the 737.

By June 2018, I had grown gravely concerned that Boeing was prioritizing production speed over quality and safety. In early 2018, Boeing experienced a substantial backlog in its production of 737 aircraft. Initially driven by the delayed delivery of critical parts, the logjam quickly cascaded into numerous other problems within the Renton factory, with key metrics growing continuously worse. "Jobs Behind Schedule" (JBS) spiked to greater than ten times the normal amount, and the "Roll Out on Time" percentage routinely dropped below 10%. In turn, the "B1 Flights on Time" rate¹ also dropped substantially.

Despite the delays, Boeing continued its much-publicized push to increase production at Renton from 47 to 52 planes per month in June 2018 and made clear its intent to increase the production rate again to 57 planes per month in 2019. Boeing said nothing about the chaos that such goals created on the production floor. To meet its heightened production target, Boeing initiated "major recovery operations" at Renton. I realized these recovery operations were prioritizing production speed over quality, placing both manufacturing employees and the flying public at risk. The fallout from these operations was widespread and largely concealed from

¹ "B1" is a flight-test term for the first test flight of a manufactured airplane.

public view. In Boeing's 2nd quarter 2018 earnings report there was zero mention of the state of the factory.

The factory did not have enough skilled employees, specifically mechanics, electricians and technicians to keep up with the backlog of work. As a result, the planned factory overtime rate more than doubled. From my military and private-sector experience, I knew that employee fatigue from excessive overtime inevitably produces process breakdowns—e.g., workmanship mistakes, missed inspection items, incomplete paperwork, or failure to follow established functional test procedures—all of which add considerable risk to the safety of airplanes. Moreover, the parts backlog was leading to substantial “out of sequence” work, meaning the work was performed in an area or at a time other than its planned location or time. This too increases the risk of process breakdowns and quality mistakes.

At the same time, actions and decisions by new factory leadership and a major supply chain reorganization led to further dysfunction. Boeing canceled daily “tiered” meetings, which were crucial to information sharing between shifts, replacing them with a once-a-shift large daily status meeting held in the Town Hall conference room. Following that transition, I witnessed numerous instances where manufacturing employees failed to communicate effectively between shifts, often leaving crews to wonder what work was properly completed. At the new Town Hall meetings, 737 program leadership increased schedule pressure by publicly grilling lower-level managers about delays in front of a hundred or more of their peers, even when the cause of a delay was completely beyond the individual employee's control. I grew increasingly worried that this dogmatic focus on schedule, coupled with employee fatigue, would inevitably lead to rushed work and circumvention of established manufacturing processes. Many employees expressed similar concerns and frustration publicly and in private.

Unsurprisingly, the confluence of parts delays, employee fatigue, out-of-sequence work, communications breakdowns, and schedule pressure led to a decline in quality. Boeing rigorously tracks identified process breakdowns and quality defects during production using a computerized database. Each database entry represents a quality defect during production, such as incomplete or incorrect build instructions, missing or malfunctioning equipment, missing inspections, or missing, damaged, or incorrect parts. More significant defects are elevated to a “Nonconformance Report” (NCR), which requires engineering and quality personnel to sign off on a corrective action. During the relevant period, the factory saw quality issues increase by over 30%, and NCRs grew rapidly as well. There were many quality issues related to Electrical Wiring Interconnect System (EWIS) compliance, such as problems with functional testing of wiring or chaffed, cut, or pinched wires. I knew that improperly manufactured, installed, or tested wires can cause intermittent electrical or electronic data errors on critical plane systems.

III. Boeing Refused to Address Its Deteriorating Factory Conditions

Alarmed by the Renton factory’s rapid and unprecedented decline, I emailed the 737 Program’s Vice President and General Manager, Scott Campbell, on June 9, 2018. *See Exhibit 3* (emails to 737 General Manager). Given the serious and time-sensitive nature of my concerns, I bypassed multiple levels of my supervisory chain and executive management to communicate directly with Mr. Campbell, the senior 737 executive who could address the factory conditions. I sent that email nearly four months before the first 737 MAX crash, expressing the gravity of my concerns as follows:

I fully appreciate the importance of doing our best to meet RO, paint windows, B1s & delivery schedules. But there is a much, much higher risk that we cannot lose sight of. I'm talking about inadvertently imbedding safety hazard(s) into our

airplanes. As a retired Naval Officer and former Squadron Commanding Officer, I know how dangerous even the smallest of defects can be to the safety of an airplane. Frankly right now all my internal warning bells are going off. And for the first time in my life, I'm sorry to say that I'm hesitant about putting my family on a Boeing airplane.

To address the worsening factory conditions, I recommended that Boeing "[s]hut down the production line to allow our team time to regroup so we can safely finish the planes." In response, Mr. Campbell assured me that "safety and quality is number one and schedule come [sic] after that," but he did not acknowledge, let alone act on, my recommendation that Boeing shut down the line to allow workers time to safely address the production backlog.

Over the following weeks, factory conditions worsened. In early July, I requested an in-person meeting with Mr. Campbell to further discuss my concerns. When we met on July 18, I gave multiple examples of process breakdowns, explained the numerous metrics indicating a decline in quality, and reiterated my recommendation that Boeing shut down the line to address product and worker-safety risks. In response, Mr. Campbell told me, "We can't do that. I can't do that." I pushed back, explaining that I had seen operations in the military shut down over less substantial safety issues, and those organizations had national security responsibilities. Mr. Campbell responded tersely, "The military isn't a profit-making organization."

In addition to shutting down the line, I also recommended a thorough engineering and quality analysis to determine if the production environment had caused safety risks that needed to be disclosed to Boeing customers. Mr. Campbell also bristled at this recommendation, but ultimately promised to have human resources pull overtime statistics and to task the engineering and quality organizations with conducting this analysis.

I left Mr. Campbell's office somewhat shocked by his dismissiveness and general unawareness towards the factory turmoil. At the recommendation of another senior manager, I documented the conversation in an email to Mr. Campbell the next day, noting Mr. Campbell's promise to address the cultural issues and worker fatigue and to conduct a quality and engineering analysis to determine if there were "any potential quality risks that might require us to alert our customers." *See* Exhibit 3. Before my voluntary retirement from Boeing on August 1, 2018, I shared this email exchange with several colleagues, who I hoped would monitor the resolution of these problems. To my knowledge, Boeing never acted on my recommendations.

IV. Boeing Failed to Investigate Its Chaotic Production Environment Even After Two Deadly Crashes

Several months later, on October 29, 2018, Lion Air Flight 610 crashed, killing all 189 people on board. Because Boeing manufactured the Lion Air airplane at Renton in the summer of 2018, I immediately feared the chaotic factory conditions had contributed to this tragic loss of life. When the Preliminary Aircraft Accident Investigation Report failed to address that possibility, I started a months-long effort to force Boeing and the accident investigators to focus on the Renton factory. My efforts did not bear fruit.

I first made several calls to Boeing's Communications Office, asking to speak with the Boeing employees supporting the accident investigation. After weeks of fruitless efforts with the Communications Office, Norwegian Air Flight 1933—a 737 MAX aircraft also manufactured in the summer of 2018—conducted an emergency landing in Iran on December 14, 2018 due to an engine issue. Feeling increased urgency, I decided to appeal directly to Boeing's Chairman, President and CEO, Dennis Muilenburg. In a December 19, 2018 letter, I requested Mr. Muilenburg's assistance in contacting the Boeing employees supporting the Lion Air accident investigation. Exhibit 4 (Dec. 19, 2018 letter to Muilenburg). On January 7, 2019, I received a

call from Boeing's General Counsel, retired Judge Michael Luttig. Mr. Luttig stated that Mr. Muilenburg had reviewed my letter and instructed him to follow up with me. After discussing my background and concerns regarding the Renton factory, I again reiterated my request to speak directly with the Boeing employees supporting the investigative team for the Lion Air crash. Mr. Luttig acknowledged this request and said he would share my information with Mr. Muilenburg and CFO Greg Smith.

On January 21, I again spoke with Mr. Luttig about my concerns. Mr. Luttig said that all the 737s in service had received thorough post-manufacturing inspections and that Boeing had not seen any issues with the other planes in the 737 fleet. Mr. Luttig then asked what I would do to investigate my concerns. I recommended that Boeing establish a cross-functional team of subject matter experts who could review data for potential quality and engineering risks and interview employees on the ground about the health of the Renton factory. In response to this proposal, Mr. Luttig recommended that they add Assistant General Counsel Padraic Fennelly to the conversation.

The following day, I spoke with Mr. Luttig and Mr. Fennelly over the phone and once again reiterated my concerns and recommendations. Shortly after the call began, however, I came to believe Mr. Luttig and Mr. Fennelly were more interested in placating me than seriously investigating the factory conditions. Disappointed with the call, I promptly documented my core recommendation by email: "Forming a cross functional [Non-Advocate Review] team to conduct an objective, comprehensive assessment of what occurred last year and the current state of the program This assessment would need to include the analysis of production related data (e.g., quality data) and talking with employees." *See* Exhibit 5 (emails exchanged with general

counsel). I stressed that investigating the Renton factory conditions was “obviously an ongoing urgent matter—it was urgent last summer [and] made even more urgent this fall.” *Id.*

Two weeks later, having heard nothing further, I sent another email to Mr. Luttig and Mr. Fennelly, setting out in painstaking detail the concerns I had been raising since June 2018: employee fatigue and schedule pressure, aggressive leadership communication, mounting quality defects (including numerous functional test and Electrical Wiring Interconnect System problems), staffing constraints, process deviations, communications breakdowns, and others. I emphasized that “the sheer volume of these issues highlights the considerable & unnecessary risk the company was (is still?) taking to meet ever increasing airplane production rates and delivery schedules” and that “production mistakes may have been made with this airplane and potentially others.” *Id.* I also felt Boeing had misled the public about the state of 737 production: “Record numbers of airplanes delivered makes for good headlines, but they can belie the reality of production health.” *Id.*

On February 14, Mr. Fennelly responded that Boeing had considered my information but had “seen nothing from any of [its data] sources that would suggest the existence of embedded quality or safety issues.” *Id.* Unsatisfied, I escalated my concerns to the Board of Directors in a February 19 letter that detailed my internal reporting efforts and requested urgent action from the Board. *See* Exhibit 6 (Feb 19 letter to Board).

Before I received any response, tragedy struck again: On March 10, 2019, Ethiopian Airlines Flight 302 crashed, killing 157 people. Another 737 aircraft manufactured in Renton in 2018 had experienced a serious—and in this instance, deadly—safety issue within its first months in service, despite Mr. Fennelly’s assurance less than one month earlier that there was no cause for concern.

I concluded that Boeing would not take appropriate action on its own accord. Two days after the crash, I again wrote Boeing's Board, this time to explain that I would be contacting the National Transportation Safety Board (NTSB) and Federal Aviation Administration (FAA) directly due to Boeing's disappointing response. *See Exhibit 7 (Mar. 12, 2019 letter to Board).*

V. My Efforts to Engage Federal Regulators

Following my March 12, 2019 letter to Boeing's Board, I immediately attempted to contact the NTSB and other regulators. After months of bureaucratic inaction, unexplainable delays, and communications from my attorneys, an NTSB investigator assigned to the Ethiopian Airlines crash finally contacted me to arrange a telephone interview. I provided him with detailed information, yet he estimated that the interview would require only 15 minutes. That interview occurred on June 26, 2019. *See Exhibit 8 (Key points provided to NTSB investigator on June 26, 2019).* The NTSB investigator had no responsibility for any matters other than the Ethiopian Airlines crash. My information, however, was not limited to that airplane. Instead, it concerned hundreds of aircraft manufactured over many months, including not only the Lion Air airplane but also numerous other planes that have experienced significant safety incidents. The NTSB's reluctance to interview me, and the limited scope of the interview it conducted, raised alarms that the agency shares Boeing's aversion to exploring systemic causes for the crashes.

As a result, I sent a letter through my counsel directly to NTSB Chairman Robert L. Sumwalt on June 28, 2019, setting forth my concerns about the condition of the Renton factory in 2018 and the lackluster response I had received from the NTSB. I requested Mr. Sumwalt ensure my information be shared with the Indonesian and Ethiopian accident investigators in accordance with ICAO Annex 13 procedures. *See Exhibit 9 (June 28, 2019 letter to NTSB).* I provided documentation of my communications with Boeing leadership; proposed that the NTSB

analyze the engineering, quality data, and manufacturing history of the Lion Air and Ethiopian airlines planes; and offered to assist the investigation in any way possible, including by identifying witnesses who could corroborate my information regarding the Renton factory environment.

On August 6, 2019, NTSB Managing Director Sharon W. Bryson sent a one-page response to my June 28, 2019 letter, informing me that my “concerns fall outside the scope of the NTSB’s role in the 737 MAX accident investigations.” *See* Exhibit 10 (Aug. 6, 2019 letter from NTSB). I was stunned by this response. Accident investigators routinely review maintenance and training records going back years. And yet, when two new airplanes crashed just months after they were built, the NTSB unilaterally deemed the chaotic and unstable production environment in which they were made to be outside the scope of the accident investigations.

On September 17, 2019, counsel wrote on my behalf to both FAA Administrator Steve Dickson and Secretary of Transportation Elaine Chao, again laying out my concerns about the chaotic state of production at the Renton factory and imploring the agencies to share my information with accident investigators. *See* Exhibit 11 (Sept. 17, 2019 letter to DOT) and Exhibit 12 (Sept. 17, 2019 letter to FAA). The FAA’s response was to treat my letter as a “Safety Hotline” report. *See* Exhibit 13 (Oct. 14, 2019 letter to FAA). I received no response from the DOT. I followed up with an additional letter to the FAA on Nov. 5, 2019, expressing renewed safety concerns in light of the Indonesian government’s release of its Final Aircraft Accident Investigation Report for Lion Air Flight 610, discussed in greater detail below. *See* Exhibit 14 (Nov. 5, 2019 letter to FAA). Although the FAA suggested in October that it might wish to interview me, I have heard nothing from the agency since then.

To date, I have submitted to numerous interviews involving the Department of Justice, the DOT's Office of the Inspector General, and the NTSB. But I have received no confirmation that any of my information concerning the state of the Renton factory has been shared with accident investigators.

VI. More Recent Developments and Ongoing Concerns

I remain gravely concerned that the dysfunctional production conditions may have contributed to the tragic 737 MAX crashes and that the flying public will remain at risk unless this unstable production environment is rigorously investigated and closely monitored by regulators on an ongoing basis. My concerns are heightened by the regulators' apparent exclusive focus on the design failure of the flight control system, specifically the failure of the Maneuvering Characteristics Augmentation System (MCAS) software. But MCAS is a system designed to correct flight anomalies when they occur. It was not the first failure event that led to these crashes.

Instead, according to publicly available information, the likely cause of both crashes was the transmission of incorrect information to the planes' MCAS by faulty Angle of Attack (AOA) sensors, which in turn caused the planes to execute a series of abrupt maneuvers contributing to the pilots' loss of control. Despite this, there has been limited discussion by Boeing and American regulators of the faulty AOA sensors, let alone a determination of the root cause(s) of their failures in the two crashes. In September 2019, however, the European Union Aviation Safety Agency (EASA) informed the European Parliament that Boeing had not provided an [“appropriate response to Angle of Attack integrity issues”](#) and indicated that it would not unground the 737 MAX until such a response was provided.

My concerns about the AOA sensors multiplied when the Indonesian government released its Final Aircraft Accident Investigation Report for Lion Air Flight 610 on October 28, 2019. The Final Accident Report explains that on October 27, 2018, the day before the Lion Air crash, the plane's AOA sensor was deemed defective and removed from the plane. Boeing subsequently tested that AOA sensor on December 10, 2018 and confirmed it was faulty. It is possible that a similarly faulty AOA sensor was installed on the Ethiopian Airlines plane that crashed on March 10, 2019.

AOA sensors have a long history of reliability. No one has asked why two brand-new AOA sensors on two brand-new planes inspected, installed, and tested by Boeing at the Renton plant during the summer of 2018 failed. And no one has investigated whether the hundreds of other planes manufactured during the summer of 2018 at Renton—including the currently flying 737 Next Gen airplanes and P-8 military airplanes—have faulty AOA sensors or other production quality issues.

I raised these concerns in a third letter to the FAA on November 5, 2019, urging Administrator Dickson to issue an Emergency Airworthiness Directive to airlines and Boeing requiring them to inspect, test, and, if necessary, replace similar model AOA sensors. *See* Exhibit 14 (Nov. 5, 2019 letter to FAA). I received no response.

The number of safety-related events involving this relatively new aircraft is another alarming indicator that Renton production was seriously deficient. Using publicly available information, I have identified thirteen occasions where safety incidents occurred on 737 MAX aircraft just weeks or months into their service life. *See* Exhibit 15 (providing my analysis of recent 737 incidents). Combined with the two crashes, this means that 15 aircraft, or 4% of the 737 MAX airplanes delivered to customers had already experienced a safety incident. While I

am unable to perform a statistical comparison with other aircraft, it is unacceptable to me that passengers on one of every 25 airplanes can expect to experience a safety incident.

Although it is imperative to correct Boeing's flawed MCAS software and pilot training, it is no less imperative to thoroughly evaluate why the AOA sensors provided faulty data in the first place, and whether those reasons implicate Renton production more broadly. It is alarming that these sensors failed on multiple flights mere months after the airplanes were manufactured in a factory experiencing frequent wiring problems and functional test issues. Regulators simply must ask questions about the conditions of the Renton factory and Boeing must answer them candidly. The safety of the flying public depends on it.

VII. Conclusion

Although delivering record numbers of airplanes does in fact make for good headlines, the numbers can mask the reality of production health and airplane quality. I witnessed that on-the-ground reality and I watched with grief and horror as 346 individuals lost their lives in the Lion Air and Ethiopian Airlines crashes. We would be remiss if we failed to remember that another individual that wasn't on one of these airplanes also died as a result of these crashes. He was an Indonesian rescue diver named Syachrul Anto.

I am not a disgruntled employee and I never imagined that I would find myself in this position. I am here today for one reason: to prevent future tragedies by ensuring that regulators and Boeing take every step necessary to prevent the loss of additional lives. Those steps must include a thorough investigation into the production of 737 aircraft at the Renton Factory and close monitoring by regulators from this point forward.

I have attached a list of recommendations for the committee's consideration.

Recommendations for the House Transportation & Infrastructure Committee

1. Direct the FAA to conduct a comprehensive investigation of the 737 Renton, Washington Factory (Final Assembly, P-8 & Wings) to determine if reported problems still exist. If the international accident investigators want to be a part of this investigation they should be afforded the opportunity. The FAA should take appropriate actions as necessary depending on the results of the investigation.
2. Direct the FAA to issue an Emergency Airworthiness Directive for Boeing and airlines to inspect, test and if necessary replace faulty AOA Sensors (per Eric Havian's Nov 5, 2019 letter to the FAA)
3. Direct the FAA to deploy enough qualified employees into Boeing's factories to closely monitor production operations and be available to respond to production concerns from Boeing employees. These FAA employees need to be accessible to Boeing employees working on all shifts and be easily visible (FAA jackets, FAA shirts, FAA posters, etc.).
4. Direct the FAA to analyze reports of safety incidents involving 737 airplanes (MAX, NG & P-8) built since 2017 and to provide a comprehensive risk assessment to this committee NLT Jan 1, 2020. The analysis needs to include the 13 other MAX incidents brought to the attention of the committee.
5. Direct the FAA to develop rules to limit work hours for employees involved in airplane manufacturing.
6. Direct the FAA to require Boeing to get FAA approval prior to increasing production rates and to closely monitor production rate increases to ensure production stability.
7. Direct the NTSB to develop a streamlined witness interviewing process to ensure future witnesses are interviewed in a timely manner. Publish this process on the NTSB website.