



U.S. DEPARTMENT OF TRANSPORTATION
OFFICE OF INSPECTOR GENERAL

**FAA Needs To Improve Its Oversight To
Address Maintenance Issues Impacting
Safety at Allegiant Air**

FAA

Report No. AV2020013

December 17, 2019





FAA Needs To Improve Its Oversight To Address Maintenance Issues Impacting Safety at Allegiant Air

Requested by Representatives Peter DeFazio, Rick Larsen, Nita Lowey, David Price, Mike Quigley, Katherine Clark, Pete Aguilar, Cheri Bustos, and Senators Jacky Rosen and Bill Nelson

Federal Aviation Administration | AV2020013 | December 17, 2019

What We Looked At

Allegiant Air—the Nation’s 11th largest passenger airline—grew faster than the airline industry as a whole in 2018 by carrying approximately 14 million passengers. However, incidents at this air carrier—including a series of in-flight engine shutdowns, aborted takeoffs, and unscheduled landings—have raised concerns about its maintenance practices.

FAA uses its Compliance Program to achieve rapid compliance with regulatory standards, eliminate safety risks, and ensure positive and permanent changes that benefit the aviation industry. This program is based on the concept that the greatest safety risk comes from an operator who is “unwilling or unable” to comply with rules, rather than a specific event or its outcome.

Our objective was to assess FAA’s processes for investigating improper maintenance practices at Allegiant Air. Specifically, we assessed FAA’s (1) oversight of longstanding maintenance issues impacting safety at Allegiant Air and (2) process for ensuring Allegiant Air implemented effective corrective actions to address the root causes of maintenance problems.

What We Found

Since 2011, FAA inspectors have not consistently documented risks associated with 36 Allegiant Air in-flight engine shutdowns for its MD-80 fleet or correctly assessed the root cause of maintenance issues. This was because inspectors did not follow FAA’s inspector guidance that requires them to document changes in their oversight once they have identified areas of increased risk. Also, FAA’s Compliance Program and inspector guidance do not include key factors related to carriers’ violations of Federal regulations. Specifically, they do not contain provisions for inspectors to consider the severity of outcomes when deciding what action to take following a non-compliance. As a result, FAA is missing opportunities to address maintenance issues and mitigate safety risks in a timely manner.

Our Recommendations

We made nine recommendations to improve the effectiveness of FAA’s oversight of air carrier maintenance programs. FAA concurred with eight of our nine recommendations and partially concurred with one. We consider the eight recommendations resolved but open, pending completion of planned actions. We are asking FAA to reconsider its actions for the partially-concurred recommendation.

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Memorandum

Date: December 17, 2019

Subject: ACTION: FAA Needs To Improve Its Oversight To Address Maintenance Issues Impacting Safety at Allegiant Air | Report No. AV2020013

From: Matthew E. Hampton
Assistant Inspector General for Aviation Audits 

To: Federal Aviation Administrator

Allegiant Air—the Nation’s 11th largest passenger airline—grew faster than the airline industry as a whole in 2018 by carrying approximately 14 million passengers.¹ However, incidents at this air carrier—including a series of in-flight engine shutdowns, aborted takeoffs, and unscheduled landings—have raised concerns about its maintenance practices. To ensure the safety of these air carrier maintenance programs and the traveling public, the Federal Aviation Administration (FAA) relies on a series of overlapping controls and responsibilities shared with aircraft manufacturers and air carriers.

FAA employs more than 4,000 aviation safety inspectors to oversee the Nation’s complex aviation system. These inspectors enforce Federal regulations and promote safety using FAA’s new Compliance Program. This program—which began in October 2015—is based on the concept that the greatest safety risk comes from an operator who is “unwilling or unable” to comply with rules and best practices for safety, rather than a specific event or its outcome. The goal of the program is to achieve rapid compliance with regulatory standards, eliminate safety risks and deviations from the standards, and ensure positive and permanent changes that benefit the aviation industry.

Expressing concerns with both Allegiant Air’s maintenance practices and FAA’s oversight of the carrier, Representatives Peter DeFazio, Rick Larsen, Nita Lowey, David Price, Mike Quigley, Katherine Clark, Pete Aguilar, Cheri Bustos, and Senators Jacky Rosen and Bill Nelson requested we conduct this audit. Our audit objective was to assess FAA’s processes for investigating improper maintenance

¹ Allegiant Air’s passenger growth represents a 12-percent increase from 2017. Further, Allegiant’s passenger enplanements grew faster than the industry as a whole, which saw domestic passenger enplanements increase by 4.9 percent during this same period.

practices at Allegiant Air. Specifically, we assessed FAA's (1) oversight of longstanding maintenance issues impacting safety at Allegiant Air and (2) process for ensuring Allegiant Air implemented effective corrective actions to address the root causes of maintenance problems. In a related review also at the request of Representatives DeFazio and Larsen, we plan to assess FAA's oversight of American Airlines' maintenance practices and issue the findings in a separate report.

We conducted this audit in accordance with generally accepted Government auditing standards. To conduct our work, we interviewed FAA headquarters staff, managers, and inspectors responsible for overseeing Allegiant Air. We also interviewed key management officials at Allegiant Air to understand their air carrier maintenance programs and obtain their perspective of FAA's oversight. Finally, we analyzed the FAA inspection data from 2012 to 2019 that were obtained from its inspectors, Hotline database, and Safety Performance Analysis System.

We appreciate the courtesies and cooperation of FAA representatives during this audit. If you have any questions concerning this report, please call me at (202) 366-0500 or Tina Nysted, Program Director, at (404) 562-3770.

cc: The Secretary
DOT Audit Liaison, M-1
FAA Audit Liaison, AAE-100

Results in Brief

FAA did not effectively oversee longstanding maintenance issues impacting safety at Allegiant Air.

Since 2011, FAA inspectors have not consistently documented risks associated with 36 Allegiant Air in-flight engine shutdowns² for its MD-80 fleet or correctly assessed the root cause of maintenance issues. This was because inspectors did not follow FAA's inspector guidance³ that requires them to document changes in their oversight once they have identified areas of increased risk. Additionally, FAA inspectors in key oversight roles for Allegiant Air did not complete required training on how to use its new oversight system, which may have contributed to inspectors ineffectively documenting and mitigating risks associated with in-flight engine shutdowns. This occurred because supervisors were not aware of this training requirement and the office did not have a training manager to support inspectors. Lastly, in April 2016, an FAA national review team⁴ evaluated Allegiant Air due, in part, to concerns about ongoing in-flight engine shutdowns. However, the team did not specifically focus on the increasing number of in-flight engine shutdowns—one of the reasons they were asked to conduct their review of Allegiant—because they believed that other teams were addressing the problems, which they were not. Due to those oversight gaps, the in-flight shutdowns continued until July 2018 and were only resolved 4 months later when Allegiant Air retired the last of its MD-80 fleet. Therefore, FAA is missing opportunities to address critical maintenance issues in a timely manner and could not provide assurance that Allegiant Air is operating at the highest degree of safety and properly mitigating identified risk.

FAA does not provide inspectors with guidance and comprehensive training needed to ensure Allegiant Air takes effective corrective actions.

FAA's Compliance Program⁵ and inspector guidance do not include key factors related to carriers' violations of Federal regulations. Specifically, they do not contain provisions for inspectors to consider the severity of outcomes when deciding what action to take following a non-compliance. Rather, its inspector guidance focuses primarily on an operator's underlying behavior instead of the

² In-flight engine shutdowns are serious events that require pilots to take emergency action, such as return or divert to other airports.

³ Federal Aviation Administration Order 8900.1, Volume 14, *Compliance and Enforcement*, November 4, 2016. For the purpose of this report, we refer to FAA Order 8900.1 as "inspector guidance."

⁴ FAA national review teams are used to verify that operators are complying with regulations and operating at the highest degree of safety.

⁵ Federal Aviation Administration Order 2150.3C, *FAA Compliance and Enforcement Program*, September 18, 2018.

severity of outcomes. Also, inspector guidance is vague on how inspectors should evaluate repetitive non-compliances in determining whether to initiate a compliance action or an enforcement action.⁶ According to FAA’s Compliance Program guidance, inspectors should reserve enforcement actions for incidents such as intentional or reckless conduct, conduct creating an unacceptable risk to safety, or failure to complete corrective action. However, a 2015 maintenance provider failure at Allegiant Air illustrates, in our view, how severe violations that represent unacceptable safety risks or could result in catastrophic outcomes should also warrant a more stringent oversight approach. In this case, a severe maintenance issue, that put approximately 30,000 passengers at risk, was characterized as egregious by an independent review. Yet, when inspectors proposed a 30-day suspension for Allegiant Air’s maintenance provider—who was unwilling to address non-compliances and provide meaningful risk mitigation actions—FAA regional officials reduced the suspension to a compliance action. Additionally, FAA inspectors closed out six of eight compliance actions *before* ensuring that Allegiant Air actually took any corrective actions. For example, an inspector closed an Allegiant Air compliance action for weaknesses in its bird strike inspection process even though the air carrier stated it needed approximately 2 more months to test the effectiveness of its proposed actions. FAA also has not provided inspectors with comprehensive training needed to help them analyze root causes of maintenance discrepancies. Without comprehensive training and guidance for inspectors, FAA cannot be sure that underlying safety concerns of maintenance problems are effectively resolved.

We are making nine recommendations to improve FAA’s oversight of air carrier maintenance programs.

Background

Founded in 1997, Allegiant Air—a wholly-owned subsidiary of Allegiant Travel Company—is an ultra-low cost⁷ air carrier, which operates nonstop, scheduled, and charter service to 122 U.S. cities and Puerto Rico on 450 flight routes. Though Allegiant Air now operates an all-Airbus fleet, it began flying McDonnell-Douglas DC-9 and MD-80 twin-engine aircraft until they retired the fleet in November 2018.

⁶ A compliance action is FAA’s non-punitive method for addressing unintentional deviations stemming from flawed systems and procedures, simple mistakes, lack of understanding, or diminished skills. In contrast, a legal enforcement action is punitive in nature and could result in civil penalties or suspension of operations. For purposes of this report, we refer to legal enforcement action as an enforcement action imposed by FAA.

⁷ Bachwich, Alexander R. and Whittman, Michael D., *The Emergence and Effects of the Ultra-Low Cost Carrier (ULCC) Business Model in the U.S. Airline Industry*, *Journal of Air Transport Management*, vol. 62, pgs. 155-164, July 2017.

Allegiant Air’s business model is unique to the industry and has been consistently profitable every quarter since 2003. Unlike traditional air carriers, Allegiant Air primarily serves smaller destinations that are less frequented by other major carriers. It also keeps ticket prices low by operating less frequently than other carriers. The low ticket cost is further facilitated by not providing certain passenger amenities, such as frequent flier points or on-board entertainment. The carrier is also distinctive in that it offers air travel both on a stand-alone basis and bundled with other travel products like hotel stays and car rentals. In addition, Allegiant Air stated its ancillary sales revenue is a significant part of its business model. These sales include the purchase of products such as advance seat assignments, priority boarding, checked and carry-on baggage, and beverages. According to Allegiant Air, its business model differs from that of a traditional airline (see table 1). Despite these differences, Allegiant must still meet all FAA regulatory requirements for commercial air carriers.

Table 1. Traditional Airlines vs. Allegiant Air Business Models

Traditional Airline	Allegiant Air
Air Transportation	Travel
Business, Leisure	Leisure
Large Cities	Small Cities
High Frequency	Low Frequency
Fixed Capacity	Variable Capacity
High Cost Assets	Low Cost Assets
Competition	Little Competition
Unprofitable/Marginally Profitable	Highly Profitable

Source: Allegiant Air

To oversee air carriers, FAA relies on a risk-based oversight system, called the Safety Assurance System (SAS). SAS is intended to evaluate an air carrier’s ability to manage risk and ensure safe operations, as well as focus on air carriers’ safety systems and controls. In addition, it provides a risk-assessment tool for FAA inspectors to identify and document potential risks. SAS is also part of FAA’s broader Safety Management System, which is focused on enhancing safety through data analysis to better respond to changes in industry business models (i.e., growth and fleet changes).

To identify safety issues and effectively correct them in a timely manner, FAA shifted from an enforcement-based oversight model to one that stresses a more collaborative approach in October 2015. According to FAA, it intends this collaborative approach, called the Compliance Program,⁸ to be an FAA inspector's first choice when trying to achieve rapid air carrier compliance with its regulations. The program encourages the self-disclosure of compliance and safety errors. It also emphasizes education and training over penalizing air carriers—as long as the carrier is “willing and able” to take corrective action—as a means to address non-compliances. When carriers self-disclose, the errors are identified, reported, and analyzed without assigning blame so that just the specifics of each case help FAA determine the appropriate corrective action. For those instances where air carriers are unwilling or unable to correct issues through the Compliance Program, inspectors may still use enforcement-based oversight tools, such as assessing civil penalties or suspending operations.

FAA Did Not Effectively Oversee Longstanding Maintenance Issues Impacting Safety at Allegiant Air

FAA did not consistently document risks in SAS or properly analyze the root cause of repeated in-flight engine shutdowns at Allegiant Air. This occurred, in part, because inspectors in key roles did not receive training in the fundamentals of SAS. In addition, FAA's national review team did not evaluate significant maintenance issues at the airline.

FAA Did Not Consistently Document, Correctly Assess, or Identify the Root Cause Associated with Allegiant Air's In-Flight Engine Shutdown Problems

FAA inspectors did not consistently document risks associated with a series of Allegiant Air in-flight engine shutdowns on its MD-80 fleet (see exhibit D). These shutdowns are considered emergency events and require the pilot to fly with one engine. FAA inspector guidance requires inspectors to document changes in their oversight once they have identified areas of increased risk. Inspectors did not

⁸ FAA changed the name of its “Compliance Philosophy” to “Compliance Program” in October 2018.

document these changes because they believed SAS did not require it. Further, SAS lacks a management control to ensure that inspectors continue to document risks until the risks have been mitigated.

Specifically, in-flight engine shutdowns forced 21 aircraft to return or divert to other airports over a 5-year period between 2014 and 2018. The air carrier reported these events to FAA, but FAA inspectors did not consistently document these risks in their risk planning assessment tools. According to FAA inspection records, inspectors first documented in-flight engine shutdown risks in June and September 2014 but did not track the problem again until January 2016. However, this problem was then only tracked for another month—even though Allegiant Air continued to experience in-flight shutdowns through July 2018. Inspectors should have tracked the risk in their Certificate Holder Assessment Tool (i.e., risk planning tool) until the problem was resolved as required by FAA inspector guidance. During our review of FAA’s records, we could not find documentation or evidence that inspectors consistently tracked the engine risk, which incorrectly suggested that the carrier had successfully mitigated the risk.

Despite not tracking engine risk, FAA took the following actions to address the increasing risk of MD-80 in-flight engine shutdowns at Allegiant Air:

First System Analysis Team—February 2016

In February 2016, FAA inspectors, engine manufacturer representatives, and Allegiant Air officials formed the first of three independent teams—called the System Analysis Team (SAT)—to determine the root cause of three recent engine shutdowns and develop corrective actions. Allegiant Air had already experienced 28 in-flight engine shutdowns since 2011 with its MD-80 aircraft—mostly related to loss of engine oil. However, by the time FAA convened the SAT, Allegiant Air had already identified weakened oil lines as the likely cause of nearly half of the shutdowns and planned to replace the faulty lines with re-engineered ones. Meanwhile, FAA attempted to link elevated engine exhaust temperatures⁹—which had started to become a problem—to the in-flight engine shutdown issues, even though there was no empirical evidence that suggested the shutdowns were caused by elevated exhaust gas temperatures.

Second System Analysis Team—March 2016

Despite the lack of empirical evidence, in March 2016, FAA convened a second SAT due to its concerns about elevated exhaust gas temperatures and to address new concerns that arose as a result of the first SAT. An example of one of these concerns is that Allegiant Air did not document certain exhaust gas temperature

⁹ Exhaust gas temperature is a measure of the temperature of gas exiting the rear of an engine. This reading is used to monitor the health of an engine. Elevated temperatures—temperatures above the maximum allowable temperature range—can be an indication of degraded engine performance.

events because the engines did not exceed the manufacturer's maximum temperature limits. Contrary to Allegiant Air's analysis, FAA expressed concerns that extreme engine temperatures could lead to premature engine wear or simultaneous failure in both of the MD-80's engines. FAA informed the carrier that it disagreed with Allegiant conducting visual inspections to look for damage related to increased engine temperatures instead of performing more comprehensive internal inspections. Ultimately, FAA and Allegiant Air agreed on six procedural changes designed to improve Allegiant Air's engine monitoring program, and closed the second SAT in March 2016.

The procedural changes developed by these SATs did not correct the elevated engine temperature or the engine shutdown problems. From January to August 2017, FAA documented more than 150 instances of elevated exhaust gas temperatures.

Third System Analysis Team—September 2017

In September 2017, FAA initiated a third SAT because Allegiant Air continued to experience elevated engine temperature conditions. An FAA analysis revealed that Allegiant operated its engines in excess of the manufacturer's maximum temperature requirements 11 times in the previous 8 months. Further, while the air carrier was monitoring these engines for instances of elevated engine temperatures, it operated 19 aircraft where *both* engines installed had already experienced high engine temperatures. To resolve the elevated temperature issue, Allegiant Air moved its MD-80 aircraft out of hot, arid operating environments—such as Las Vegas—to a more temperate airport locale. In October 2018, FAA closed the third SAT after Allegiant Air agreed to FAA's call for changes to maintenance procedures. The agreement included more rigorous inspection and troubleshooting activities after an elevated exhaust temperature event.

MD-80 Fleet Retired—November 2018

Although Allegiant agreed to FAA's call for changes during the third SAT, this agreement was only in place for about a month before Allegiant retired the last of its MD-80 fleet—an action that ultimately resolved the problem. From January 2011 to the retirement of its MD-80 fleet in November 2018, Allegiant Air experienced 36 in-flight engine shutdowns, in part, because FAA was ineffective at assessing and identifying the root cause of the problem.

FAA Inspectors in Key Roles Were Not Trained To Use SAS

FAA inspectors did not receive mandatory training on how to use SAS effectively. This is because the Agency does not have the policies and procedures in place to

monitor inspector compliance with training requirements. According to FAA's oversight office, supervisors were not aware of this training requirement, and there is no training manager to support inspectors. FAA also lacks a policy and tool for reminding managers when training is due.

In September 2018, FAA headquarters conducted a Flight Standards Evaluation Program (FSEP) inspection. This inspection is required every 3 years to identify and correct systemic weaknesses and identify program strengths within the Flight Standards Service. The inspection revealed that three inspectors, in key positions assigned to oversee Allegiant Air, did not complete required courses on the fundamentals of SAS and safety data collection. One of these courses provides inspectors with a foundational knowledge of SAS concepts, business processes, and an understanding of how to operate the system. Another course also explains how to accurately translate inspection observations into usable data to support risk assessments. According to the FSEP team lead and our review of program data, inspector failure to complete this training requirement is an agency-wide problem.

These missed training requirements may have contributed to inspectors ineffectively using FAA's oversight system to assess risk, such as inspectors not documenting and mitigating the risks associated with Allegiant Air's series of in-flight engine shutdowns.

FAA's National Review Team Did Not Evaluate Two Prominent Allegiant Air Maintenance Issues

In addition to three System Analysis Teams initiated to address the in-flight engine shutdown issues, FAA also assigned a National Certificate Holder Evaluation Process (CHEP) team¹⁰ to review Allegiant Air. However, this national team did not review two prominent maintenance issues. This is because FAA does not have policies and procedures in place to require that CHEP teams report whether air carriers meet FAA's stated program goals. The goals of the CHEP program are to verify that the operator complies with applicable regulations, evaluate whether the certificate holder is operating at the highest possible degree of safety in the public interest, and identify hazards and mitigate associated risks.

CHEPs are program reviews conducted by inspectors independent of the FAA oversight office for the air carrier being reviewed and are normally conducted

¹⁰ According to FAA Inspector guidance, evaluation teams may consist of national, divisional, or Flight Standards office personnel.

every 5 years to evaluate air carriers' abilities to adhere to Federal aviation regulations. However, at the request of the FAA regional office, in April 2016, FAA headquarters expedited its CHEP review of Allegiant Air due to concerns that the air carrier was experiencing repetitive in-flight engine shut downs. Despite those concerns, the team did not evaluate the very issues that prompted the early review.

- First, the evaluation team did not assess Allegiant Air's engine shutdown problem. According to the national review team lead, the local FAA inspection office had already convened the SAT to address over-heated engines and the team believed the SAT was addressing the issue. However, it took more than 2 years before the SAT could agree on a plan to mitigate the engine risk and ultimately the risk was not mitigated until Allegiant Air retired the fleet.
- Second, the CHEP team did not evaluate the repeated failure of an Allegiant Air repair station to complete its required inspections (see exhibit E). The local FAA inspection office provided this information to the CHEP team, but it is unclear why the team did not examine the issue. However, FAA inspectors continued to inspect the repair station and identified similar problems to those that caused an incident in August 2015, in which a pilot almost lost control of the aircraft during takeoff when it lifted off prematurely. Each time, the inspectors handled the discrepancies without using enforcement action. By March 2017, more than 18 months after the original incident, FAA inspectors concluded that changes made at the repair station justified ending their increased oversight. Had the CHEP team included this issue during its April 2016 inspection, it may have been resolved earlier.

Overall, we found that—as a result of FAA's lapse in oversight of key maintenance issues impacting safety at Allegiant Air—FAA missed opportunities to address longstanding maintenance issues in a timely manner. Further, because the national review team did not review these two key maintenance discrepancies, it could not determine whether the Allegiant Air was operating at the highest degree of safety and properly mitigating identified risk in accordance with its program goals.

FAA Does Not Provide Inspectors With the Guidance and Comprehensive Training Needed To Ensure Allegiant Air Takes Effective Corrective Actions

FAA's Compliance Program and inspector guidance do not provide enough detail for inspectors to conduct comprehensive oversight. As such, the severity of outcomes or reoccurrence of maintenance non-compliances are not factors in inspectors' decisions when initiating a compliance action. Further, the Compliance Program allows FAA inspectors to close compliance actions before determining whether corrective actions were implemented and effective. Also, FAA inspectors did not take important training to aid in the assessment of the air carrier's root cause analysis and corrective action plans to ensure maintenance discrepancies were addressed. Finally, FAA has not developed a process to incorporate historical compliance action data into its inspection database, leaving the local inspection office to develop its own method to compile the data.

FAA's Compliance Program Lacks Effective Oversight Guidance

Key Factors Related to Violations Are Not Considered in FAA's Guidance

FAA inspectors did not consider the severity of outcomes when deciding what action to take when an air carrier violates Federal regulations. This is because FAA's inspector guidance and Compliance Program guidance do not specifically address this condition. Instead, the Compliance Program guidance states that FAA should reserve enforcement actions for incidents such as intentional or reckless conduct, conduct creating or threatening to create an unacceptable risk to safety, or failure to complete corrective action. Conversely, a severe violation that FAA determined was not the result of intentional or reckless conduct, might also warrant a more stringent oversight approach, such as assessing an enforcement action. However, under FAA's Compliance Program, FAA no longer considers the outcome of a violation when evaluating whether an enforcement action or a compliance action would be the right approach following a violation. Instead, FAA now focuses on individual behavior when determining whether to take an enforcement action. As a result, a violation that could result in a potentially catastrophic outcome may not end in an enforcement action.

To illustrate this point, in May 2015, Allegiant Air's maintenance provider failed to insert a cotter pin on a critical flight control component on an MD-80 aircraft (see figure 1). The cotter pin is designed to prevent a nut from loosening. Once the aircraft was returned to service, Allegiant unknowingly operated the aircraft for almost 2 months on 216 flights. According to our analysis, approximately 30,000 passengers were at risk during this time. On August 17, 2015, a pilot almost lost control of this aircraft during takeoff when it unexpectedly tried to lift off prematurely. Had the aircraft become airborne, a serious incident or accident could have occurred because the cotter pin was not installed. Nevertheless, the crew was able to abort the takeoff and safely return the plane to the terminal.

Figure 1. Missing Cotter Pin



The photo shows an MD-80 elevator rod (red arrow) dislodged from its mounting hole (blue arrow) because it was not properly secured with a cotter pin (not shown).

Source: FAA

Allegiant Air's investigation determined that its maintenance provider not only failed to insert the cotter pin, but also failed to have another technician conduct a secondary inspection that is required to ensure it was installed. In addition, similar repetitive maintenance issues had occurred with this maintenance provider in the past (see exhibit E). As a result, the local FAA inspection office proposed an enforcement action, which—had it been upheld—would have prevented the repair station from performing work for up to 30 days.

After this incident occurred, in October 2015, FAA implemented its Compliance Program, which calls for FAA inspectors to collaborate with air carriers and repair stations to resolve discrepancies. As a result of the Agency's new emphasis on collaboration, FAA regional staff who were responsible for reviewing enforcement proposals, disagreed whether the maintenance provider should receive a 30-day certificate suspension or a compliance action (i.e., non-punitive action). When the FAA regional staff completed their review in December 2015, they ultimately overturned the 30-day suspension proposal and directed the case to be closed under the Compliance Program—effectively resolving this case without punitive actions.

The disparate proposed actions in this case occurred because FAA did not use a process to address disputes between FAA offices. According to FAA's independent team assigned to review this case, the regional office lacked sufficient interdependence because it failed to consult inspectors responsible for oversight of Allegiant and its maintenance provider to gain insight into the maintenance provider's compliance posture, willingness, and ability to implement an effective corrective action plan. Additionally, FAA staff did not consult with legal counsel to determine how to properly proceed with this case, despite their differences of opinion. Instead, the case was returned to the local inspection office for disposition. According to a senior FAA official, the case should have received legal review.

The seriousness of this case raised questions within FAA about the effectiveness of the Compliance Program and whether the decision to address the severity of the violation with non-punitive action was consistent with FAA's safety policy. As a result, FAA formed an independent team to review the case and later substantiated that a compliance action was "not consistent with the egregious nature of the violation, and the intentional disregard [by the maintenance contractor] for procedural compliance." The independent team also stated that the maintenance provider "demonstrated patterns of behavior and performance that represented an unacceptable risk to safety." Additionally, the team observed that FAA did not use a resolution process to address disagreements between FAA offices and suggested that FAA create an issue resolution process to ensure disagreements in handling non-conformances are dealt with consistently, using the most appropriate processes and all relevant information.

Despite the findings of the independent team, FAA did not reverse its decision and initiate an enforcement action against the maintenance provider. Using the Compliance Program to resolve this case proved to be ineffective because FAA inspectors determined that similar discrepancies regarding missed mandatory inspections persisted, and FAA did not accept and close out the repair station's corrective actions related to this case until March 2017.

A second factor FAA inspectors do not consider when determining what action to take following a non-compliance is the reoccurrence of maintenance discrepancies. For example, Allegiant Air's maintenance provider repeatedly failed to complete required inspections, suggesting that the corrective actions were ineffective at addressing the root cause of the problem. This non-compliance persisted for 20 months, but inspectors continued to handle the non-compliances with compliance actions rather than pursuing a more stringent oversight approach. This occurred because FAA's inspector guidance is vague on how to address recurring non-compliances. Conversely, FAA's Compliance Program guidance states that inspectors should consider safety risks when determining the appropriate action to take when an air carrier has recurring non-compliances. In this case, FAA inspectors did not consider the safety risks that a maintenance provider's repeated failure to complete required inspections could pose to the safe operation of the air carrier.

FAA Inspectors Closed Out Compliance Actions Without Determining Whether Corrective Actions Worked

FAA inspectors did not consistently determine whether Allegiant Air's corrective action plans addressed the root cause of maintenance problems before closing compliance actions. This occurred because FAA inspector guidance does not specifically require it. Instead, the guidance suggests that an inspector's decision to conduct an inspection (e.g., follow-up inspections conducted after closing out compliance actions) is based on whether the issue is complex or not. In comparison, a similar program—FAA's Voluntary Disclosure Reporting Program (VDRP) used by air carriers to self-disclose errors to FAA—also requires root causes analysis and submission of comprehensive fixes to prevent future reoccurrence of problems. However, VDRP goes one step further than FAA inspector guidance by requiring inspectors to validate that comprehensive fixes address the problem before closing out the disclosure.

Our analysis of eight compliance actions initiated between 2017 and 2019 showed that six were closed out *before* FAA performed inspections of Allegiant Air's corrective actions. For example, an inspector identified weaknesses in Allegiant Air's bird strike inspection process and initiated a compliance action to address the issue. After the carrier submitted its corrective action plan to FAA, the inspector reviewed and approved the plan. The inspector then closed the compliance action—even though Allegiant Air stated it still needed to test the effectiveness of the plan. FAA reopened the case against Allegiant Air only after we inquired about this disparity.

The lack of guidance and controls limits FAA's ability to ensure that discrepancies are resolved in an effective and timely manner.

FAA's Root Cause Analysis Training Is Insufficient

According to FAA inspectors, they do not have the training they need to effectively evaluate whether proposed corrective actions will address the root cause of maintenance non-compliances. While FAA inspector guidance emphasizes the importance of inspectors using critical thinking in problem solving and correctly identifying root causes to recommend appropriate corrective actions to air carriers, inspectors stated that FAA does not provide comprehensive root cause analysis training. Also, root cause analysis is a key component of both the Safety Management System and FAA's Compliance Program. However, our analysis showed that of the nine maintenance inspectors assigned to Allegiant Air, three have not been trained to conduct root cause analysis. Though three of the inspectors completed FAA's 2-hour computer-based training course on this topic, two of these inspectors agreed that the course did not provide the level of detail needed to determine whether corrective action plans would effectively address root causes. According to an FAA inspector, other courses offered in the industry provide a much more detailed understanding of root cause analysis. FAA's ability to identify and mitigate safety hazards is contingent upon its inspectors being comprehensively trained to analyze the root causes and ensure that the proposed corrective actions will prevent maintenance problems from recurring.

The lack of root cause analysis training may result in identified problems not being effectively mitigated.

FAA Has Not Provided Inspectors With an Effective Means To Track and Report Compliance Actions

FAA inspectors cannot easily track and report the number or details related to compliance actions taken against Allegiant Air because FAA has not developed a process for inspectors to capture historical compliance action data. When asked to provide us with compliance action details for our analysis, an FAA analyst had to search separate databases, such as Safety Assurance System (SAS), Program Tracking and Reporting Subsystem, and their local SharePoint site to obtain historical and current information. The analyst then manually prepared a report for our review. The lack of a process to incorporate historical data into its inspection database inhibits FAA inspectors and managers from quickly and accurately counting or tracking compliance actions taken against Allegiant Air.

Conclusion

Effective and consistent oversight of aircraft maintenance is a critical element of maintaining the safety of commercial air carrier operations. FAA has made efforts to improve its inspections of air carriers through a risk-based approach to oversight and is working more closely with industry to achieve prompt compliance and eliminate safety risks through initiatives such as the Compliance Program. However, FAA's Compliance Program is still evolving and currently does not provide the guidance and training inspectors need to ensure corrective actions are implemented and effective for air carriers, such as Allegiant Air. Moving forward with the Compliance Program, the Agency can capitalize from lessons learned at Allegiant to improve oversight at all air carriers system wide.

Recommendations

To improve the effectiveness of FAA's oversight of Allegiant Air's maintenance program, we recommend that the Federal Aviation Administrator:

1. Develop and implement a management control to require managers to review and validate that known risks documented in the Safety Assurance System Certificate Holder Assessment Tool are tracked until mitigated.
2. Develop and implement policies and procedures to monitor inspector compliance with Safety Assurance System training requirements.
3. Revise its inspector guidance to require Certificate Holder Evaluation Process teams to report inspection results to the local inspection office, including a determination on whether the carrier is operating at the highest possible degree of safety in the public interest and how the team reached that conclusion.
4. Revise its Compliance and Enforcement guidance and its Inspector guidance to include the severity of outcomes as a factor in considering whether inspectors should initiate compliance or enforcement actions.
5. Develop and implement a resolution process to ensure disagreements in handling non-compliances are dealt with consistently, using the most appropriate processes and all relevant information.
6. Revise its inspector guidance to clarify how inspectors address recurring non-compliances as a factor in considering whether they should initiate compliance or enforcement actions.

7. Revise its inspector guidance to require inspectors to determine that corrective actions taken by air carriers are implemented and have addressed known discrepancies prior to closing compliance actions.
8. Perform a comprehensive review of FAA's root cause analysis training to ensure it meets Agency expectations. Modify training, as appropriate, based on the review and require inspectors to complete the course(s) or offer inspectors access to industry-based training programs.
9. Develop and implement a process to incorporate historical compliance actions in SAS for inspectors to track current and historical compliance actions.

Agency Comments and OIG Response

We provided FAA with our draft report on October 22, 2019, and received its formal response on November 27, 2019, which is included as an appendix to this report. FAA concurred with eight of our nine recommendations as written and provided completion dates for recommendations 1 through 3 and 5 through 9. FAA partially concurred with recommendation 4. Although it agreed to clarify its compliance and enforcement policy, we are requesting that FAA reconsider its actions for this recommendation, as detailed below.

For recommendation 4, FAA partially concurred because the Agency does not believe "severity of outcome" should be a significant determinant of how best to return an air carrier to compliance. FAA further stated that the decision to implement a compliance versus an enforcement action is more appropriately based upon factors such as whether the conduct was reckless, intentional, or indicates an inability or unwillingness of the air carrier to comply with the regulations. We agree with FAA's premise that reckless and intentional behavior should be a key determinant in deciding whether to take an enforcement action. However, we question how a regulatory violation that could have resulted in a potentially catastrophic outcome should not also be a key factor in making this determination. Moreover, FAA's position is inconsistent with FAA's Compliance and Enforcement guidance. Specifically, the guidance calls for taking enforcement action when conduct creates or threatens to create a significant risk to safety, which could lead to a severe outcome. While FAA has agreed to revise its guidance and enforcement policy in light of our draft report findings, it remains unclear how this will address our specific concerns regarding violations which could have catastrophic consequences. Therefore, we are requesting that FAA reconsider and, if necessary, clarify its actions concerning this recommendation.

Actions Required

We consider recommendations 1 through 3 and 5 through 9 resolved but open, pending completion of the planned actions. In accordance with DOT Order 8000.1C, we request that FAA provide, within 30 days of this report, the additional information on recommendation 4.

We appreciate the courtesies and cooperation of FAA representatives during this audit. If you have any questions concerning this report, please call me at (202) 366-0500 or Tina Nysted, Program Director, at (404) 562-3770.

Exhibit A. Scope and Methodology

We conducted this performance audit between August 2017 and October 2019 in accordance with generally accepted Government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

We initially planned to conduct an industry-wide audit of FAA's oversight of air carrier maintenance programs. We began our audit work by visiting two air carriers and associated FAA oversight offices for JetBlue Airways and Alaska Airlines. However, we decided to refocus the next phase of the audit after determining that FAA had moved its oversight strategy from emphasizing enforcement actions to working with carriers collaboratively to address the root causes for violations of safety regulations. Furthermore, we received several requests from various congressional committees and members asking us to examine a range of issues associated with FAA's oversight of Allegiant Air that had been highlighted in media reports.

Given the increased congressional interest, we modified our audit objectives to assess FAA's processes for investigating improper maintenance practices at Allegiant Air. Specifically, we assessed FAA's (1) oversight of longstanding maintenance issues impacting safety at Allegiant Air, and (2) process for ensuring Allegiant Air implemented effective corrective actions to address the root causes of maintenance problems. In a related review, also at the request of Representatives DeFazio and Larsen, we plan to assess FAA's oversight of American Airlines' maintenance practices and issue the findings in a separate report.

We conducted our audit work at FAA Headquarters and the FAA Pacific Certificate Management Office in Las Vegas, Nevada—which is responsible for overseeing Allegiant Air. We also interviewed key management officials at Allegiant Air to understand their maintenance programs and obtain their perspective of FAA's oversight. To assess the Agency's capability to investigate allegations of improper maintenance practices at Allegiant Air, we reviewed and evaluated FAA policies and procedures that govern the oversight of air carrier maintenance. We interviewed four of eight inspectors—who were available at the time of our visit—regarding Allegiant Air's maintenance programs. We also reviewed correspondence exchanged between FAA and Allegiant. Additionally, we analyzed FAA inspection data for 2014 to 2018, obtained from its Safety Performance Analysis System and submissions to FAA's Hotline database.

To determine whether FAA ensured Allegiant Air implemented effective corrective actions to address the root causes of maintenance problems, we analyzed FAA's Compliance Actions. We obtained a listing of all compliance action records—16 in all—between 2017 and 2019 from FAA's Safety Assurance System. We performed a file review of all eight closed records to determine if FAA inspectors conducted follow-up inspections of the Compliance Actions.

Exhibit B. Organizations Visited or Contacted

Department of Transportation

FAA Headquarters, Flight Standards Service

FAA Office of Audit and Evaluation

Alaska Airlines Certificate Management Office

Delta Air Lines Certificate Management Office

New York Flight Standards District Office

Pacific Certificate Management Office

Western-Pacific Region Technical Standards Branch, Air Carrier

Western-Pacific Region Technical Standards Branch, General Aviation

Other Organizations

Alaska Airlines

Allegiant Air

JetBlue Airways

Exhibit C. List of Acronyms

AAE-1	Director, Office of Audit and Evaluation
A/C	Aircraft
AVS-1	Associate Administrator for Aviation Safety
CHEP	Certificate Holder Evaluation Process
DOT	Department of Transportation
EIR	Enforcement Investigative Report
EGT	Exhaust Gas Temperature
FAA	Federal Aviation Administration
FSEP	Flight Standards Evaluation Program
IFSD	In-Flight Shut Down
LOC	Letter of Correction
MEL	Minimum Equipment List
OIG	Office of Inspector General
PAC CMO	Pacific Certificate Management Office
RMP	Risk Management Process
SAS	Safety Assurance System
SAT	System Analysis Team
VDRP	Voluntary Disclosure Reporting Program

Exhibit D. Allegiant Air MD-80 Engine Events

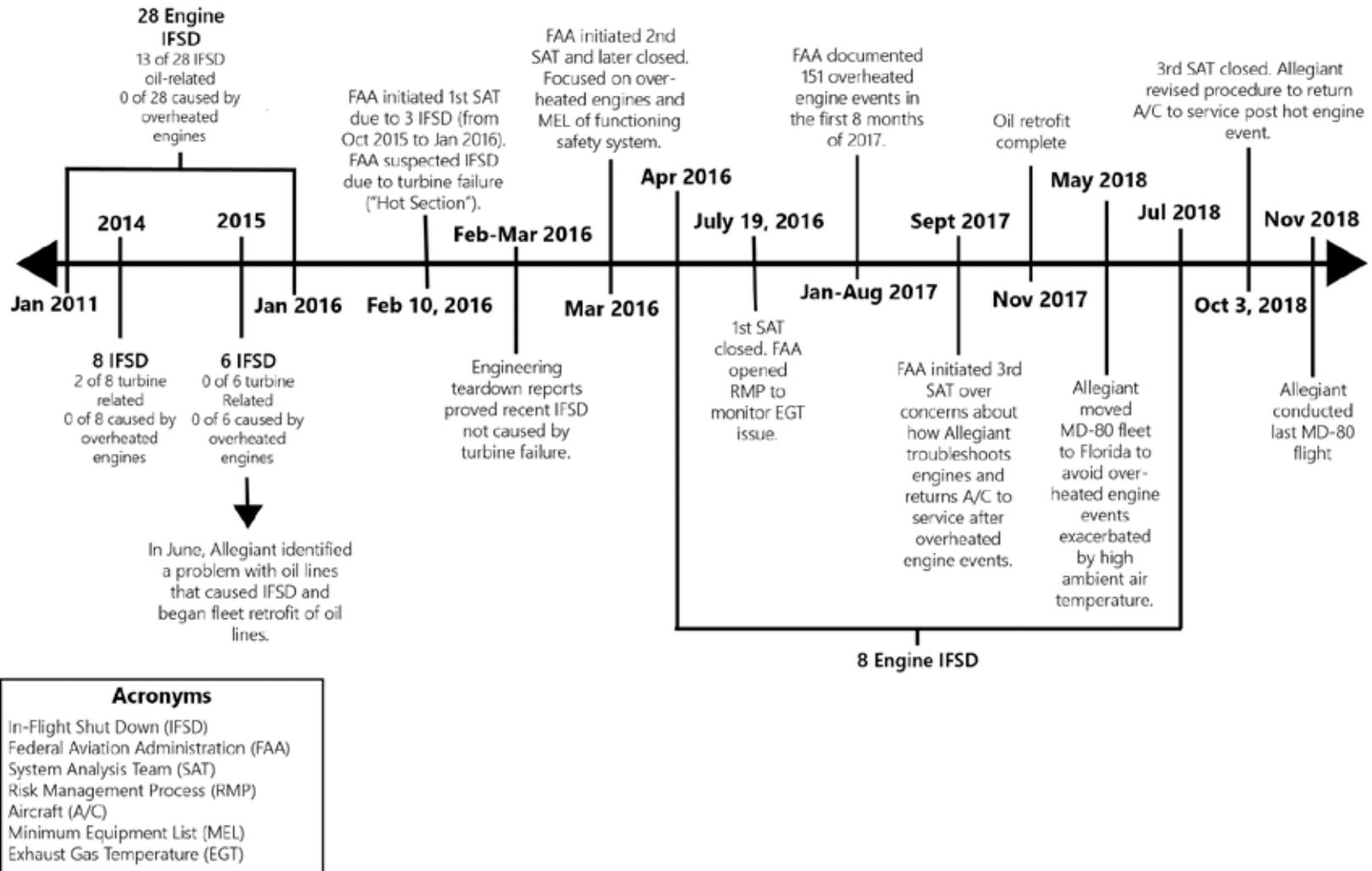
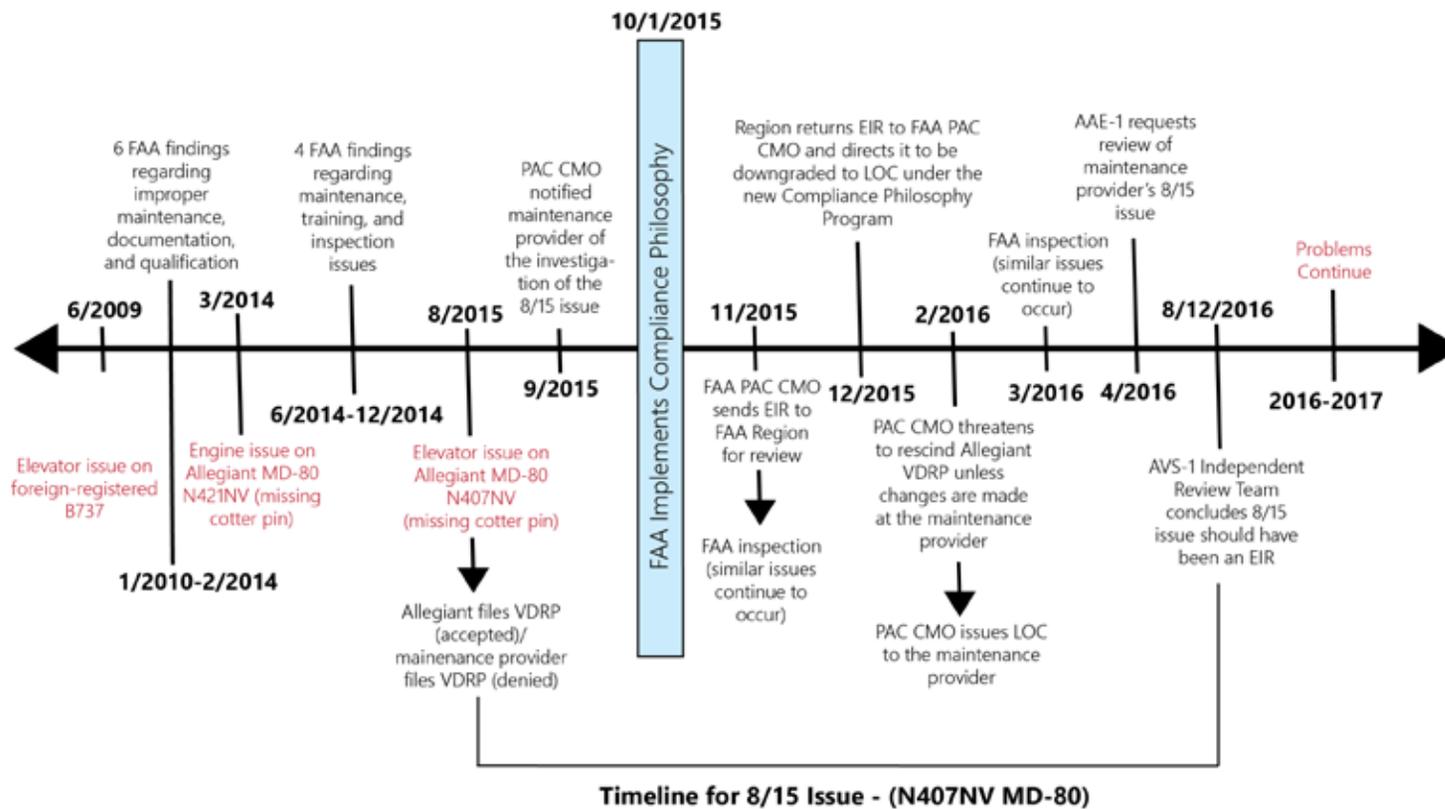


Exhibit E. Air Carrier Maintenance Deficiencies at Allegiant Air's Maintenance Provider



Acronyms
Enforcement Investigative Report (EIR)
Federal Aviation Administration (FAA)
-Director Office of Audit and Evaluation (AAE-1)
-Associate Administrator for Aviation Safety (AVS-1)
Letter of Correction (LOC)
Pacific Certificate Management Office (PAC CMO)
Voluntary Disclosure Reporting Program (VDRP)

Exhibit F. Major Contributors to This Report

TINA NYSTED	PROGRAM DIRECTOR
KEVIN GEORGE	PROJECT MANAGER
MARK PERRILL	SENIOR ANALYST
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EBONI NOLAND	AUDITOR
SUSAN CROOK-WILSON	WRITER-EDITOR
SETH KAUFMAN	SENIOR COUNSEL

Appendix. Agency Comments



Federal Aviation Administration

Memorandum

Date: November 27, 2019

To: Matthew E. Hampton, Assistant Inspector General for Aviation Audits

From: H. Clayton Foushee, Director, Office of Audit and Evaluation, AAE-1 

Subject: Federal Aviation Administration's (FAA) Response to Office of Inspector General (OIG) Draft Report: FAA's Oversight to Address Maintenance Issues Impacting Safety at Allegiant Air

The FAA has initiated compliance actions at Allegiant Air that have improved safety for the flying public, are generally consistent with FAA's Compliance Program, and are in accordance with Safety Assurance System (SAS) policies. Nonetheless, the FAA continually strives to enhance the agency's oversight posture and, and we will work with the OIG regarding its draft report recommendations.

We have reviewed the draft report and offer the following clarifications:

- The OIG draft report describes the actions taken by the FAA as insufficiently responsive to deficiencies at Allegiant Air. In addressing non-compliance concerns at Allegiant, inspectors within the Certificate Management Office (CMO) did track issues within the SAS. The CMO responded by convening Safety Analysis Teams (SATs) when elevated risk was identified and modified its approach as new information was obtained. In addition to conducting a Certificate Holder Evaluation Program (CHEP) review on Allegiant, the FAA conducted a separate SAT to address the engine maintenance concerns addressed in the report. These actions complemented one another. Through these elevated review processes, the FAA continued to focus on and engage with Allegiant Air. Between October 2015 and December 2018, the FAA completed 49 compliance actions related to airworthiness, along with initiating 3 enforcement actions relating to airworthiness. These actions increased safety for the public and improved the safety culture of the operator.

- The OIG draft report suggests that the “severity of an event” should be a key factor in deciding what action to take following an air carrier’s violation of the regulations. The FAA disagrees that severity should be a key factor in this determination. The Compliance Program was designed to address underlying behaviors and systems that are the root causes of deviations in determining what action(s) to take. Certain behaviors, such as intentionally acting contrary to the regulations or reckless behavior, represent the highest risk to safety, regardless of the severity of a particular violation.

Upon review of the recommendations, we concur with recommendations 1-3 and 5-9. We will implement recommendation 2 and 8 by June 30, 2020 and recommendations 1, 3, 5, 6, 7 and 9 by October 31, 2020.

We partially concur with recommendation 4, because we do not believe “severity of outcome” should be a significant determinant of how best to return an air carrier to compliance. The FAA believes that the severity of a violation is often based upon chance and other factors unrelated to the root cause(s). The decision to implement a compliance versus an enforcement action is more appropriately based upon factors such as whether the conduct was reckless, intentional, or indicates an inability or unwillingness of the air carrier to comply with the regulations. These parameters best predict the likelihood of future non-compliance. We do recognize that clarification of this aspect of the compliance and enforcement policy is necessary in light of the draft report findings, and intend to update that guidance by October 31, 2020.

We appreciate this opportunity to respond to the OIG draft report. Please contact H. Clayton Foushee at (202) 267-9000 if you have any questions or require additional information about these comments.

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