



U.S. House of Representatives
Committee on Transportation and Infrastructure

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September 16, 2008

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SUMMARY OF SUBJECT MATTER

TO: Members of the Subcommittee on Aviation

FROM: Committee on Transportation and Infrastructure, Oversight and Investigations
Majority Staff

SUBJECT: FAA Aircraft Certification: Alleged Regulatory Lapses in the Certification and
Manufacture of the Eclipse EA-500

PURPOSE OF HEARING

The Subcommittee on Aviation of the Committee on Transportation and Infrastructure will meet on Wednesday, September 17, 2008 at 10:00 a.m. in 2167 Rayburn House Office Building to review an oversight investigation. This investigation concerned allegations that the Federal Aviation Administration (FAA) rushed to approve both the type (TC) and production certifications (PC)¹ of a new aircraft, the Eclipse EA-500, despite safety concerns with the design and manufacturing of the aircraft raised by a number of FAA certification engineers and aviation safety inspectors.

BACKGROUND

FAA AIRCRAFT CERTIFICATION SERVICE

The FAA maintains oversight of manufacturers through its Aircraft Certification Service (AIR). AIR is the FAA organization responsible for: 1) administering safety standards governing the design, production, and airworthiness of civil aeronautical products; 2) overseeing design, production, and airworthiness certification programs to ensure compliance with prescribed safety standards; 3) providing a safety performance management system to ensure continued operational safety of aircraft; and 4) working with aviation authorities, manufacturers, and other stakeholders to help them successfully improve the safety of the international air transportation system.²

¹ The FAA must issue both a type certificate and a production certificate for every new type of aircraft. The procedures for approval are covered in detail in FAA Order 8110.4c, which was last revised March 28, 2007.

² From the FAA website, http://www.faa.gov/about/office_org/headquarters_offices/avs/offices/air/

AIR is organized into the Office of the Director and four divisions located at the Washington, DC Headquarters, and four geographic directorates. The Aircraft Certification Service headquarters offices and the directorates share responsibility for the design and production approval, airworthiness certification, and continued airworthiness programs of all U.S. civil aviation products.

FAA APPROVAL OF A NEW AIRCRAFT

When a manufacturer initiates plans to develop and build a new aircraft, it must receive two separate approvals from the FAA before the new aircraft can enter service. First, the design of the aircraft must be proven to meet all applicable safety regulations pertaining to aircraft design. This is commonly referred to as Type Certification (TC), and to obtain approval of a TC, a manufacturer must demonstrate that the aircraft can be operated safely, there are no known significant design defects, and that all likely modes of systems malfunction can be overcome in a way that the aircraft can be landed safely in an emergency situation. Second, the manufacturer must demonstrate the capability to reliably replicate and produce the design successfully in the manufacturing process, and this is demonstrated with FAA's approval of a Production Certificate (PC). FAA issued the TC for the EA-500 on September 30, 2006, and it issued the PC on April 26, 2007.

A TC is a design approval issued by FAA when the applicant demonstrates that a product complies with the applicable regulations, which are described in FAA Order 8110.4C³. As defined by 14 CFR § 21.41, the TC includes the type design, the operating limitations of the aircraft, applicable regulations, and other conditions or limitations prescribed by the Administrator. The TC is the foundation for other FAA approvals, including the production certificate (PC) and airworthiness approvals.

A PC is an approval by the FAA to manufacture or alter a product after having shown compliance with an approved type design. The FAA issues a PC to a TC holder, or a licensee of a TC holder, who meets the requirements of 14 CFR § 21.135, 21.139, and 21.143.

ECLIPSE AVIATION AND VERY LIGHT JETS

An emerging trend over the last several years has been an initiative by multiple manufacturers to design an entirely new class of aircraft commonly referred to as very light jets (VLJs). VLJs have been heavily promoted by FAA as a potential solution to congestion around larger airports, and as a means to bring a convenient, fast transportation alternative to smaller communities that cannot support network commercial air service. Forecasters have predicted that literally thousands of VLJs could enter the National Airspace System (NAS) over the next two decades, and these aircraft will operate in the same high altitude airspace as the current fleet of large commercial aircraft.

As the new influx of VLJs enters the system with a new mix of pilot experience and technology, the FAA must be vigilant in monitoring the impact on the existing NAS and on ensuring rigorous safety oversight. In 2006, FAA certified the first VLJs, the Cessna Mustang, and Eclipse EA-500.

³ Federal Aviation Administration, Order 8110.4C, revised March 28, 2007.

Eclipse Aviation was formed in 1998 for the sole purpose of building a radically different, high technology, new VLJ. In late 2006, Eclipse unveiled a six-passenger aircraft, which featured advanced avionics and a high level of fuel efficiency. Eclipse Aviation issued a press release on January 1, 2008 claiming that it had set a new record by completing and certifying 104 aircraft in only 12 months, surpassing a previous record by Cessna, which certified 100 Citation 500 aircraft in 18 months.⁴ Approximately 200 EA-500 have been manufactured to date out of about 2,700 aircraft ordered.

ALLEGATIONS OF A RUSH TO CERTIFICATION

A few weeks prior to the April 3, 2008 Full Committee hearing on "Critical Lapses in FAA Safety Oversight of Airlines: Abuses of Regulatory Partnership Programs," O&I Committee staff were contacted by engineers and safety inspectors in the FAA's Aircraft Certification Service (AIR) and received documentation alleging that FAA had inappropriately certified the EA-500 VLJ. The allegations suggest that serious design problems with the EA-500 were identified during the certification process, and that these deficiencies should have delayed the issuance of the aircraft's TC and PC. FAA certification engineers and inspectors who insisted on correction of these design deficiencies before certification were allegedly relieved of their former duties with the Eclipse program by senior FAA management and replaced by those more amenable to management's desire to certify the aircraft by its self-imposed deadline of September 30, 2006. These rumors were further fueled by the fact that in the days leading up to September 30, many engineers involved in the program felt that they had made the case that the aircraft was not ready for certification, and they were surprised when the TC was signed on September 30, a Saturday.

It was further alleged by various informants that Eclipse founder and Chief Executive Officer, Vern Raburn,⁵ was very assertive at FAA Headquarters and seemed to have a great deal of influence with senior FAA management. The Director of Aircraft Certification, John Hickey, was personally involved in pushing the Eclipse certification program and replaced personnel who created delays in the process. These allegations raised additional questions about whether the FAA's culture has migrated over time toward overly collaborative relationships with industry. These concerns are similar to those aired during the April 3, 2008 Full Committee hearing.

Concerns about the EA-500 were intensified on June 5, 2008, when an EA-500 jet made an emergency landing at Chicago Midway International Airport. On approach to the airport, the flying pilot pushed the throttles (fly-by-wire) forward and both engines "froze" at full power and were completely unresponsive to throttle inputs. The crew quickly shut down one engine by closing the fuel supply lever to that engine, and the other engine retarded to idle thrust shortly thereafter, but the other engine continued to be unresponsive to throttle inputs. The pilots declared an emergency, were cleared to land on any runway, and were able to land the plane without injury to the two pilots or two passengers. The airplane had accumulated only 238 hours and 192 cycles at the time of the incident. This situation could easily have been a fatal accident. The crew was fortunate that shutting down one engine caused the second engine to suddenly roll back to idle thrust. Ironically, that incident revealed a software defect indicating non-compliance with certification requirements that each power plant control must be completely independent of the others.

⁴ Eclipse Aviation Press Release, January 1, 2008, www.eclipseaviation.com/company/news/.

⁵ Mr. Raburn was released as CEO by the Eclipse Aviation Corporation Board of Directors in late July 2008 and subsequently left the company.

Following the incident, the NTSB issued urgent recommendations to the FAA. They advised that mandatory inspections be required on all EA-500 airplane throttle quadrants to ensure that pushing the throttle levers against the maximum power stops will not result in an engine control failure, that all units failing inspection should be replaced, and that the replacement parts must be similarly inspected. NTSB also recommended that FAA issue an airworthiness directive (AD) which would require Eclipse Aviation to immediately develop an emergency procedure for the dual engine control failure that occurred and incorporate the procedure into the airplane flight manual and quick reference handbook. NTSB also raised a theory that the problem could be due to flaws in the avionics software logic⁶, and both FAA and Eclipse later confirmed these software flaws.

On June 12, the FAA heeded the NTSB's recommendations and issued an emergency AD, which effectively grounded 200 jets until they could be inspected. AD 2008-13-51 requires a pilot inspection of the thrust quadrant assembly (TQA) on each plane in advance of the aircraft's next flight. The NTSB final analysis of this software failure mode has not been completed, but it is of concern in light of the questions surrounding the "non-standard" software certification of the EA-500.

As a result of this incident, FAA re-examined its certification of the software that controls the engines and discovered software logic flaws that should have been resolved before approving the design with issuance of the TC and PC. On June 26, 2008, FAA official Michele M. Owsley sent a letter to Eclipse Aviation informing the company that "our review of the design information thus far indicates several design regulatory non-compliances" [with certification requirements].⁷ Ms. Owsley is the FAA official who also signed the original TC. This letter advised Eclipse to develop an approach to bring the aircraft design into certification compliance.

In a July 16, 2007 memorandum obtained by OIG investigators, Ms. Owsley stated the following:

During the TC, we accepted a lesser level of validation and consequently the FAA ended up doing a great deal of developmental flying with Eclipse, a task that the company should accomplish prior to FAA TIA [preliminary aircraft] testing. In conducting a lessons learned review after the initial TC, we identified the level of software certification as an issue we would treat differently on subsequent certifications.⁸

On August 20, 2008, the FAA announced that it had begun, on August 11, 2008, an unusual "Special Certification Review" led by a former Boeing safety expert, which would be concluded in 30 days. The FAA said that special reviews are "used regularly" by the FAA, and it cited 6 occurrences in the last 10 years.⁹ This panel has concluded its work, and remains steadfast in maintaining the FAA position that the certification was conducted properly, despite the findings of

⁶ Safety Recommendation A-08-46 and -47, National Transportation Safety Board, June 12, 2008.

⁷ FAA letter from Michele M. Owsley, Manager, Airplane Certification Office, Rotorcraft Directorate to Randy Griffith, Certification Manager, Eclipse Aviation, June 26, 2008.

⁸ Written Testimony before the Subcommittee on Aviation, Committee on Transportation and Infrastructure, Calvin L. Scovel III, Inspector General, Department of Transportation, September 15, 2008.

⁹ FAA Press Release, August 20, 2008.

the OIG.¹⁰ Mr. Ronald Wojnar was a member of this “special review” team, and he was also in charge of the original Eclipse production certification process after the previous manager (David Downey) was reassigned (see “*Summary of Findings and Allegations*” below). In addition, the special review team focused exclusively on four issues related to issuance of the type certification. The FAA review did not examine any of the issues associated with the production certification, which is a major focus of the OIG investigation, as well as later reported problems with the aircraft.¹¹

FAA CUSTOMER SERVICE INITIATIVE (CSI)

In previous Committee hearings, it has been noted that partnership programs, in which the airlines and aircraft manufacturers are treated more as the FAA’s “customers” as opposed to regulated entities, have become firmly rooted in recent FAA culture. The FAA’s website prominently features the FAA’s one sentence statement entitled “Our Vision” which states, “Our vision is to improve the safety and efficiency of aviation, while being responsive to our customers and accountable to the public.”¹²

In the April 3, 2008 Full Committee hearing, “Critical Lapses in FAA Safety Oversight of Airlines: Abuses in Regulatory ‘Partnership Programs,’” the Customer Service Initiative (CSI) figured prominently in the questions addressed to the FAA by Members. It was suggested that FAA placed too much emphasis on airlines and manufacturers as the “customer” as opposed to the public being FAA’s only customer, and that FAA appeared to place a continued emphasis upon promoting aviation as opposed to its only statutory mandate, safety. Moreover, FAA documents describing the CSI clearly suggest that the FAA views certificate holders (e.g. airlines, manufacturers, and other regulated entities) as the customer. Following the ValuJet accident in 1996, legislation was enacted that specifically removed the FAA’s “promotion of aviation” mandate and required FAA to focus exclusively on safety as the highest priority.¹³ Several Members noted that the CSI appeared to create conflicts with FAA’s safety mandate, and that the traveling public should be the FAA’s only customer.

The Aircraft Certification Service has its own version of the CSI.¹⁴ As with the CSI procedures implemented in the Flight Standards Service, an applicant has the right to appeal any FAA certification decision to higher authorities. This document is replete with references to the certificate holder or applicant as the “customer” of the FAA. According to the DOT OIG, Eclipse made use of the CSI in filing at least one formal appeal of a certification decision, and may have made other informal appeals.¹⁵

¹⁰ Briefing of the FAA EA-500 Special Certification Review Team to Committee Staff, September 12, 2008.

¹¹ O&I Staff conversation with Megan Rosia, FAA Assistant Administrator for Government and Industry Affairs, September 15, 2008. As of September 16, 2008, O&I Staff have not been provided with a copy of the Special Certification Review Team report.

¹² Federal Aviation Administration, www.faa.gov/about/mission/.

¹³ Federal Aviation Reauthorization Act of 1996, Public Law 104-264, Section 401, Enacted October 9, 1996.

¹⁴ Aircraft Certification Service, Customer Service Initiative Customer Guide, Federal Aviation Administration, July 11, 2008.

¹⁵ See note 8.

SUMMARY OF FINDINGS AND ALLEGATIONS

T&I Committee O&I staff immediately requested assistance from the Department of Transportation (DOT), Office of Inspector General (OIG) to verify the allegations of the various FAA employees previously associated with the Eclipse certification program. The OIG investigation confirmed many of the allegations and raised numerous significant concerns and regulatory policy questions.

FAA PERMITTED EXCEPTIONS TO ITS USUAL DESIGN CERTIFICATION PROCESS

According to OIG investigators and FAA personnel who have been interviewed by Committee investigators, the FAA deviated from the normal certification process in various ways and before significant design problems were resolved. OIG found that many of these design problems continue today. These include problems with the avionics software, as well as airspeed and altitude indicator problems. More importantly, recent events reported by Eclipse operators indicate that many problems identified during the design certification have still not been resolved, including erroneous stall warnings, cockpit display distortions, and flap movement failures.

Avionics Software Issues

The OIG testimony states that given the EA-500's dependence on software, it would have expected FAA to perform rigorous analysis and testing prior to issuance of the TC. They found, however, that before issuing the TC, FAA did not require this software to be approved to the accepted industry standard (DO-178B). Instead, FAA accepted what the OIG characterizes as an "IOU" from Eclipse, which stated that the aircraft would meet the accepted standard at a later date. While those actions were not a violation of Federal Aviation Regulations (FARs) and are not unprecedented, OIG was concerned because the EA-500 was a brand new company attempting to certify a brand new aircraft. Nonetheless, they were allowed to deviate from the accepted industry standard, and the OIG was particularly concerned that the FAA applied a "less stringent" standard to the avionics software design, which the aircraft relies heavily upon for operation. Users have since reported problems directly related to the EA-500 software such as cockpit display failures. When the TC was issued, Eclipse had only completed 23 of the 65 tests needed to meet the approved industry standard for software certification.¹⁶ As discussed above (see "*Allegations of a Rush to Certification*"), the FAA manager who approved the Eclipse TC has since expressed concerns over the process used for certifying the avionics software.

Airspeed and Altitude Indicator Problems (Pitot Static System)

The EA-500 design for the pitot static system (which provides airspeed, altitude, and rate of climb information), did not include a drainage system for excess moisture, contrary to the normal design standard for this system. A moisture and ice contaminated pitot static system was a major causal factor in the Air Florida accident in 1982 where a B-737 crashed into the 14th Street Bridge in Washington, D.C. shortly after takeoff.¹⁷ FAA can and did approve an "Equivalent Level of Safety" (ELOS) exemption for the EA-500 pitot static system. The Fort Worth certification team was not

¹⁶ See note 8.

¹⁷ National Transportation Safety Board Abstract, Air Florida, Inc., Boeing 737-222, N62AF, Collision with 14th Street Bridge near Washington National Airport, Washington, DC, January 13, 1982

satisfied with the proposed design and did not want to approve it. As a result, approval authority was transferred to a different FAA office, which did approve an ELOS exemption for the original design of the pitot static system.¹⁸

The system was initially tested in the dry climate of New Mexico and experienced no significant early problems. Once the aircraft began operations in more humid climates, problems began occurring with moisture contamination, causing altitude and airspeed deviations. Subsequently, FAA has issued several Airworthiness Directives (ADs), the latest on September 9, 2008, requiring correction of this problem, even though it was noted by the team prior to certification.¹⁹

Intermittent Erroneous Stall Warnings

The EA-500 experienced problems with the stall warning system both before and after the issuance of the TC and PC. FAA regulations state that “. . . the stall warning must not occur during takeoff with all engines operating, a takeoff with one engine inoperative, or during approach to landing.” According to FAA pilots who spoke with both OIG and Committee investigators, these inappropriate warnings can be extremely dangerous particularly when landing because it has a high probability of causing pilots to take urgent actions based upon a belief that they are entering a stall.

FAA management disputes that there is a real problem and attributes the warnings to flying the aircraft at inappropriate speeds. However, these warnings still occur today, and pilots operating the aircraft dispute that the incidents of stall warnings are entirely due to speed control problems in operation. This issue is still under investigation.²⁰

Cockpit Display Failures

The EA-500 experienced numerous incidents of screen blanking or freezing both before and after the issuance of the TC. In order to award the design certificate, Eclipse agreed to fix the software “bug” causing these failures after receiving the TC. Eclipse reported to FAA that it had fixed the problem nearly 4 months after issuance of the TC, and FAA also required Eclipse to develop an emergency procedure for screen blanking in the aircraft flight manual. However, a number of additional incidents have been filed in service difficulty reports (SDRs) between August 2007 and May 2008.²¹

Flap Movement Failures

FAA regulations require that the main wing flaps must be designed so that the occurrence of flap failure is “extremely improbable.” However, both before and after issuance of the TC, the aircraft had problems with flaps sticking in position. After issuance of the TC, but before issuance of the PC, the FAA’s Flight Standardization Board (FAA test pilots), recommended that it be restricted to two-pilot operation stating in part:

¹⁸ See note 8.

¹⁹ Federal Aviation Administration, Airworthiness Directives; Harco Labs, Inc. Pitot/AOA Probes (Part Numbers 100435-39, 100435-39-001, 100435-40, and 100435-40-001), September 9, 2008.

²⁰ See note 8.

²¹ Ibid.

The immediate issue that caused the Board to reach this conclusion is the repeated flap failures that have been occurring during recent flights. These failures are now approaching one flap failure for every 10 attempts to operate the flaps. The flight control problem affects safety of flight and acceptable operational reliability.²²

FAA Headquarters officials overruled the Board's recommendation and approved the EA-500 for single-pilot operations after receiving a CSI complaint from Eclipse.²³

Service Difficulty Reports

The EA-500 has logged a large number of Service Difficulty Reports (SDRs)²⁴ during its relatively short period of time in service. Information obtained by DOT OIG investigators indicated 81 SDRs submitted for 28 Eclipse aircraft in service between August 2007 and May 2008.

According to the FAA, none of the current problems were identified during the design certification, but this is contrary to what is reported by certification engineers and inspectors, who were associated with the certification program and FAA records obtained by OIG. For example, in the two weeks immediately prior to the issuance of the TC on September 30, 2006, Eclipse test flew the aircraft for 100 hours as a pre-condition for receiving certification. During those flights the pilots experienced: 1) at least 4 inappropriate stall warnings during landing; 2) 10 instances of screen freezing or blanking; and 3) 18 cases of either actual flap failure or flap failure messages on the cockpit display. As a result, the OIG has concluded that FAA had sufficient reason to know about the problems still occurring with the aircraft today.²⁵

The European Aviation Safety Agency (EASA) Has Declined to Certify the EA-500

It is also significant that the European Aviation Safety Agency (EASA) has not granted a TC to the EA-500 due to many of the defects that were originally reported by FAA engineers and inspectors. FAA and EASA have "harmonized" certification procedures such that an FAA TC or PC is usually automatically recognized by EASA (and vice versa). EASA has concerns that the EA-500 does not meet the FAA/EASA harmonized certification standards to the extent that the agency will not recognize FAA's certification without further testing and review.

FAA AWARDED ECLIPSE A PRODUCTION CERTIFICATE EVEN THOUGH THE COMPANY FAILED TO DEMONSTRATE THE ABILITY TO REPLICATE THE APPROVED DESIGN

FAA granted Eclipse a PC on April 26, 2007. Prior to receipt of this certification, every aircraft manufactured by Eclipse was required to receive an FAA inspection and certificate of airworthiness. However, once Eclipse received the PC, it could mass-produce its aircraft without a required FAA inspection.

²² Ibid.

²³ Ibid.

²⁴ SDRs are reports submitted by operators when a failure or defect occurs in aircraft structure or is detected if that failure or defect has endangered or may endanger the safe operation of an aircraft.

²⁵ See note 8.

Manufacturers are required to undergo an evaluation by an FAA Production Certification Board (PCB) before receiving approval for a PC. The primary task of the PCB is to ensure that corrective actions for any area of design non-compliance are accomplished prior to PC approval. The OIG found that FAA issued the PC without resolving a number of deficiencies identified by the PCB, which completed its review on April 12, 2007, approximately 2 weeks prior to PC approval. The PCB also found significant problems with Eclipse suppliers. The PC was awarded with 13 known production problems that had not been addressed, and the PCB did not close those open items until almost a year later, in February 2008.

Eclipse encountered numerous problems replicating its own aircraft design on the assembly floor both before and after receiving its certificate. OIG found that manufacturing deficiencies were missed by Eclipse inspectors serving as FAA “designees” (see ODAR discussion below). For example, in one instance Eclipse presented an aircraft to FAA for airworthiness certification with approximately 20 airworthiness deficiencies, even though it had been signed off with no non-conformities by an Eclipse FAA designee. The OIG investigation found production problems associated with previously identified design problems. In addition, OIG found: 1) Eclipse supplier quality control issues; 2) significant problems that were not identified by Eclipse inspectors; and 3) deficiencies in the manufacturing quality assurance program.²⁶

Committee investigators also interviewed a number of FAA certification engineers and inspectors who confirmed these problems. A number of former Eclipse manufacturing employees also contacted the committee with reports of serious problems in the production process.

SENIOR FAA MANAGEMENT IDENTIFIED ECLIPSE AS A PRIORITY CERTIFICATION AND APPEARED TO BE LENIENT WITH THE MANUFACTURER

Because Eclipse was identified, at top management levels, as a priority for certification, OIG concluded there was reason to believe that the FAA may have been excessively lenient with the manufacturer. At minimum, this finding raises the concern that FAA may have been more intent on promoting aviation and new technology than it was with its safety oversight mandate. A specific certification date was included in the FY 2006 Aircraft Certification Performance Plan.²⁷

The OIG found that Eclipse complained “they were not getting the service they needed.” FAA’s Director of Aircraft Certification Service, John Hickey, was personally involved in the Eclipse certification and assigned his former deputy to oversee the project. In March 2007, he removed David Downey, Rotorcraft Directorate Manager before issuance of the PC for “not actively managing the manufacturing process well,” apparently because Mr. Downey refused to sign-off on the PC because he believed Eclipse had not met the requirements. In a seven-page letter of reprimand sent to Mr. Downey, FAA officials stated that he failed to meet expectations associated with meeting its customer service initiatives such as “building relationships with our customers to achieve operational results.” In fact, FAA Headquarters officials required that Mr. Downey undergo a peer appraisal, and directed that the Chief Operating Officer of Eclipse would be one of the individuals appraising his performance in certifying the EA-500.²⁸ It would appear that this was an

²⁶ Ibid.

²⁷ Annual Performance Plan, Fiscal Year 2006, FAA Aircraft Certification Service, 2005.

²⁸ See note 8.

obvious conflict-of-interest position for an FAA manager charged with evaluating the safety of a new aircraft type, and it is yet another example of the Committee's previous concerns with the CSI.

FAA engineers and inspectors initially involved in the Eclipse project were reassigned after raising problems with the aircraft's design and production. According to the FAA, the reassignments were related to "performance issues." Furthermore, FAA officials allegedly pressured Mr. Ford Lauer, the San Antonio Manufacturing Inspection District Office (MIDO) manager, to sign a document that prohibited FAA inspectors from conducting detailed inspections, and to specifically prevent them from looking under the floorboards and removing interiors of the aircraft. Due to his concerns about the implications of this action, the MIDO Manager purchased professional liability insurance. An FAA audit team evaluating the Eclipse for production certification was allegedly told to "look no more than one inch deep" by the newly appointed manager.²⁹ The activities of the FAA manufacturing audit team were significantly curtailed by the newly-appointed manager, Mr. Wojnar. Specifically, Mr. Wojnar's newly-implemented production certification plan did not require Eclipse employees to remove floorboards or interior panels for FAA inspectors. Prior to the establishment of this new plan by the new manager, FAA inspectors had been routinely finding numerous deficiencies on aircraft that had already been inspected and "certified" by Eclipse "designated inspectors" (see discussion of "*Organizational Designated Airworthiness Representative (ODAR)*" below).³⁰

After multiple occurrences of aircraft being presented to FAA for airworthiness certifications with numerous design and production deficiencies, the manager of the FAA Manufacturing Inspection Office (MIO) sent an e-mail in February 2007 to Eclipse detailing all of the steps that Eclipse needed to accomplish to comply with FAA requirements of gaining an airworthiness certificate. In March 2007, this manager was also removed from the project. The senior FAA official in charge of certification, Mr. Hickey, told Committee staff on September 5, 2008 that he thought the requirements imposed in the e-mail to Eclipse were "excessive" and "very inappropriate," and that this was the reason for his decision to remove this manager. However, other FAA managers, including the supervisor of the removed manager, stated they believed the e-mails were entirely appropriate because FAA is ultimately responsible for certifying the airworthiness of each new aircraft. This is defined in FAA Order 8130F.³¹

Organizational Designated Airworthiness Representative (ODAR)

The FAA approved an Eclipse Aviation request to be authorized as an Organizational Designated Airworthiness Representative (ODAR) to perform approved functions on behalf of FAA. FAA granted Eclipse Aviation the authority to certify its own aircraft far earlier than other manufacturers, specifically 4 years prior to Eclipse obtaining the TC.³²

An ODAR is an organization that collectively meets the experience and technical requirements of an individual Manufacturing Designated Airworthiness Representative (DAR), and

²⁹ Written Testimony of Maryetta J. Broyles, Technical Program Specialist, Aircraft Certification Service, FAA.

³⁰ See note 8.

³¹ Ibid.

³² Ibid.

essentially allows a manufacturer to approve its own processes without FAA oversight.³³ To obtain DAR authorization, the manufacturer is required to have sufficient and relevant experience, as an organization, to perform the functions for which the authorization was requested. Since Eclipse is a new manufacturer and had never before designed or manufactured an airplane, it is difficult to understand how Eclipse could have the appropriate level of experience required as an organization to qualify for ODAR status. However, it is interesting to note the Eclipse manager of certification had recently left FAA to take that position with Eclipse in 2001, with no “cooling off period.” Eclipse received ODAR status in September 2002, 4 years before receiving TC approval in 2006.³⁴

Single Pilot Aircraft Certification

FAA also granted single-pilot operation certification for the EA-500, even though the FAA Flight Standardization Board (FSB) had significant concerns about the ability to safely operate the aircraft with one pilot and recommended against single-pilot certification. Many EA-500 pilots interviewed by the OIG have testified that they do not believe the aircraft can be safely operated by a single-pilot, given its complexity, which is essentially equivalent to that of larger, transport category aircraft, which can only be operated by 2 or more pilots. It is significant that the largest operator of the EA-500 only allows two-pilot operations with the aircraft. The CEO of Eclipse at the time, Mr. Raburn, filed a CSI complaint about the FSB recommendation to reject the aircraft for single-pilot certification, and the FSB recommendation was reversed by senior FAA management.³⁵

Other Issues

It was also found that FAA devoted a disproportionate share of resources to the project in order to rapidly certify the aircraft. Some personnel worked 80 hour weeks for months; and they were redirected from other certificates to work on the Eclipse. According to FAA documents obtained by the OIG, the FAA’s cost for the Eclipse certification was almost \$3 million and the total hours logged was over double that of a comparable certification project.³⁶

The DOT OIG is continuing to investigate this case and will attempt to determine if problems identified during the certification and manufacturing process have been corrected. They are also evaluating the current manufacturing process to determine the effectiveness of the Eclipse quality assurance system, the adequacy of training for production personnel, and the competence of the FAA designees.

SUMMARY

The FAA remains steadfast in its assertion that no Federal regulations were violated. However, when the findings and assertions uncovered in this investigation are viewed in total, there is a disturbing suggestion that there was a “cozy relationship” and reduced level of vigilance on the FAA’s part during both the TC and the PC approval process of the EA-500. Based upon the results of the OIG investigation, to date, and the conclusions of the FAA’s “lessons learned review, and—

³³ Organizational Designation Authorization Procedures, FAA Order 8100.15, Department of Transportation, Federal Aviation Administration, August 18, 2006.

³⁴ See note 8.

³⁵ Ibid.

³⁶ Ibid.

most importantly—the problems that continue to impact pilots, the OIG believes that FAA should have exercised greater diligence in certifying the EA-500 design.³⁷

With the significant risks posed by a new aircraft, powered by new technology, and produced by a new manufacturer, it seems logical to have expected the FAA to exercise much greater scrutiny than in the average certification program with an established manufacturer such as Airbus, Boeing, Cessna, etc. Moreover, the EA-500 represented a whole new class of aircraft, and it did not easily fit into the FAA's normal certification regime because the EA-500 has advanced avionics and turbine engine technology more characteristic of a large transport aircraft. Its only commonality with a typical general aviation aircraft is its light weight and small passenger capacity. However, the FAA chose to use certification requirements for general aviation aircraft rather than the more rigorous requirements that should be required of aircraft with that degree of complexity.

Instead, FAA seems to have been unusually lenient given the priority it assigned and the collaborative relationship that was developed with Eclipse management. It seems entirely illogical and inappropriate for senior FAA management to assign itself a date by which an aircraft is to be ready for certification approval and then to find reason to actually meet that date, when just days prior, numerous FAA personnel were opposed to issuance of the TC. On the contrary, it would appear that the burden of when an aircraft is ready to be certified should fall entirely upon the manufacturer, and it should be none of FAA's concern as a matter of policy. It is clearly not the FAA's responsibility to meet a manufacturer's certification deadline, which is used to satisfy potential customers and company investors. The FAA's only responsibility should be to respond in a timely fashion to an applicant's approval documentation and to provide a "yes" or "no" decision on whether an aircraft is ready for safe certification or not.

It is also interesting to note that the FAA Rotorcraft Certification Directorate in Ft. Worth, Texas, which was assigned primary responsibility for evaluating the EA-500, appears to have been very diligent in its attempt to adhere to established certification regulations and appears to have performed admirably. However, their decisions and recommendations were routinely overruled by higher-level FAA management, with "customer service" to Eclipse looming as a strong influence.

The Congress removed the FAA's "promotion of aviation" mandate in 1996.³⁸ The FAA's CSI and recent behavior in other areas suggest that the promotion of aviation is still an integral part of FAA's culture.

In the Eclipse case, it appears that when design deficiencies were identified that appeared to be non-compliant with FAA certification requirements, senior FAA management became personally involved, overruled lower-level engineers and inspectors, worked diligently to find "work-arounds," to find "alternative approval rationales and techniques," and accepted "IOUs" for later compliance. In many ways, the certification process in this case was conducted "backwards" from the clear intent and requirements of FAA certification regulations. Instead of certifying on the basis of safety alone, FAA senior management appeared to be highly motivated to find ways to explain why design deficiencies identified by FAA engineers and inspectors as "unsafe" were indeed "flawed," but they were still "acceptable for certification" by simply changing the approval criteria. Indeed, one broad policy issue that needs further examination relates to the many "loopholes" FAA has at its disposal

³⁷ Ibid.

³⁸ See note 12.

to find “alternative means of compliance” or “equivalent levels of safety” for certification regulations. Thus, the allegations and findings in this case are cause for concern and suggest the immediate need for a broad policy review of FAA certification practices.

WITNESSES

PANEL 1

The Honorable Calvin L. Scovel, III
Inspector General
U.S. Department of Transportation

PANEL II

Mr. Tomaso DiPaolo
Aircraft Certification National Representative
National Air Traffic Controllers Association

Mr. David Downey
Vice President, Flight Safety
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*(Former Rotorcraft Directorate Manager
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Mr. Dennis Wallace
Software Engineer
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Mr. Ford Lauer
Manager, San Antonio Manufacturing Inspection District Office
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Ms. Maryetta Broyles
Technical Program Management Specialist
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PANEL III

Mr. Nicholas A. Sabatini
Associate Administrator for Aviation Safety
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Mr. John J. Hickey
Director, Aircraft Certification Service
Federal Aviation Administration

Mr. Ronald Wojnar
Senior Advisor, Aircraft Maintenance Division
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Federal Aviation Administration

Mr. Tom Haueter
Director, Office of Aviation Safety
National Transportation Safety Board

PANEL IV

Ms. Peg Billson
President and General Manager, Manufacturing Division
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Accompanied by
Mr. Roel Pieper
Chief Executive Officer
Eclipse Aviation Corporation

Mr. Clyde Kizer
Retired Aerospace Executive