



Memorandum

Date: January 5, 2022

Subject: INFORMATION: Capstone Memorandum: Observations and Common Themes in OIG's Recent Work on FAA's Oversight of Air Carrier Maintenance Programs

From: Barry J. DeWeese 
Principal Assistant Inspector General for Auditing and Evaluation

To: Federal Aviation Administrator

Maintaining the safety of our National Airspace System (NAS) is the Federal Aviation Administration's (FAA) top priority. Over the last 3 years, our office has published three reports related to FAA's oversight of air carrier safety, including air carrier maintenance programs. We conducted this work, in part, at the request of a number of Members of Congress.¹

We initially planned to conduct an industry-wide audit of FAA's oversight of air carrier maintenance programs. However, after determining that FAA had adjusted its oversight strategy to work with carriers collaboratively to address safety violations, we refocused our audit. In particular, congressional requests highlighted concerns at both Allegiant Air and American Airlines. Allegiant Air was experiencing continued maintenance problems, while American Airlines was being sued by its own mechanics due to alleged pressure to shortcut maintenance to keep aircraft in service. As such, we decided to report on these two carriers separately. We issued our findings on FAA's oversight of Allegiant Air in December 2019 and American Airlines² in October 2021. In addition, we initiated an audit of FAA's oversight of Southwest Airlines

¹ Requestors included Representatives Peter DeFazio, Rick Larson, Nita Lowey, David Price, Mike Quigley, Katherine Clark, Pete Aguilar, and Cheri Bustos, and Senators Jacky Rosen and Bill Nelson.

² See: *FAA Needs To Improve Its Oversight To Address Maintenance Issues Impacting Safety at Allegiant Air* (OIG Report No. AV2020013), December 17, 2019; and *FAA Lacks Effective Oversight Controls To Determine Whether American Airlines Appropriately Identifies, Assesses, and Mitigates Aircraft Maintenance Risks* (OIG Report No. AV2022004), October 20, 2021. OIG reports are available on our website at <http://www.oig.dot.gov/>.

following a number of safety concerns in 2018.³ We issued our final report in February 2020.⁴

We have prepared this capstone memorandum given the interrelated nature and significance of these audits and our recommendations. The following presents a summary of our findings and recommendations from all three reports, highlighting common themes regarding FAA's oversight and intended to draw your attention to potential systemic issues.

Summary

While FAA has taken positive steps to work more closely with air carriers to improve safety, our work found that weaknesses in FAA's oversight led to long-unresolved safety issues. In particular, FAA did not ensure Allegiant Air, American Airlines, and Southwest Airlines identified and resolved root causes of non-compliances. Further, our reviews indicate that FAA is not fully prepared to evaluate whether air carriers are effectively assessing and mitigating safety risks, due in part to a lack of training and guidance on how to oversee air carriers' Safety Management Systems (SMS). We issued and FAA has taken action on a number of recommendations to strengthen its management controls related to overseeing and enforcing air carrier safety. Ultimately, while some of the issues we identified were specific to FAA local offices that oversee particular carriers, they present an opportunity for FAA to assess its overall oversight of air carrier safety programs.

Background

In its role as a safety regulator, FAA establishes regulatory standards to ensure safe operations in the NAS. However, the Agency also recognizes that compliance with regulations alone is insufficient to guarantee safety. To align with international standards and enhance safety, FAA issued regulations⁵ in 2015 requiring all part 121 air carriers to develop and implement an SMS. FAA required air carriers to implement SMS in order to identify and analyze potential hazards and mitigate risk to an acceptable level based on each carrier's operating environment. FAA is responsible for ensuring that air carriers' SMS effectively manage safety risk—including compliance with existing regulatory standards.

³ In early 2018, our office received a hotline complaint regarding FAA's oversight of Southwest Airlines and a number of operational issues at the carrier. Then, on April 17, 2018, Southwest Airlines Flight 1380 suffered an engine failure and debris penetrated the aircraft cabin, resulting in the first U.S. passenger fatality in over 9 years.

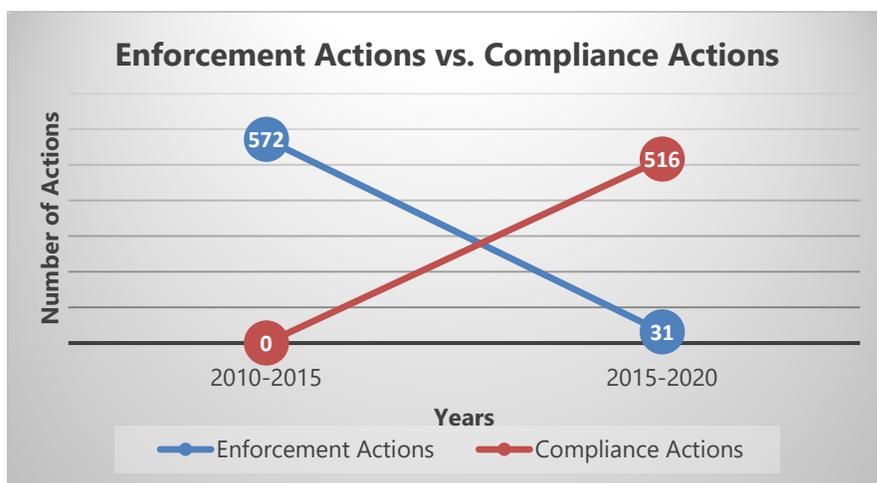
⁴ *FAA Has Not Effectively Overseen Southwest Airlines' Systems for Managing Safety Risks* (OIG Report No. AV2020019), February 11, 2020.

⁵ Safety Management Systems for Domestic, Flag, and Supplemental Operations Certificate Holders, Title 14, Code of Federal Regulations (CFR), Parts 5 and 119.

FAA’s requirement for air carriers to establish SMS occurred in tandem with a wider shift in the Agency’s approach to safety oversight. Specifically, beginning in 2015, FAA began transitioning from an enforcement oversight model to one that emphasizes a more collaborative approach. According to FAA, this collaborative approach, called the Compliance Program,⁶ is intended to achieve *rapid* compliance with its regulations from the air carriers. FAA’s Compliance Program works from the premise that the greatest safety risks do not arise from specific events or outcomes but from operators that are unwilling or unable to comply with safety rules and best practices. The program provides inspectors with multiple options for addressing non-compliances, ranging from issuing Compliance Actions to more stringent legal enforcement action. In contrast to a legal enforcement action, such as a civil penalty or certificate revocation, Compliance Actions allow an air carrier to address a non-compliance in accordance with an agreed-upon corrective action plan. In those situations, FAA also emphasizes education and training over penalizing air carriers—as long as the carrier is willing and able to take corrective action.

This shift to the Compliance Program has transformed how FAA works with air carriers to resolve identified safety issues. For example, as shown in the figure below, the number of enforcement actions against American Airlines dropped dramatically since FAA transitioned to its Compliance Program approach in 2015.

Figure. FAA’s Shift From Enforcement Actions to Compliance Actions—American Airlines



Source: OIG analysis of FAA data

⁶ FAA changed the name from “Compliance Philosophy” to “Compliance Program” in October 2018.

Weaknesses in FAA's Oversight Led to Long-Unresolved Safety Issues

Our work raised questions about whether FAA is effectively achieving the Compliance Program's goals to secure rapid compliance, eliminate safety risks, and ensure positive and permanent changes. In particular, FAA did not ensure air carriers identified and resolved root causes of non-compliances. Further, FAA issued Compliance Actions for serious safety issues and did not always verify that carriers resolved non-compliances prior to closing a Compliance Action.

FAA Did Not Ensure Air Carriers Identified and Addressed the Root Cause of Non-Compliances

Root cause analysis became an integral part of FAA oversight with the implementation of the Compliance Program in 2015. The concept behind root cause analysis is to resolve and prevent recurrence of a problem by identifying the underlying factors that are causing the problem and then recommending solutions that address each factor.

However, our audits found significant weaknesses in FAA's oversight related to identifying and addressing root causes. According to FAA guidance,⁷ inspectors should collaborate with the air carrier to correctly identify and fix the root cause(s) of violations. Yet FAA's collaboration with air carriers was not sufficient to resolve recurring issues at the three carriers we reviewed, some of which presented serious safety risks. In particular:

- **Engine shutdowns at Allegiant Air.** From January 2011 to November 2018, Allegiant Air experienced 36 in-flight engine shutdowns among MD-80 aircraft in its fleet. This occurred in part because FAA was ineffective at assessing and identifying the root cause of the problem. Shutdowns are considered emergency events and require the pilot to fly with one engine. In-flight engine shutdowns forced 21 aircraft to return or divert to other airports over a 5-year period between 2014 and 2018.

Between 2016 and 2018, FAA convened three independent teams of FAA inspectors, engine manufacturers, and Allegiant Air officials to determine the root cause of the engine shutdowns. However, the procedural changes these teams developed did not correct the problems, which were only resolved when Allegiant retired the last of its aging MD-80 fleet in November 2018.

⁷ Federal Aviation Administration Order 8900.1, volume 14, *Compliance and Enforcement*, October 14, 2020.

- **Inaccurate weight and balance information at Southwest Airlines.**

In January 2018, FAA learned that Southwest Airlines was providing inaccurate aircraft weight and balance information to pilots prior to take-off—a violation of FAA regulations. Inaccurate information to pilots could pose a safety issue because violations of weight and balance limits can result in hazardous or catastrophic conditions, including during take-off and landing.

After learning about the violation, FAA required the carrier to investigate discrepancies of 300 pounds or more to determine the root cause. However, we found that inspectors did not ensure Southwest Airlines fulfilled its requirements or verify that the carrier took the agreed-upon actions. As a result, these discrepancies continued for nearly 2 years. Despite the prolonged nature of the violations, FAA granted the carrier multiple extensions to determine the root cause. Then the Agency granted the carrier even more time to implement corrective actions, even though the principal inspector did not feel the carrier had identified the true cause.

- **Maintenance non-compliances at American Airlines.** Our review of FAA’s oversight of American Airlines found a pattern of insufficient root cause analysis for maintenance non-compliances. In 171 of 185 (92 percent) maintenance compliance cases we sampled from fiscal years 2016 to 2020, American Airlines did not identify the root cause at all or determined that the root cause was related to human factors issues. According to FAA guidance, human factors issues are not considered true root causes because they place the blame on an individual rather than on a process or system. For example, in September 2019, FAA found that mechanics had overlooked a work step on a maintenance task card pertaining to passenger cabin doors. According to the air carrier’s response to FAA, “the Root Cause was complacency of the Supervisor.” FAA did not press American Airlines for the true root causes of the problems (i.e., by asking why the supervisor was complacent) and just accepted human error as the reason for the violation.

Ineffective root cause analysis and the associated corrective actions may have contributed to a number of repetitive non-compliances at American Airlines, including recordkeeping errors and improperly completed maintenance. As a result, FAA and the carrier missed an opportunity to make more expansive enhancements to the system to prevent future occurrences of the same or a similar error.

According to our work, these non-compliances occurred in part because, nearly 6 years after FAA implemented its Compliance Program, the Agency is

still refining its inspector guidance⁸ for identifying and addressing root causes of identified discrepancies. In addition, we reported in our Allegiant and American Airlines reports that FAA did not adequately train its inspectors on how to analyze root causes and determine whether corrective action plans would be effective. We also reported that FAA inspectors for Southwest Airlines stated that identifying root cause is the responsibility of the carrier and inspectors should not be involved in that process. These statements contradict FAA guidance, which requires inspectors to work with air carriers to determine the root cause of safety concerns.

FAA Issued Compliance Actions for Serious Safety Issues and Closed Cases Without Verifying Corrective Actions Were Taken

According to FAA inspector guidance, inspectors will use Compliance Actions to correct discrepancies as a means for achieving rapid compliance. However, our work identified weaknesses in FAA's use of Compliance Actions and its oversight processes at the three carriers we reviewed. In particular, FAA no longer considers the potential outcome of a violation when evaluating whether an enforcement action or a compliance action would be the right approach to address the violation. Instead, FAA now focuses on individual behavior when it determines whether to take an enforcement action. As a result, a violation that could result in a catastrophic outcome may not end in an enforcement action.

In our view, FAA should consider whether severe violations represent unacceptable safety risks or could result in catastrophic outcomes in determining whether those violations warrant a more stringent oversight approach. To illustrate, in 2015, a severe maintenance issue at Allegiant Air, which put approximately 30,000 passengers at risk, was characterized as egregious by an independent review. An Allegiant Air maintenance provider failed to insert a cotter pin on a critical flight control component on an MD-80 aircraft.⁹ As a result, a pilot nearly lost control when the aircraft tried to lift off prematurely during takeoff. Agency inspectors proposed an enforcement action of a 30-day suspension for Allegiant Air's maintenance provider, which was unwilling to address non-compliances and provide meaningful risk mitigation actions. However, FAA regional officials reduced the suspension to a Compliance Action.

Further, 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 issue persisted for 20 months,

⁸ Federal Aviation Administration Order 8900.1, volume 14, *Compliance and Enforcement*, November 4, 2016, and October 14, 2020. Federal Aviation Administration Order 2150.3C, *FAA Compliance and Enforcement Program*, September 18, 2018. For the purpose of this letter, we refer to FAA Order 8900.1 as "inspector guidance."

⁹ The cotter pin is designed to prevent a nut from loosening.

but inspectors continued to handle the non-compliances with Compliance Actions rather than pursuing enforcement actions. Ultimately, using the Compliance Program to resolve this case proved to be ineffective because FAA inspectors determined that similar violations persisted.

We also found that FAA closed Compliance Actions at two carriers without verifying that they had completed the agreed-upon corrective action plans. Specifically:

- **Allegiant Air.** FAA inspectors closed out six of eight Compliance Actions *before* ensuring that Allegiant Air actually took any corrective actions. For example, an inspector closed a Compliance Action for weaknesses in Allegiant Air's 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 reopened the case against Allegiant Air only after we inquired about this disparity.
- **American Airlines.** FAA inspectors accepted all 394 corrective actions proposed by the carrier that we reviewed—including 20 actions that were closed out *before* American Airlines could implement them. For example, in 2018, an FAA inspector closed out a Compliance Action related to the carrier's maintenance procedures and stated that FAA had validated the corrective actions. Yet the carrier's documented response showed that 8 of the 19 corrective actions would not be completed for up to 5½ months.

Based on our findings in these reports, we issued a number of recommendations to strengthen FAA's management controls related to compliance and enforcement actions (see the exhibit for a list of our recommendations and their status).

FAA Is Not Fully Prepared To Oversee SMS and Evaluate Whether Air Carriers Are Effectively Assessing and Mitigating Risk

FAA is responsible for overseeing air carriers' implementation of their SMS, including the carriers' assessments of safety risk ratings and controls. However, we identified gaps in FAA's oversight of air carriers' risk assessments and other weaknesses in its SMS oversight, due largely to a lack of comprehensive guidance, tools, and training for its inspectors.

FAA Inspectors Did Not Consistently Evaluate Southwest or American Airlines' Safety Risk Assessments

FAA requires air carriers to use its SMS to assess the level of risk (i.e., "risk rating") associated with non-compliances and report on which controls failed and the consequences that would occur as a result. Additionally, FAA

inspectors are required to evaluate whether air carriers' risk assessments contain acceptable risk ratings, root cause analyses, and proposed corrective actions.

However, our 2020 review of FAA's oversight of Southwest Airlines found that FAA inspectors were not consistently evaluating the air carrier's risk assessments. Yet FAA used the air carrier's SMS risk assessments to justify continued non-compliance with safety regulations. For example, we reported that Southwest Airlines operated 88 aircraft in an unknown airworthiness state, including more than 150,000 flights on previously owned aircraft that did not meet U.S. aviation standards—putting 17.2 million passengers at risk. Although FAA was aware of this violation, it accepted Southwest's justification that the issues were low safety risks. The carrier continued operating aircraft without ensuring compliance with regulations for nearly 2 additional years. This occurred, in part, because the Agency lacks management controls to ensure Southwest Airlines and FAA inspectors do not use SMS as a substitute for regulatory requirements.

We also reported that FAA inspectors approved major pilot training program changes proposed by Southwest Airlines without considering whether the carrier evaluated the potential safety impacts of those changes. FAA inspectors never reviewed the carrier's risk assessment to ensure it considered factors unique to Southwest Airlines, such as ongoing operational challenges and its operating environment, in the development of the training. Had inspectors attempted to review the assessment, they would have determined that Southwest Airlines did not conduct one, as required, for this new training program.

Our most recent work also found weaknesses in American Airlines' risk assessments and FAA's oversight of the carrier's SMS. Our analysis of 193 findings (from our sample of 60 compliance actions) indicated that the carrier rated 141 of them (73 percent) as "low" or "very low" risk. However, FAA did not evaluate whether American Airlines' risk ratings adequately captured the level of risk for these findings. While categorizing risk assessments is inherently subjective, accurately identifying these ratings is integral to decision making in SMS. The risk rating ultimately determines the corrective actions the carrier must take and what level of air carrier management will be responsible for accepting and mitigating the risk.

FAA Lacks Comprehensive Training, Tools, and Guidance for SMS Oversight

Overall, our work found that many of FAA's oversight challenges are due in part to a lack of comprehensive training, tools, and guidance for SMS oversight. For example, FAA inspectors overseeing American Airlines told us that the training they received was a high-level overview of SMS and lacked

details on how to accurately review air carrier risk ratings. FAA inspectors also stated that their data collection tool is insufficient for comprehensively evaluating the effectiveness of the carrier's SMS.

We identified issues with training and guidance in FAA's oversight of Southwest Airlines, as well. According to senior FAA managers, the local oversight staff were not prepared to oversee SMS because the Agency rushed the implementation process and training to meet regulatory deadlines. In addition, the manager of FAA's SMS program office stated that they do not want inspectors to view SMS as a stand-alone program.

A lack of guidance also impacted FAA's ability to oversee another key tenet of an effective SMS program—air carriers' safety culture. FAA defines safety culture as the shared values, actions, and behaviors that demonstrate a commitment to safety over competing goals and demands. To effectively meet shared safety goals, both FAA and air carriers must demonstrate a safety culture that establishes and maintains an environment conducive to safe and efficient aviation activities. In 2020, we reported that many FAA officials expressed concern about the safety culture at Southwest Airlines. However, FAA did not provide inspectors with appropriate guidance on how to assess safety culture and factor it into their oversight.

As a result of these issues, FAA may be missing opportunities to identify weaknesses in air carriers' SMS related to assessing and mitigating safety risks and promoting effective safety culture. Accordingly, we issued a number of recommendations to FAA to enhance its oversight (see exhibit).

Sustained Management Attention Is Needed To More Effectively Balance Collaboration and Enforcement in Air Carrier Safety Oversight

We made a total of 27 recommendations in our three reports to improve FAA's oversight of Allegiant, Southwest, and American Airlines' safety programs. FAA has addressed or begun to address many of these recommendations, including those related to Allegiant Air's maintenance risks and Southwest Airlines' operation of 88 previously owned aircraft that did not meet airworthiness standards. As of December 2021, FAA has completed action to close 14 of the 20 recommendations from our Allegiant and Southwest Airlines reports. (See the exhibit for a list of all recommendations and their status.)

Key areas in which further actions remain to close our recommendations include:

- Developing and implementing a management control to ensure that inspectors do not send compliance action close out letters until the corrective actions have been completed and validated.
- Ensuring that Southwest Airlines resolves discrepancies in reporting weight-and-balance information to pilots prior to takeoff.
- Developing and implementing training, processes, and enhanced inspector tools to oversee SMS (including assessing carriers' safety cultures and evaluating air carrier risk assessments).
- Establishing management controls to ensure FAA and air carriers do not use SMS as a substitute for regulatory compliance.
- Performing a comprehensive review of FAA's root cause analysis training and modifying training as appropriate to ensure it meets Agency expectations.

Going forward, we encourage FAA's sustained management attention to resolving our remaining open recommendations related to its oversight of the three carriers. Moreover, these issues present an opportunity for FAA to assess its oversight of all air carrier safety programs and address any potential systemic issues. We acknowledge that some of the issues we identified were specific to local FAA oversight offices responsible for overseeing the related air carriers. However, our reviews highlight that significant challenges remain to effectively balance collaboration and enforcement with air carriers.

Conclusion

FAA is charged with safely overseeing the busiest and most complex air transportation system in the world. The Agency continues to improve its oversight system, including working more closely with air carriers to improve compliance and implement effective SMS. However, FAA must exercise regulatory oversight and intervene in a timely manner to ensure that carriers take actions to identify and reduce safety risks. These steps will be critical to maintain public confidence that U.S. air carriers are operating at the highest degree of safety.

We remain committed to working with FAA to identify opportunities to continually enhance its safety oversight and protect the traveling public. If

you have any questions, please contact me at (202) 366-1302 or Tina Nysted, Program Director, at (404) 562-3770.

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

Exhibit. Status of Related OIG Recommendations as of December 2021

Recommendations for Allegiant Air Oversight

#	Recommendation	Status
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.	Closed
2	Develop and implement policies and procedures to monitor inspector compliance with Safety Assurance System training requirements.	Closed
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.	Closed
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.	Closed
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.	Closed
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.	Closed
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.	Closed
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.	Open
9	Develop and implement a process to incorporate historical compliance actions in SAS for inspectors to track current and historical compliance actions.	Closed

Source: *FAA Needs To Improve Its Oversight To Address Maintenance Issues Impacting Safety at Allegiant Air* (OIG Report No. AV2020013), December 17, 2019.

Recommendations for Southwest Airlines Oversight

#	Recommendation	Status
1	Ensure Southwest Airlines complies with regulatory requirements to provide accurate weight and balance information to pilots, or grant an exemption that justifies the non-compliance being in the public interest.	Open
2	Retrain inspectors at the local oversight office for Southwest Airlines on the purpose and proper use of the Voluntary Disclosure Reporting Program.	Closed
3	Train managers and inspectors of the local oversight office on their roles and responsibilities to work with Southwest Airlines for root cause analysis.	Closed
4	Enhance management controls to ensure designated airworthiness representatives comply with established procedures to verify that aircraft conform to U.S. airworthiness standards.	Closed
5	Develop a management control to ensure that designated airworthiness representatives verify the completeness and accuracy of maintenance records, and do not rely on air carrier provided summary data to make airworthiness determinations.	Closed
6	Complete a compliance review of other certificates issued by the designated airworthiness representatives used by Southwest Airlines.	Closed
7	Ensure Southwest Airlines complies with regulatory requirements that the 88 previously owned aircraft conform to U.S. aviation standards.	Closed
8	Train inspectors on FAA's process to provide feedback on designated airworthiness representatives when corrective actions are needed, and provide inspectors access to the system used to provide feedback.	Open
9	Develop and implement a management control to ensure air carriers and inspectors do not use Safety Management Systems as a substitute for regulatory compliance.	Open
10	Develop and implement guidance on how to evaluate air carrier safety risk assessments to ensure the carrier has performed a comprehensive analysis, identified root causes, and established appropriate corrective actions.	Open
11	Develop and implement inspector guidance on how to evaluate air carrier safety culture and how it should be factored into oversight decisions.	Open

Source: *FAA Has Not Effectively Overseen Southwest Airlines' Systems for Managing Safety Risks* (OIG Report No. AV2020019), February 11, 2020.

Recommendations for American Airlines Oversight

#	Recommendation	Status
1	Develop and implement root cause analysis training for inspectors more in line with training in the aviation industry.	Open
2	Develop and implement a management control to ensure that inspectors maintain the link between the compliance action and the corrective action validation inspection within its inspection databases.	Open
3	Develop and implement a management control to ensure inspectors require air carriers to provide written root cause analyses and that these analyses do not specifically identify human factors issues as root causes.	Open
4	Develop and implement a management control to ensure that inspectors do not send compliance action close out letters until the corrective actions have been completed and validated.	Open
5	Develop and implement a team inspection approach in order to periodically assess the air carrier's Safety Management System.	Open
6	Develop and implement Safety Management System training for inspectors that is specifically designed to aid inspectors in evaluating air carrier risk assessments.	Open
7	Revise the Safety Management Systems data collection tool to allow inspectors to perform more detailed reviews and accurately document the results of these reviews.	Open

Source: *FAA Lacks Effective Oversight Controls To Determine Whether American Airlines Appropriately Identifies, Assesses, and Mitigates Aircraft Maintenance Risks* (OIG Report No. AV2022004), October 20, 2021.

U.S. Department of Transportation
Office of Inspector General

Fraud & Safety Hotline

<https://www.oig.dot.gov/hotline>

hotline@oig.dot.gov

(800) 424-9071

OUR MISSION

OIG enhances DOT's programs and operations by conducting objective investigations and audits on behalf of the American public.



1200 New Jersey Ave SE
Washington, DC 20590
www.oig.dot.gov