Modality of completion	Number of respondents	Frequency of response	Average burden per response (minutes)	Estimated total annual burden (hours)
Totals	6,530,493			117,150

Dated: August 9, 2013.

Faye Lipsky,

Reports Clearance Director, Social Security Administration.

[FR Doc. 2013–19701 Filed 8–13–13; 8:45 am]

BILLING CODE 4191–02–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

Aviation Rulemaking Advisory Committee—New Task

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of new task assignment for the Aviation Rulemaking Advisory Committee (ARAC).

SUMMARY: The FAA assigned the Aviation Rulemaking Advisory Committee (ARAC) a new task to provide recommendations regarding the outdated Advisory Circular (AC) 120–17A, Maintenance Control by Reliability Methods guidance material. The FAA needs to provide its employees and the aviation industry with current information for developing, implementing, maintaining and overseeing air carrier's maintenance reliability programs. This notice informs the public of the new ARAC activity and solicits membership for the Maintenance Reliability Program Working Group.

FOR FURTHER INFORMATION CONTACT: Paul K. Pitts, Federal Aviation Administration, AFS–330 Air Carrier Maintenance Branch, 800 Independence Avenue SW., Washington, DC 20591; email: *Paul.K.Pitts@faa.gov,* telephone: (202) 385–6818, facsimile: (202) 385–6474.

SUPPLEMENTARY INFORMATION:

ARAC Acceptance of Task

As a result of the June 2013 ARAC meeting, the FAA has assigned and ARAC has accepted this task and will establish the Maintenance Reliability Program Working Group. The working group will serve as staff to ARAC and provide it advice and recommendations on the assigned task. ARAC will review and approve the recommendation report that will be sent to the FAA.

Background

The FAA established ARAC to provide advice and recommendations to the FAA Administrator, through the Associate Administrator of Aviation Safety, on the FAA's rulemaking activities. ARAC's objective is to improve the development of the FAA's regulations and guidance material by providing information, advice, and recommendations related to aviation issues.

The National Transportation Safety Board (NTSB) issued safety recommendation, A–09–110, which identified contradictory philosophy regarding on-condition maintenance in reliability program control mechanisms recognized by the FAA. Specifically, it requested the FAA to:

> Resolve the differences between Advisory Circular (AC) 120–17A and AC 120–16E (now revised to AC 120–16F) in regard to Federal Aviation Administration philosophy and use of on-condition maintenance programs.

Currently, AC 120–17A refers to the Maintenance Steering Group 2 (MSG–2) logic for developing maintenance programs, which dates from the 1970's. AC 120–16F, dated November 15, 2012, provides guidance for the implementation of an air carriers maintenance program. Air carriers consider the maintenance requirements for identifying tasks and intervals when establishing maintenance programs. These considerations address corrective and preventive maintenance on airframes, engines, rotors, propellers, appliances, and emergency equipment. Recognizing the experience gained from MSG–2, we now use MSG 3 logic, which replaced MSC–2 logic in 1980, for developing a more effective set of procedures through analysis of aircraft functions, rather than components. In response to the NTSB safety recommendation, the FAA is requesting ARAC assistance to evaluate the guidance contained in the AC's that are associated with methods for establishing, monitoring, maintaining and overseeing air carrier reliability programs.

The Maintenance Reliability Program Working Group will provide advice and recommendations on the concepts and standards for maintenance reliability methods for ARAC review and approval.

The Task

The Maintenance Reliability Program Working Group is to complete the following:

1. Review the NTSB Recommendation A–09–110. *http://www.ntsb.gov/doclib/recletters/2009/A09_108_111.pdf*

2. Review AC 120–17A, ''Maintenance Control by Reliability Methods'' *http://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/22744,* and AC 120–16F ''Air Carrier Maintenance Programs''. *http://www.faa.gov/documentLibrary/media/Advisory_Circular/AC%20120-16F.pdf*

3. Gather and review all internal and external guidance documents that reference or provide information on establishing, monitoring, maintaining and overseeing air carrier reliability programs.

4. Determine whether updated guidance material is appropriate and if so, develop draft internal and external guidance based on modern concepts, which ensure a standardized methodology for establishing, monitoring, maintaining and overseeing air carrier's aircraft maintenance reliability programs.

5. Develop and submit a report that contains recommendations for ensuring consistent establishment, monitoring, maintaining and overseeing an air carrier reliability program that explains the decisions made in developing the recommendation and any corresponding documents.

6. The working group may be reinstated to assist the ARAC by responding to FAA's questions or concerns after the recommendation has been submitted.

The report should document both majority and minority positions on the findings and the rationale for each position. Any disagreements should be documented, including the rationale for each position and the reasons for the disagreement.

Schedule

The recommendation report must be submitted to the FAA for review and acceptance no later than September 30, 2014.

Working Group Activity

The Maintenance Reliability Program Working Group must comply with the

procedures adopted by ARAC. As part of the procedures, the working group must:

1. Conduct a review and analysis of the assigned tasks and the related materials or documents.

2. Draft and submit a work plan for completion of the task, including the rationale supporting such a plan, for consideration by ARAC.

3. Provide a status report on the work plan at each ARAC meeting.

4. Draft and submit the recommendation report based on the review and analysis of the assigned tasks.

5. Present the recommendation report to the ARAC at a regularly scheduled meeting.

Participation in the Working Group

The Maintenance Reliability Program Working Group will be comprised of technical experts having an interest in the assigned task. A working group member need not be a member representative of ARAC. The FAA would like a wide range of members to ensure all aspects of the tasks are considered in development of the recommendations.

The June 18, 2010 Presidential memorandum ''Lobbyists on Agency Boards and Commissions,'' states that a member must not be a federally registered lobbyist, who is subject to the registration and reporting requirements of the Lobbying Disclosure Act of 1995 (LDA) as amended, 2 U.S.C 1603, 1604, and 1605, at the time of appointment or reappointment to the ARAC, and has not served in such a role for a two-year period prior to appointment. For further information see OMB final guidance on appointment of lobbyists to federal boards and commissions (76 FR 61756, October 5, 2011.) Therefore, the FAA will not select any person that is a registered lobbyist.

If you wish to become a member of the Maintenance Reliability Program Working Group, write the person listed under the caption **FOR FURTHER INFORMATION CONTACT** expressing that desire. Describe your interest in the task and state the expertise you would bring to the working group. We must receive all requests by September 3, 2013. ARAC and the FAA will review the requests and advise you whether or not your request is approved.

If you are chosen for membership on the working group, you must actively participate in the working group by attending all meetings, and providing written comments when requested to do so. You must devote the resources necessary to support the working group in meeting any assigned deadlines. You must keep your management chain and those you may represent advised of working group activities and decisions to ensure the proposed technical solutions do not conflict with the position of those you represent. Once the working group has begun deliberations, members will not be added or substituted without the approval of the ARAC Chair, the FAA, including the Designated Federal Officer, and the Working Group Chair.

The Secretary of Transportation determined the formation and use of ARAC is necessary and in the public interest in connection with the performance of duties imposed on the FAA by law.

ARAC meetings are open to the public. However, meetings of the Maintenance Reliability Program Working Group are not open to the public, except to the extent individuals with an interest and expertise are selected to participate. The FAA will make no public announcement of working group meetings.

Issued in Washington, DC, on August 9, 2013.

Lirio Liu,

Designated Federal Officer, Aviation Rulemaking Advisory Committee.

[FR Doc. 2013–19739 Filed 8–13–13; 8:45 am]

BILLING CODE 4910–13–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

Order 1050.1F Environmental Impact: Policies and Procedures

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice; request for public comment.

SUMMARY: The Federal Aviation Administration (FAA) proposes to update, reorganize, and revise its order that contains policies and procedures for implementing the National Environmental Policy Act (NEPA), in accordance with regulations issued by the Council on Environmental Quality (40 CFR parts 1500–1508). The order additionally provides direction on using the NEPA review process to ensure compliance with other environmental laws, regulations, and executive orders that may be applicable to proposed FAA actions. Order 1050.1E Environmental Impact: Policies and Procedures will be replaced with Order 1050.1F Environmental Impact: Policies and Procedures. FAA Order 1050.1F, Environmental Impact: Policies and Procedures is available at *http://www.faa.gov/about/office_org/headquarters_offices/apl/environ_policy_guidance/policy/.* This notice provides the public opportunity to comment on the revised Order. All comments on the proposed changes will be considered in preparing the final version of Order 1050.1F.

DATES: Comments should be received by September 30, 2013.

ADDRESSES: You may send comments by any of the following methods:

Federal eRulemaking Docket: Go to *http://www.regulations.gov.* Follow the online instructions for sending your comments electronically.

Fax: 202–493–2251.

Mail: Send comments to the U.S. Department of Transportation, Docket Operations, M–30, West Building Ground Floor, Room W12–140, 1200 New Jersey Avenue SE., Washington, DC 20590–0001.

Hand Delivery: U.S. Department of Transportation, Docket Operations, M–30, West Building Ground Floor, Room W12–140, 1200 New Jersey Avenue SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

You may examine the docket, including comments received, on the Internet at *http://www.regulations.gov* or in person at the U.S. Department of Transportation Docket Operations office between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: Donald Scata, Office of Environment and Energy (AEE–400), Federal Aviation Administration, 800 Independence Avenue SW., Washington, DC 20591; telephone (202) 267–9890; email *donald.scata@faa.gov.*

SUPPLEMENTARY INFORMATION: The National Environmental Policy Act (NEPA) establishes a broad national policy to protect the quality of the human environment and ensures that environmental considerations are given careful attention and appropriate weight in decisions of the Federal Government. Regulations promulgated by the Council on Environmental Quality (CEQ) (40 CFR parts 1500–1508) implement Section 102(2) of NEPA, which contains the ''action-forcing'' provisions to ensure that Federal agencies act according to the letter and spirit of NEPA. 40 CFR 1505.1 requires Federal agencies to develop and, as needed, revise implementing procedures consistent with the CEQ regulations.

The FAA's current Order 1050.1E, Environmental Impact: Policies and Procedures, provides FAA's policy and procedures for complying with the requirements of: (a) The CEQ

The Boeing Company
P.O. Box 3707, MC 09-76
Seattle, WA 98124-2207

April 6, 2015
B-H020-REG-15-TLM-26

Ms. Lirio Liu
Director, Office of Rulemaking, ARM-1
Federal Aviation Administration
800 Independence Avenue, SW.
Washington, D.C. 20591

Lirio.liu@faa.gov

Subject: Maintenance Reliability Program Working Group – AC 120-17A, Maintenance Control by Reliability Methods

Reference: Tasking Notice Federal Register Doc. 2013-19739 (78 FR 49595, August 14, 2013)

Dear Ms. Liu,

On behalf of the Aviation Rulemaking Advisory Committee (ARAC), I am pleased to submit the attached report as an ARAC recommendation. This recommendation report responds to the ARAC's tasking to evaluate and address maintenance reliability programs to determine methods for ensuring consistent establishment, monitoring, maintenance, and oversight of a reliability program.

The report is a product of the Maintenance Reliability Program Working Group (MRPWG), composed of subject matter experts from equipment manufacturers (both airframe and powerplant), major and regional Title 14, Code of Federal Regulations (14 CFR) part 121 operators, 14 CFR part 91 operators, cargo operators, and maintenance facilities. The report contains 31 recommendations for the FAA's consideration.

The ARAC approved the report for transmittal to the FAA during its March 19, 2015, meeting. I want to thank all the members of the Maintenance Reliability Program Working Group (MRPWG), for their hard work.

Sincerely,

Todd Sigler
ARAC Chair

Enclosure

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

800 Independence Ave., S.W.
Washington, DC 20591

APR 27 2015

Mr. Todd Sigler
ARAC Chair
The Boeing Company
P.O. Box 3707 MC 09-76
Seattle, WA 98124-2207

Dear Mr. Sigler:

This is in response to your letter dated April 6, 2015, transmitting to the Federal Aviation Administration (FAA) the Maintenance Reliability Program Working Group's recommendation report, which the Aviation Rulemaking Advisory Committee (ARAC) approved on March 19, 2015.

I wish to thank the Maintenance Reliability Program Working Group members who provided resources to develop, review, and approve the recommendations. The industry-wide cooperation and engagement achieved through your leadership was necessary to produce the innovative recommendations presented in the report.

I also wish to thank the ARAC members who reviewed and approved the recommendation report. The recommendation report and the other official documents will be placed on the FAA's Committee Database Website within 90 days of receiving them.

The FAA considers this submittal of the Maintenance Reliability Program Working Group recommendation report as completion of the original tasking issued on August 9, 2013, (78 FR 49595, August 14, 2013) and has officially closed this task. We will keep the ARAC apprised of the FAA's efforts during future ARAC public meetings.

Sincerely,

Lirio Liu
Director, Office of Rulemaking

MAINTENANCE RELIABILITY PROGRAMS WORKING GROUP

Prepared for the Aviation Rulemaking Committee

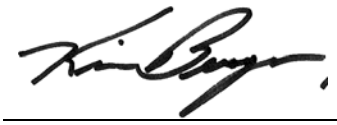
February 25, 2015

Working Group Chairman: Ron Little
Manager – Scheduled Maintenance Programs
Delta Air Lines, Inc.

RELIABILITY PROGRAM WORKING GROUP

Ron Little, Working Group Chair
Manager, Maintenance Programs
Delta Air Lines

Leonard Beauchemin
Managing Director
AeroTechna Solutions



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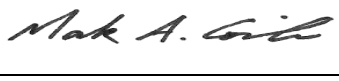
Southwest Airlines



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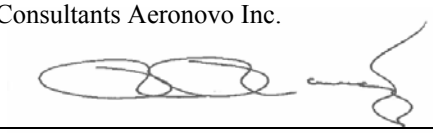
Manny Gdalevitch
Managing Director
Consultants Aeronovo Inc.

Dave Mikkelson
Manager, Maintenance Programs
Allegiant Travel Company



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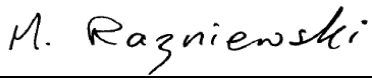
Manager, Maintenance Programs and
Reliability
Air Wisconsin Airlines Corporation



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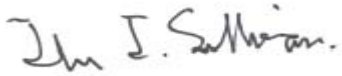

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Oliver Weiss
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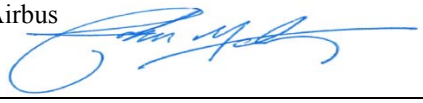
Bryan Riffe*
Director, Reliability
US Airways



John Yakubowsky*
Technical Fellow
The Boeing Company

** Indicates nonvoting member*

CONTENTS

EXECUTIVE SUMMARY

Background

This recommendation report responds to the Aviation Rulemaking Advisory Committee's (ARAC) tasking to evaluate and address maintenance reliability programs to determine methods for ensuring consistent establishment, monitoring, maintenance, and oversight of a reliability program. The report is a product of the Maintenance Reliability Program Working Group (MRPWG), composed of subject matter experts from equipment manufacturers (both airframe and powerplant), major and regional Title 14, Code of Federal Regulations (14 CFR) part 121 operators, 14 CFR part 91 operators, cargo operators, and maintenance facilities.

MRPWG Findings

Based on the ARAC tasking, the MRPWG identified four major findings:

1. Validation of National Transportation Safety Board (NTSB) Safety Recommendation A–09–110,
2. Federal Aviation Administration (FAA) Advisory Circular (AC) 120–17A is outdated and contains serious deficiencies requiring revision,
3. The defined goal of a reliability program in AC 120–17A is to maintain inherent reliability that was determined to be anecdotal to operators and requires revision, and
4. Additional FAA documents were found to be in conflict requiring harmonization.

MRPWG Deliverables

The MRPWG is submitting to the ARAC three documents as a result of its work. In order to fully comprehend the intent of the conclusions reached by the MRPWG all three documents must be used and cross-referenced. The documents are the—

1. Recommendation Report,
2. Draft AC-MRPWG guidance, and
3. Process/Analysis Flowcharts.

Recommendation Report

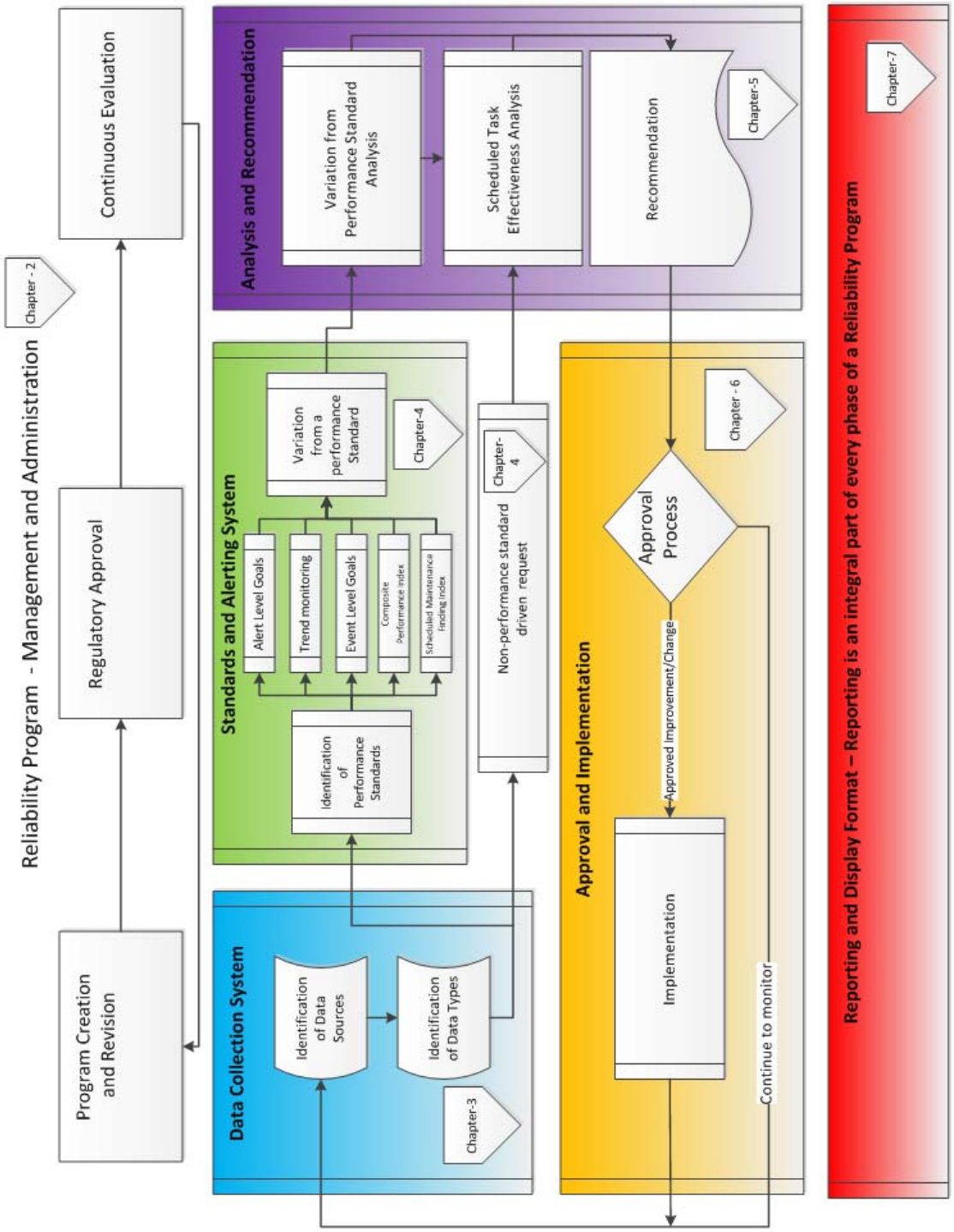
The MRPWG agreed on a total of 31 recommendations to the FAA contained in this recommendation report.

Draft AC-MRPWG Guidance

The MRPWG developed a draft guidance document (AC–MRPWG) based on modern concepts for a standardized methodology establishing, monitoring, maintaining and overseeing an operator's aircraft maintenance reliability programs. The main purpose of the draft AC–MRPWG is to ensure the MRPWG more clearly communicates the intent of the concepts and processes that support and enhance the recommendations found in this report.

Flowchart Diagrams

The MRPWG determined the use of flowcharts is an effective means of displaying complex processes. In addition to developing a high-level reliability program process flowchart, the MRPWG constructed detailed analysis flowchart diagrams to serve as visual aids to help clarify and communicate complex processes that may be a part of any operator's reliability program and the standards for determining time limitations. The following is the reliability program flowchart developed by the MRPWG used in the draft AC-MRPWG depicting the entire reliability program process.



1. INTRODUCTION

1.1 Background

On November 8, 2005, an Embraer 110P1 operated by Business Air, Inc., crashed shortly after takeoff from Manchester-Boston Regional Airport in Manchester, New Hampshire. In its subsequent investigation, the National Transportation Safety Board (NTSB) discerned the presence of contradictory Federal Aviation Administration (FAA) philosophy regarding on-condition maintenance.[1] The root of the contradictory philosophy concerned differing language in two FAA advisory circular (AC) guidance documents: AC 120–16F[2], "Air Carrier Maintenance Programs," and AC 120–17A, "Maintenance Control by Reliability Methods."

1.2 Maintenance Reliability Program Working Group Tasking

In June 2013, the ARAC accepted a new task from the FAA to provide recommendations regarding AC 120–17A and related guidance material in response to NTSB safety recommendation A–09–110. The ARAC established the Maintenance Reliability Program Working Group (MRPWG) and tasked it to complete the following:

1. Review the NTSB Recommendation A–09–110.

2. Review AC 120–17A, "Maintenance Control by Reliability Methods."

3. Gather and review all internal and external guidance documents that reference or provide information on establishing, monitoring, maintaining, and overseeing air carrier reliability programs.

4. Determine whether updated guidance material is appropriate, and if so, develop draft internal and external guidance based on modern concepts, which ensure a standardized methodology for establishing, monitoring, maintaining and, overseeing an air carrier's aircraft maintenance reliability programs.

5. Develop and submit a report that contains recommendations for ensuring consistent establishment, monitoring, maintenance, and oversight of an air carrier reliability program that explains the decisions made in developing the recommendation and any corresponding documents.

6. The ARAC may reinstate the MRPWG to assist in responding to FAA's questions or concerns after the ARAC submits the recommendation. The report should document both majority and minority positions on the findings and rationale for each position. The report should also document any disagreements, including the rationale for each position and the reasons for the disagreement.[3]

---

[1] *Safety Recommendation*. Rep. National Transportation Safety Board, 1 Oct. 2009. Web. 27 Jan. 2015. <http://www.ntsb.gov/safety/safety-recs/recletters/A09_108_111.pdf>.

[2] The initial citation was AC 120–16E, which was cancelled on November 15, 2012, by the publication of AC 120–16F. All references in the recommendation report are to AC 120–16F.

[3] Aviation Rulemaking Advisory Committee-New Task, 78 Fed. Reg. 49595 (August 14, 2013).

1.3 Maintenance Reliability Program Working Group Composition

The MRPWG tasking stated the FAA's desire to include a diverse membership from the aviation industry to ensure all aspects of the tasks were considered in development of the recommendations. The resulting composition of the MRPWG included representation from equipment manufacturers (both airframe and powerplant), major and regional Title 14 Code of Federal Regulations (14 CFR) part 121 operators, 14 CFR part 91 operators, cargo operators, maintenance facilities, subject matter experts and industry groups (see Figure 1–1).

Figure 1–1 MRPWG Membership

Name	Company	Industry Group
Ron Little, Chair	Delta Air Lines	A4A
Ken Mahan	FAA	FAA (AFS 330)
Katherine Haley	FAA	FAA (ARM Analyst)
Amy Oonk Brown	Southwest Airlines	A4A
Kevin Berger	FedEx	A4A
Mark Coile	UPS	A4A
Bryan Riffe	US Airways (nonvoting)	A4A
Oliver Weiss	Airbus	AIRBUS
Sarah MacLeod	Aeronautical Repair Station Association (ARSA)	ARSA
Matthew Razniewski	The Boeing Company	BOEING
John Yakubowsky	Boeing (nonvoting)	BOEING
John Sullivan	CAVOK	CAVOK Group - Consulting Group
Melanie Cox	GE Aviation	GE
Dave Mikkelson	Allegiant	National Air Carrier Association (NACA)
Leonard Beauchemin	National Business Aviation Association (NBAA)	NBAA
Russ Raddatz	Air Wisconsin	Regional Airline Association (RAA)
Manny Gdalevitch	Aeronovo	Aviation Consulting
Harold Summers	Helicopter Association International (HAI) (not active)	HAI

*****Mr. Mahan was preceded in his role as FAA representative by Mr. Paul Pitts and Ms. Sally Marshall.

1.4 Maintenance Reliability Program Working Group Meetings

The initial MRPWG meeting was held December 10–11, 2013. Subsequently, the MRPWG held seven "face-to-face" meetings hosted by MRPWG members. Members unable to attend in person were able to contribute via Web and teleconferencing capabilities. The MRPWG held the following meetings:

Date	Location	Host
December 10–11, 2013	Washington, DC	FAA
March 3–7, 2014	Phoenix, AZ	US Air
May 5–9, 2014	Dallas, TX	Southwest Airlines
June 23–27, 2014	Atlanta, GA	Delta Air Lines
August 19–21, 2014	West Chester, OH	GE Aviation
October 21–24, 2014	Washington, DC	FAA
December 9–12, 2014	Washington, DC	NBAA
January 21–22, 2015	Salt Lake City, UT	FAA

In addition, the MRPWG held weekly Web and teleconferences; task groups held additional Web and teleconferences as necessary to complete assignments.

1.5 Work Plan

In order to perform its tasking, the MRPWG prepared and executed a work plan to establish responsibilities and a timeline to complete all tasks within the prescribed period. In order to best address the multiple facets of a reliability program, the MRPWG created task groups to focus on specific aspects of research and product construction. The task group headings were based on elements of a reliability program as determined by the MRPWG. The work plan managed interdependencies among task groups. The task groups were—

- Introduction and advisory circular formatting,
- Definition of terms,
- Data collection and analysis,
- Response to unacceptable levels of reliability performance and the standards for determining and revising time limitations, and
- Data display and reports.

At the face-to-face meetings, each task group delivered to the entire MRPWG draft sections of a revised AC120–17A related to their area of focus and research. The MRPWG then discussed, debated, and revised the concepts presented by the task groups in order to gain consensus of the MRPWG. At every step dissenting opinions were encouraged in order to capture all aspects of these concepts.

2. RECOMMENDATION DEVELOPMENT

As required by the ARAC tasking, the MRPWG completed an initial review of documents and guidance material. As a result of this initial review, the MRPWG members identified four major task findings. These finding further resulted in the MRPWG completing additional tasking requirements with the development of this recommendation report, draft AC-MRPWG and additional deliverables.

2.1 NTSB Recommendation A–09–110 (ARAC Tasking 1)

Task 1. Review the NTSB Recommendation A–09–110.
The following is an excerpt from the NTSB Safety Recommendation A–09–110, page 4:

Contradictory FAA Philosophy Regarding On-Condition Maintenance

The accident airplane's engines were maintained, in part, under an FAA-approved "on-condition" maintenance program.[6] According to FAA Advisory Circular (AC) 120–17A, "Maintenance Control by Reliability Methods," which was issued in 1978, on-condition maintenance is:

> *"… a preventive primary maintenance process. It requires that an appliance or part be periodically inspected or checked against some appropriate physical standard to determine whether it can continue in service. The purpose of the standard is to remove the unit from service before failure during normal operation occurs."*

This AC also states that hard time, on-condition, or condition monitoring are the primary aircraft maintenance processes. As written, the AC was intended to provide conceptual guidance for operations conducted under 14 CFR Parts 121 and 127. However, no ACs specifically address on-condition concepts for Part 135 operators such as Business Air.

AC 120–16E, "Air Carrier Maintenance Programs" (another active AC), conflicts with AC 120–17A in regard to FAA on-condition maintenance philosophy. According to AC 120–16E, paragraph 602a(2), Parts 119, 121, and 135[7] air carriers "should not use terms such as hard time, on-condition, or condition monitored in [their] maintenance schedule." The AC further states that "these terms represent obsolete 1960s methodology [and] are vague" and that use of these terms runs the risk that needed maintenance may not be performed according to a set schedule.[8]

Although AC 120–7A (as written) was not intended to provide guidance to Part 135 operators, both ACs are intended for Part 121 operators, and thus the NTSB is concerned about the differing guidance that is provided to operators. Therefore, the NTSB recommends that the FAA resolve the differences between AC 120–17A and AC 120–16E in regard to FAA philosophy and use of on-condition maintenance programs. Further, once the differences noted in Safety Recommendation A–09–110 are resolved, the NTSB recommends that the FAA review existing on-condition maintenance programs to ensure that they are compatible with the most current accepted philosophy.

Resolve the differences between Advisory Circular (AC) 120–17A and AC 120–16E in regard to Federal Aviation Administration philosophy and use of on-condition maintenance programs. (A–09–110)

Finding No. 1

The MRPWG reviewed NTSB Recommendation A–09–110, dated October 1, 2009, and determined the recommendation is valid regarding contradictory FAA philosophy related to on-condition maintenance philosophy.

The MRPWG provided recommendations within this report and in the draft guidance AC-MRPWG that removes this contradictory philosophy and terminology.
(See Recommendation No. 3 of this report and draft guidance AC-MRPWG)

The RPWG found that once the differences noted in Safety Recommendation A–09–110 are resolved, the NTSB also recommends that the FAA review existing on-condition maintenance programs to ensure that they are compatible with the most current accepted philosophy as stated in NTSB recommendation A–09–111.

2.2 Guidance Material Review (ARAC Taskings 2, 3, and 4)

> *Tasking 2—Review AC 120–17A, "Maintenance Control by Reliability Methods."*
>
> *Tasking 3—Gather and review all internal and external guidance documents that reference or provide information on establishing, monitoring, maintaining and overseeing air carrier reliability programs.*
>
> *Tasking 4—Determine whether updated guidance material is appropriate and, if so, develop draft internal and external guidance based on modern concepts, which ensure a standardized methodology for establishing, monitoring, maintaining and overseeing an air carrier's aircraft maintenance reliability programs.*

AC 120–17A

AC 120–17A was published in March 1978 and refers primarily to Air Transport Association[4] Maintenance Steering Group 2 (MSG–2) methodology for maintenance task development and reliability control methods, processes, and analysis techniques.

Recognizing the experience gained from MSG–2, the industry now predominantly uses MSG–3 logic, which replaced MSG–2 logic in 1980, for developing a more effective set of procedures through analysis of aircraft functions and functional failures, rather than components.
The MSG–2 methodology found in AC 120–17A, while still valid, is neither modern nor comprehensive in nature.

Additional Guidance Material

The MRPWG gathered and reviewed FAA and existing industry guidance material, including the following:

1. FAA AC 120–17A
2. FAA AC 120–16F
3. FAA AC 120–79
4. FAA AC 121–22C
5. E.M.A.C Maintenance Programme Optimization 1 (IATA)

[4] The Air Transport Association currently does business as Airlines 4 America (A4A).

6. Airlines for America MSG–3 Operator/Manufacturer Scheduled Maintenance Vol. 1 – Fixed Wing Aircraft Rev. 2013.1
7. Reliability-Centered Maintenance Report (United Airlines)
8. Airworthiness Manual Advisory Reliability Monitoring Programs (April 1986) (Canada)
9. Civil Aviation Advisory Publication 34 Aircraft Maintenance Reliability Program UAE
10. South Africa Civil Aviation Authority Technical Guidance Material – The Reliability Program and Ongoing Oversight of Reliability Programs and Maintenance Program Escalation (June 2013)
11. Australian Civil Aviation Safety Authority – AC 42–3(0) Reliability Programs (Sep 12)

Finding No. 2

Based on a review of AC 120–17A and additional guidance material, the MRPWG determined that updated guidance material in the form of a revised AC 120–17A is not only appropriate but required due to the following major deficiencies in the existing guidance.

1. AC 120–17A contains dated and contradictory philosophies as noted in Finding No. 1.
2. AC 120–17A does not contain guidance or methods related to:
    a. Current task development methodologies;
    b. Maintenance schedule task types based on failure effect;
    c. New regulatory requirements / programs;
        i. 14 CFR §121.1111 – Electrical Wiring Interconnect System
        ii. 14 CFR§ 121.1113 – Fuel Tank Safety
    d. Modern reliability program monitoring techniques;
    e. Modern analysis methods and tool.

As a result of this finding and as directed by the ARAC tasking, the MRPWG has developed draft guidance based on modern concepts that, if followed, will ensure a standardized methodology for establishing, monitoring, maintaining and overseeing an air carrier's aircraft maintenance reliability programs. The foundation for this draft guidance is found in the 31 recommendations contained in the report that further elaborates on the inadequacies of the existing AC 120–17A guidance.

The immediate recommendation report and draft AC do not recommend simply supplanting dated MSG–2 methodology with current MSG–3 practices, but rather embrace an approach not confined to a specific MSG methodology. The MRPWG agreed such an approach will inhibit obsolescence of guidance material as industry methodologies continue to evolve (see Recommendation No. 3 of this report).

Finding No. 3

The MRPWG found that the current AC120–17A language defined the goal of a reliability program was to maintain "inherent" levels of reliability. The MRPWG agreed that the new goal of a reliability program should be to maintain "acceptable" levels of reliability as defined by the operator. It was agreed upon that the level of reliability that an operator maintains is usually a financial business decision that should be left up to the operator to define what those "acceptable" performance standards are. However, once those performance standards are developed, the reliability program should maintain them. The MRPWG determined that the inherent reliability was an anecdotal term that has never been available to the operators. The inherent reliability of a fleet, system or component is an important design specification requirement that the original equipment manufacturer (OEM) uses in the MSG task development process. However, that design specification is not normally accessible to the operators outside of the MSG task development working groups and Industry Steering Committees (ISC).

The MRPWG agreed that maintaining "acceptable" levels of reliability as defined by the operator does not allow for compromise of the safety and/or airworthiness of the aircraft.

Finding No. 4

As the MRPWG reviewed FAA guidance material and found several documents to contain errors or conflict with other guidance material. Recommendation No. 31 of this report details pertinent materials to be harmonized with an updated approach to establishing, monitoring, and maintaining reliability programs. The identified guidance should be harmonized to the recommendations contained in report and the draft guidance material AC–MRPWG provided to the FAA.

2.3 Goals and Deliverables

The MRPWG discussed and approved six goals and related guidelines used during the development of the report, recommendations, and example of a revised AC 120–17A. The MRPWG agreed to that an operator's reliability program should:

1. Define, establish, and maintain an effective maintenance schedule.
2. Define the standards for determining the time limitations contained within the air carrier's maintenance schedule.
3. Define acceptable levels of reliability performance of the aircraft, powerplant, systems, and components.
4. Collect data to monitor, analyze, and document reliability performance relative to acceptable levels.
5. Define appropriate responses to identified unacceptable levels of reliability.
6. Develop, revise, and approve the methods, processes, and controls for the Reliability Program.

2.3(a) Draft AC–MRPWG

Per the ARAC tasking, the MRPWG members drafted a document (AC–MRPWG) based on modern concepts for a standardized methodology establishing, monitoring, maintaining and overseeing an operator's aircraft maintenance reliability programs. Members of the MRPWG

agreed the practical application of modern concepts via the draft AC was integral to conveying the vision of the MRPWG and the feasibility of its recommendations. In this approach, draft AC 120–RPWG is a complementary document to the Recommendation Report and, as such, is referenced in report to demonstrate recommendations "in action" in updated guidance.

2.3(b) Recommendation Report

Per the ARAC tasking, MRPWG members constructed the recommendation report to capture the recommendations developed by the MRPWG. Although no dissensions are recorded, the MRPWG actively encouraged individual members to advocate language, scope and philosophy.

In constructing the recommendation report, the MRPWG identified assumptions under which it constructed the report. The MRPWG assumed that—

- Reliability is part of a Continuing Analysis and Surveillance System (CASS);
- An effective CASS , including appropriate support organization, is in place for the operator;
- Neither recommendations nor language in the draft AC are intended to strengthen or address deficiencies in a CASS program:
- The audience of the report is 14 CFR part 121 operators, 14 CFR part 135 operators with aircraft with 10+ seating, and 14 CFR part 91, subpart K operators;
- Elements of the recommendations and draft AC may be extended to other types of operators;
- The existence of a change in philosophy in moving from maintaining inherent reliability toward acceptable reliability as defined by the operator.

2.3(c) Flowchart Diagrams

The MRPWG constructed flowchart diagrams as appendices to draft AC-MRPWG to serve as visual aids to complement amended language and to provide simpler presentation of complex technical decisions. The support for inclusion of visual aids in guidance material is captured in Recommendation No. 5. The flowcharts address not only a reliability program in total but also specific system task flows.

3. RECOMMENDATIONS

In order to facilitate the establishment and consistent monitoring, maintaining, and oversight of an operator's reliability program, the MRPWG provides the following 31 recommendations to the FAA for inclusion in a revision to AC 120–17A or other guidance material, both internal and external of the agency. The MRPWG classified the following 31 recommendations into the following four major categories:

- 3.1 Scope, Structure and Philosophy of the Guidance Material;
- 3.2 Recommendations for AC Guidance on the Definition, Data and Methods that constitute a Reliability Program;
- 3.3 Roles and Responsibilities of an Organization with an Approved Reliability Program; and
- 3.4 Harmonization with other Regulatory Material

Each specific recommendation is divided into four areas:

1. Recommendation—This recommendation report contains 31 specific recommendations for a foundation to revise AC 120–17A;
2. Draft AC–MRPWG reference—Citations that link the recommendations to specific sections in a draft Advisory Circular created by RPWG for clarification of intent;
3. Background—The highlights of the MRPWG discussion, debate and concerns that led up to the final recommendation of the MRPWG and why the MRPWG came to its conclusions to include any concerns voiced during those discussions;
4. Dissenting Opinions—The MRPWG chair encouraged dissenting opinions throughout this project. While there were no official dissenting opinions many concerns were debated and discussed at every meeting, all concerns were adequately addressed to the satisfaction of every member.

3.1 Recommendations for Scope, Structure, and Philosophy of the Guidance Material

Recommendation No. 1

The FAA should develop guidance material that clearly states an operator's autonomous approval authority and scope in accordance with its Operation Specification (D074). FAA internal training material for certificate management offices (CMO) and Administration personnel involved with reliability programs should also clearly reflect this delineation of authority.

Explanation

The MRPWG identified a problem exists in the uniformity of FAA interpretation of authority granted to an operator under OpSpec D074. The current inconsistency, in addition to costing operators, creates the contradictory regulatory environment identified by the NTSB as an issue in need of remedy.

During the MRPWG discussion, several, but not all, operators reported that their FAA CMO approval currently is required for revisions to the operator's maintenance schedule task or check intervals. This included situations where those intervals are based on that operator's reliability program using the standards for determining time limitations per the operator's D074 Operations Specification (OpSpec). This inconsistency among FAA CMOs is a result of erroneous interpretation and is inconsistent with the authority granted to an operator through its reliability OpSpec. This misinterpretation puts certain operators at a competitive disadvantage. During discussions with the MRPWG FAA representative, the MRPWG determined that an operator with a D074 OpSpec is granted autonomous authority to approve maintenance schedule time limitations, unless otherwise restricted, in accordance with the standards for determining time limits found in the operator's D074 OpSpec and reliability program manual without additional FAA CMO approval of those maintenance schedule time limitations.

The RPWG also recommends the operator approval authority described above and in the draft AC–MRPWG be immediately communicated to all FAA personnel with involvement in operators' reliability programs by means of training, memorandum, or FAA order to field inspectors. This communication should not be dependent upon the published revision to AC 120–17A.

Draft AC-MRPWG Reference

Section 1–1

Dissenting Opinions

None

Recommendation No. 2

FAA guidance material should clearly define an operator's eligibility (whether 14 CFR part 121, part 135, or part 91, subpart K) for a reliability program.

Explanation

The MRPWG discussed the issue of addressing non-14 CFR part 121 operators in the AC. Specifically, the MRPWG debated whether to include the opportunity for negotiation with the FAA on which reliability program elements would be adopted. The working group concluded that amended guidance regarding standards for determining time limitations must be worded so that all operators, regardless of size, may execute a reliability program and, additionally, according to 14 CFR §91.1015(a)(5), a 14 CFR part 91, subpart K operator may use a reliability program but must be administer it in conjunction with the operator's Continuous Airworthiness Maintenance Program (CAMP).

The MRPWG noted the ability of an operator to continually monitor its fleet performance is an indicator of the capability of that operator to effectively revise its maintenance schedule. Therefore, language in future FAA guidance should establish standards for determining time limitations must be worded to allow assessment of different operators' data systems, engineering organizations and proficiency in developing and administering a reliability program.

The working group noted that part 91, subpart K operators are outside the scope of organizational tasking.

Draft AC-MRPWG Reference

Section 1–3

Dissenting Opinions

None

Recommendation No. 3

The FAA should remove any maintenance philosophy language and terminology that relates to a specific revision of "Airlines for America (A4A) Maintenance Steering Group (MSG)" from any future AC revision and replace with more generic task terms.

Explanation

The current AC contains language that is specific to the MSG–2 revision that was in effect when the AC was released in 1978. MSG methodology has evolved from MSG–2 to MSG–3, which is revised periodically by the A4A Maintenance Program Industry Group and approved by the International Maintenance Review Board Policy Board. The MSG–2 language, though still applicable for fleet types still in operation with tasks developed under MSG–2, would not be applicable to current fleet type tasks developed under MSG–3. The MRPWG believes the language in future revisions to the AC should not be specific to a particular revision of MSG but rather to all operators regardless of fleet types they operate. The working group believes that MSG-specific language could lead to confusing terms when going from MSG–2 to MSG–3 with little useful value in subsequent guidance material. An operator seeking a reliability program should have a working knowledge of the MSG–2 or MSG–3 methodology used for its fleet types. This recommendation relates to the NTSB report and part of the MRPWG tasking to remove confusing terms and maintenance philosophies from FAA guidance (for example, on-condition). Language constructed in support of this recommendation should harmonize with existing or subsequently amended language within AC 120–16F.

Draft AC-MRPWG Reference

Section 1–5(b)

Dissenting Opinion

None

Recommendation No. 4

The FAA should provide a clear list of applicable terms, definitions and acronyms relevant to guidance material related to reliability programs.

Explanation

It became apparent during MRPWG meetings that clearly defining terms and acronyms was crucial to unambiguously communicating the intent of guidance, particularly draft AC–MRPWG. The MRPWG identified key terms, researched industry accepted definitions, and determined applicability in the draft AC or provided revisions to ensure correct applicability. These terms are listed in the MRPWG's draft AC.

Draft AC-MRPWG reference

Section 1–6

Dissenting Opinion

None

Recommendation No. 5

The FAA should consider representing complex processes with visual aids to provide a graphical definition that supports the process description and illustrates the relationships between process elements.

Explanation

Outlining the key elements of the reliability program in a flowchart or other visual aid allows an operator to understand the relationship between specific elements and the interaction that forms the operator's reliability program. This recommendation is applicable to all FAA guidance material containing multiple elements and complex processes.

Draft AC-MRPWG reference

Figure 2–1

Dissenting Opinion

None

Recommendation No. 6

FAA guidance should accommodate new or updated regulatory requirements that would have significant impact on the means of compliance that are included (for example, Safety Management Systems).

Explanation

The MRPWG discussed potential future changes to regulations and, while no specific material was included, determined that the draft AC does not constitute a conflict with anticipated regulatory changes. The MRPWG recommends that, prior to the release of an amended AC or other guidance material, the FAA cross-reference on a wider scale for other regulatory efforts currently underway. This effort will ensure the AC will be relevant and applicable at the time of its issuance and in the imminent future.

Draft AC-MRPWG reference

Not applicable

Dissenting Opinion

None

3.2 Recommendations for Guidance Material on the Definition, Data, and Methods That Constitute a Reliability Program

Recommendation No. 7

FAA guidance material should state the goal of an operator's reliability program is to provide data and processes to direct the actions of the maintenance program so that it sustains a level of fleet reliability that supports the overall objectives of that operator.

Explanation

The MRPWG discussed the scope of a reliability program. The working group agreed that tasks under a reliability program's authority include those tasks that support operational reliability or

customer experience. The reliability program does not include those tasks that are mandatory based on known unsafe conditions highlighted through design analysis or through in service experience (for example, airworthiness directive, airworthiness limitation item, and certification maintenance requirements). It was agreed that the reliability program goal is to optimize the maintenance schedule to support the operational goals defined by the operator. As a result, the setting of appropriate reliability performance standards is part of the reliability program.

Draft AC-MRPWG Reference

Section 4–1

Dissenting Opinion

None

Recommendation No. 8

FAA guidance material should include a minimum requirements list in the operator's reliability program manual.

Explanation

The MRPWG discussed the typical contents of a reliability program manual and concluded that including a minimum requirement list for the manual in the guidance material is critical to achieve consistent and effective reliability programs. The MRPWG came to these conclusions as task groups defined the individual processes and identified key elements needed to support those processes. It was determined that without these minimum requirements certain areas of the reliability program would be deficient or unable to execute the required processes.
The recommended minimum content list would include:

- A general description of the reliability program;
- The application of the reliability program to the operator's fleet;
- Data collection methods and data applicability;
- Organizational responsibilities;
- Procedures for monitoring and revising reliability performance standards;
- Processes for driving a corrective action;
- Report contents and frequency;
- Standards for adjusting time limitations;
- Reference to all forms that are unique to the reliability program;
- Reliability program revision, control and approval process;
- Requirements for self-audit of performance and monitoring for effectiveness of the reliability program; and
- Reliability program organizational authority.

Draft AC-MRPWG Reference

Section 2–1(b)

Dissenting Opinion

None

Recommendation No. 9

FAA guidance material should specify the elements of a reliability program that would require specific FAA approval and the elements that require only FAA acceptance. The MRPWG also recommends that the AC define that approval authority or acceptance should be identified in an operator's reliability program manual.

Explanation

MRPWG discussions with the FAA representative confirmed that certain elements of a reliability program will always require specific FAA approval, including initial program approval. An operator should identify in its reliability program manual whether it elects to have additional isolated elements subject to FAA approval. The MRPWG determined the following minimum FAA approval requirements:

- Procedures relating to reliability measurement and performance standards,
- Addition or deletion of aircraft types,
- Addition or deletion of components and/or system being monitored,
- Changes involving performance standards, including instructions relating to the development of these standards,
- Methods to ensure accuracy and applicability of data collected to support the program,
- Data analysis methods and application to the maintenance schedule, and
- Any changes associated with approval authority.

Draft AC-MRPWG Reference

Section 2–2(c)

Dissenting Opinion

None

Recommendation No. 10

The FAA should require a reliability program include periodic review of the operator's reliability program to ensure it remains.

Explanation

The MRPWG discussed the drivers of a successful reliability program and concluded that one of those drivers is self-auditing and monitoring effectiveness of the program. Self-auditing and monitoring effectiveness ensure that the measurements, alert values, metrics and processes are achieving the program goals such as:

1. The operator's fleet(s) reaching the operator-defined level of acceptable reliability performance.
2. The maintenance schedule element of the operator's CAMP meeting the CASS definition of effective.

Draft AC-MRPWG Reference

Section 2–3

Dissenting Opinion

None

Recommendation No. 11

The FAA should require the five main elements of a reliability program:

1. ***Data Collection (recommendations Nos. 13–20)***
2. ***Standards and Alerting (recommendations Nos. 21–22)***
3. ***Analysis Recommendations (recommendations Nos. 23–28)***
4. ***Approval and Implementation (recommendations Nos. 29–30)***
5. ***Reporting and Displays (recommendation No. 31)***

Explanation

The MRPWG reviewed AC 120–17A together with the main elements of the MRPWG members' respective reliability programs. The MRPWG concluded that a fully functional reliability program should contain these five elements and that they should be clearly defined in any guidance material revision. The draft AC includes multiple aspects for each of these elements, however it is not intended that an operator would need to include all of these aspects.

Draft AC-MRPWG Reference

Section 2–1(a)

Dissenting Opinion

None

Recommendation No. 12

The MRPWG recommends that FAA require that the operator's reliability program identify the sources and types of data that will be collected and used by that program. In addition, the MRPWG recommends that the guidance material define the difference between data sources and data types and include specific examples.

Explanation

The MRPWG discussed the potential sources of data for a reliability program as well as the types of data that may be available to indicate the current performance of those data sources. It agreed that revised guidance material should state that a reliability program should describe the data sources and types that are proposed as the inputs to the program. The MRPWG concluded that guidance material should also include a listing of potential data sources and types, together with clarification of the demarcation between those terms. Finally, the MRPWG concluded that guidance material should outline examples of both data sources and data types, as the differences between the two are commonly misunderstood.

Draft AC-MRPWG Reference

Section 3–1

Section 3–2

Dissenting Opinion

None

Recommendation No. 13

FAA regulatory materials should include language that a reliability program contains a process step to validate the accuracy of the data that is gathered to support the program. In addition, to ensure data applicability, defects must be identified with a specific ATA code, aircraft system, routine maintenance task or other defined and accepted method of identification.

Explanation

The MRPWG agreed that a reliability program relies upon accurate data inputs; therefore, a reliability program should include validation of any data that is to be used in the analysis and recommendation steps of the process. The MRPWG recommends that guidance material include considerations for establishing data validity, such as—

- Comprehensive data standards,
- Uniform documentation designed to achieve data standard compliance,
- Audits of data to detect and correct any irregularities, or
- Methods for providing feedback to any section of the organization that has generated data that deviates from the accepted standards.

Draft AC-MRPWG Reference

Section 3–3

Dissenting Opinion

None

Recommendation No. 14

The FAA guidance materials should state an operator's reliability program includes a defensible method for determining a sample size or data set that adequately represents its fleet with respect to the maintenance task under consideration.

Explanation

The MRPWG agreed that applicable data is the foundation of a reliability program. Data sampling allows an operator to analyze a defined portion of data from a relevant data set, rather than analyzing the entire amount of data that may be available. However, for smaller fleets, analysis of all available data from the data set may be necessary. The MRPWG agreed that the operator's reliability program should—

- Include language specifying that the operator must have a defensible method of selecting data that represents its fleet when making decisions regarding time limitation adjustments.

- The MRPWG defined the term defensible method as a process that is consistent, measurable, unbiased, factual, accurate, and repeatable.
- Regardless of the method used to determine how much data is required, the documented process must result in confidence that the selected data set is representative of the entire fleet. This avoids the possibility that optimization decisions are based on data from aircraft at the extremes of the data set.
- Define the process for selecting a data pool that reflects the fleet composition, considering following criteria:
  - Operational History,
  - Configuration,
  - Utilization and Environmental Conditions,
  - Task Yield (see Recommendation No. 15),
  - Seasonal Duty,
  - Previous operator ownership,
  - Time elapsed since major conversions or refurbishments, and
  - Sustained storage periods.
- Include one or more of the following means of defining data selection method from the data pool that is generated by the criteria above, such as—
  - A defined number of aircraft,
  - A percentage of fleet size,
  - A statistical formula, or
  - Percent of data over a defined period of time.

Draft AC-MRPWG Reference

Section 5–2

Dissenting Opinion

None

Recommendation No. 15

The FAA guidance materials should define task yield as a percentage measure of the actual interval for accomplishing a task against the current maximum allowed interval defined in the operator's program. The MRPWG also recommends that guidance material include direction on minimum acceptable yield for data included in task escalation analysis.

Explanation

The MRPWG agreed it is inherent to the validity of task escalation analysis to consider the yield of the pertinent task, where the yield is a percentage measure of the actual interval for accomplishing a task against the maximum interval currently allowed. The MRPWG recommends that a definition of task yield and an example calculation are included in guidance material revisions to ensure the intent of this measure is clearly understood. In addition, the MRPWG concluded guidance material should include direction that—

- A minimum acceptable value for yield of 90 percent on average for all task accomplishments contributing data to the task escalation analysis,
- No task accomplishment within the data set used for task escalation analysis should have a yield less than 80 percent; and
- For each data point, the yield may be obtained by a single accomplishment of the task. Alternatively, multiple consecutive accomplishments of the same task may be included as long as both nil and positive findings are evaluated for each accomplishment and special consideration is given to degradation patterns. For example, a task completed at 45 percent yield on two consecutive occasions could be used as a combined data point to achieve a 90 percent task yield, assuming no findings on the first task completion.

Draft AC-MRPWG Reference

Section 1–6

Section 5–2(f)

Dissenting Opinion

None

Recommendation No. 16

The FAA guidance materials should recognize that the type of task under review determines the data type(s) to be analyzed. The MRPWG recommends that a table is included in the guidance material to categorize the different tasks within an operator's maintenance schedule and to identify the primary and secondary sources of data to be analyzed in relation to those tasks.

Explanation

The MRPWG discussed whether all tasks should be treated equally with respect to the data that would need to be analyzed to determine if the task is still applicable, effective, and optimized. Historically, the findings resulting from routine task execution were reviewed and analyzed to determine whether an interval remains appropriate. The MRPWG agreed, however, that it is normal and expected for routine tasks to generate findings and in cases where the task is associated with an evident failure effect, routine findings may be secondary information for substantiating an interval change.

Specific examples discussed and agreed to by the MRPWG are—

- System or powerplant tasks with an evident failure effect would use the fleet's operational performance (for example, delays, cancellations, flight interruptions, aircraft out of service, pilot reports) as the primary data for task escalation.
- Failure Event Category (FEC) 8 (Hidden Safety), zonal and structural tasks, are typically associated with failures that do not have an operational effect and are only detected when the routine task is performed. Escalation of such tasks would use routine findings as the primary data.
- Zonal and structural tasks are typically associated with failures that are only evident when an area is accessed during the task and the routine task findings would be the primary data for task escalations.

In each case, the listed secondary data type would be used to validate the conclusion of analysis of the primary data. Additional examples are provided in the draft AC-MRPWG Table 5–1.

Draft AC-MRPWG Reference

Section 5–2(b)

Table 5–1

Dissenting Opinion

None

Recommendation No. 17

The FAA guidance material should discuss the importance of establishing the relevance of data to adjusting the time limitation of a particular task and should provide guidance on the correct preparation of data prior to inclusion in an analysis. It is the recommended that guidance material include the definitions for—

1) ***Related data,***
2) ***Unrelated data,***
3) ***Significant findings, and***
4) ***Nonsignificant findings.***

Explanation

The MRPWG agreed that not all data is related or relevant to a task and its interval.
The performance of routine tasks often results in additional findings that are unrelated to the intent of that task or are insignificant to the failure mode or effect that the task was intended to mitigate. To ensure that all of the data being used for task escalation analysis is related and significant to the task under consideration, the reliability program should include a process step to prepare the data for analysis by removing all unrelated or insignificant findings.

Draft AC-MRPWG Reference

Section 5–2(e)

Dissenting Opinion

None

Recommendation No. 18

The methods outlined FAA guidance material should allow a part 91, subpart K operator with a CAMP to combine data with that from other CAMP operators in cases where there is a limited quantity of data from its own fleet. The guidance should state this is only an acceptable approach when it can be shown that the fleet, duty cycles, operating environments and relevant maintenance schedule are sufficiently similar for that data to be applicable. Guidance material should define that this approach would only be applied to expand a data set to gain additional confidence on the original results, not to significantly change a recommendation that was based on an operator's own data.

Explanation

The MRPWG recommends that part 91, subpart K operators (under management specifications) be allowed to use data from other operators and sources in order to substantiate task interval adjustments. The intent behind this recommendation is to allow operators with small fleets to expand the pool of potential data to similar fleets to gain additional confidence in the analysis used to support time limitation adjustment. The MRPWG acknowledged that there can be other benefits to data sharing, such as identifying failures that are unique to one operator, which could drive additional corrective actions.

The MRPWG discussed implementations of the recommendation in other forums such as—

- Combining operator data at the Working Group/Industry Steering Committee level when adjusting task intervals contained in the Maintenance Review Board Report (MRBR).
- An operator that contracts other operators or vendors to manage its reliability program.

A MRPWG member voiced concern over the potential for an operator to use data that was not sufficiently applicable to its fleet or operations to drive appropriate decisions. One way to address this concern would be by including guidance that analysis of pooled data should include review of its applicability and also stating that the intent of data pooling is to gain additional confidence in an analysis result, not to significantly alter an analysis outcome without understanding the driving factors behind that difference.

Draft AC-MRPWG Reference

Section 3–4

Dissenting Opinion

None

Recommendation No. 19

The FAA guidance material should contain recommended techniques for developing performance standards and identifying deviations from those standards.

Explanation

The MRPWG discussed the various methods used to determine that reliability performance deviated from an operator's defined standards. The MRPWG concluded that guidance material should identify the various techniques available and include a definition of the methods, data inputs, action drivers and reliability program requirements for each. This will enable operators to select the most appropriate method for their organization based on the type and volume of available data, the size and capability of the reliability program organization and the priority of

reliability to the operator's overall business goals. The MRPWG identified the following methods for determining performance deviations and recommends that each of these is included in the AC:

- Alert-based program,
- Trend-monitoring-based program,
- Event-based program,
- Composite performance index-based program (multiple data types used to produce an index of key indicators for reliability drivers), and
- Scheduled Maintenance Findings Index.

The working group also included examples of performance standard variations in the draft AC and recommends that a similar example is included in revision of guidance materials to ensure that the intent of each of these methods is clear.

The MRPWG also recommended that the FAA include language in guidance materials that all performance standards should be subject to periodic review and adjustment, as necessary.

Draft AC-MRPWG Reference

Table 4–1

Section 4–2(a)–(e)

Dissenting Opinion

None

Recommendation No. 20

The FAA should require that, once a performance standard deviation has been identified, additional analysis is required to determine a root cause and to develop an appropriate action plan to address the deviation. The MRPWG also recommends guidance material include applicable analysis methods and tools for clarity.

Explanation

MRPWG discussions on current methods for analysis of performance standard deviations revealed a wide variety of methods being used and that existing guidance material is open to interpretation. This led to a working group general concern that not all operators are aware of best practices for this type of analysis, which could lead to recommendations that do not fully address the root cause of the deviation but merely mask the failure effect. The MRPWG concluded this concern would be addressed by including AC guidance that root cause analysis is required and by detailing some examples that, while not mandatory or exhaustive, would be effective in directing operators to a thorough and effective analysis process. The MRPWG included a suggested list of appropriate analysis methods in the draft AC.

Draft AC-MRPWG Reference

Section 5–1

Dissenting Opinion

None

Recommendation No. 21

The FAA guidance material should clearly define the meaning of terms that are commonly used to describe repetitive defects:

1) ***No Fault Found,***
2) ***Rogue Units,***
3) ***Chronic Units, and***
4) ***Chronic Systems/Aircraft***

Explanation

The MRPWG discussed the issue of repetitive defects specific to a part or system serial number, rather than a larger design or maintenance issue affecting a population of the same part number(s). The discussion highlighted that the vocabulary for describing such parts and systems was not common across the industry. Therefore, the MRPWG concluded that including a definition of these terms would facilitate discussion between operators, industry committees, and manufacturers. The MRPWG agreed on the following definitions, which are included in more detail within the draft AC:

- No Fault Found—a fault that cannot be replicated during unit or system test.
- Rogue Unit—a single line-replacement unit (LRU) serial number with a history of identical faults.
- Chronic Unit—a single LRU serial number with a history of different faults.
- Chronic Systems or Aircraft—a specific aircraft serial number with a history of repetitive defects.

Draft AC-MRPWG Reference

Section 5–1(b)(3)

Dissenting Opinion

None

Recommendation No. 22

The FAA should require that the reliability program incorporate a process to drive a recommended action in response to any variation from the identified reliability performance standards.

Explanation

The MRPWG discussed that, because the top-level goal of the reliability program is to support optimization of the operator's maintenance schedule, an essential element of that process is to respond to any detected variations against performance standards. The MRPWG concluded that, with respect to the maintenance schedule, recommendations on individual tasks could include—

- An increase or decrease in the current maintenance schedule interval;
- The revision, deletion, or addition of a task or task procedures; or
- Acceptance of the current performance with a plan for continued monitoring.

Draft AC-MRPWG Reference

Section 5–3

Dissenting Opinion

None

Recommendation No. 23

The FAA guidance material should state that recommendations to address variations from an operator's performance standards may also include revision to areas of the operator's CAMP other than the maintenance schedule.

Explanation

The MRPWG agreed that an FAA-approved reliability program is part of the operator's CASS and, as such, could result in recommendations that go beyond maintenance schedule adjustments and drive changes to elements of the broader CAMP. These recommendations could include—

- Changes to one or more of the 10 elements of CAMP,
- Fleet modification or configuration changes,
- Changes to maintenance or operating procedures, or
- Request for manufacturer support.

In addition, the MRPWG agreed that changes recommended through the reliability program which go beyond revision of the maintenance schedule, must also follow the operator's CASS program procedures.

Draft AC-MRPWG Reference

Section 5–3

Dissenting Opinion

None

Recommendation No. 24

The FAA guidance materials should provide direction that an operator's reliability program allows for change requests that are generated outside of the recommendations that are driven by performance standard deviations. This should include routine analysis of the maintenance schedule tasks to ensure that they remain applicable, effective and optimized.

Explanation

The MRPWG agreed the goal of the reliability program is to direct the actions of the CAMP to sustain fleet reliability, which includes determining the correct time limitations for any tasks contained within the maintenance schedule. An operator's reliability program should not be limited to driving corrective actions as a result of deviations from fleet reliability performance standards. To fully optimize the maintenance schedule, the reliability program should also periodically review the tasks and task intervals to ensure they remain applicable, effective and optimized. In addition, tasks may be added to the maintenance schedule by requests driven from within an operator's organization due to appearance concerns, customer feedback or other concerns that do not surface as a deficiency in the CAMP.

Draft AC-MRPWG reference

Section 4–4

Dissenting Opinion

None

Recommendation No. 25

The FAA guidance materials should include direction on the disposition of revisions to FAA-approved Design Approval Holder (DAH) source documentation (for example, MRBR) for the operators to incorporate appropriate changes without further substantiation.

Explanation

The MRPWG discussed how to handle changes to DAH source documents after an aircraft has entered service and the operator's maintenance schedule is approved and implemented. In these instances, the MRPWG agreed an AC should stipulate that—

- Unless mandated by regulation, operators are not required to adopt DAH changes. However, it is a best-practice for an operator to review the source document changes, and compare them to current reliability performance to determine if the change should be incorporated.
- The operator may elect to adopt all, some, or none of the of the DAH source document revision.
- If the DAH source document is FAA approved, the AC should note an operator may elect to incorporate those changes without further substantiation.
- When available, operators are encouraged to participate in the DAH revision process, and support them by providing operationally derived reliability data and in-service experience.

The MRPWG discussion reached these conclusions for the following reasons:

- The operator's reliability program is continuously monitoring that the maintenance schedule remains applicable and effective. The operator's reliability program will detect any MRBR changes that do not support the operator's performance standards and the reliability program will drive an action recommendation.
- This recommendation provides an equivalent standard between a new operator and an existing operator.
- Supplemental Type Certificate (STC)-Derived instructions for continued airworthiness (ICA) should not be treated any differently than any other task unless the STC holder's ICA documents provide specific instructions for interval management. It is a good practice for operators to coordinate with STC holders by providing product performance feedback during analysis initiatives associated with these designs.
- The MRB process is rigorous in its analysis and approval process.

Draft AC-MRPWG Reference

Section 4–4(e)

Dissenting Opinion

None

Recommendation No. 26

The FAA guidance materials should include direction that a reliability program define the process for approving recommendations.

Explanation

The MRPWG agreed a reliability program would include the process for review and disposition of recommendations by a competent approval authority and should specifically identify the party with that responsibility. In addition, there should be stated methods for—

- Resolution of any nonconcurrence,
- Ensuring closure of all proposals, and
- Archiving the disposition of all recommendations.

The MRPWG discussed the importance of clarity in guidance materials that FAA approval of a maintenance schedule adjustment is not required as long as the conditions of the D074 Operations Specifications (OpSpec) time limitation determination standards have been met, unless that approval requirement is defined in the operator's manual system. However, operators should be prepared to demonstrate compliance of the methods used to develop the recommendation with those OpSpec standards on request from the FAA Oversight Office.

Draft AC-RPWG Reference

Section 6–1

Dissenting Opinion

None

Recommendation No. 27

The FAA guidance materials should include direction that the reliability program should define the process for confirming implementation of approved recommendations.

Explanation

The MRPWG agreed that a complete reliability program would include a process for confirming the implementation of any maintenance schedule or CAMP changes recommended to resolve a reliability performance standard deviation. The MRPWG agreed the implementation plan should be included in the documentation of the change approval process. The MRPWG discussed various aspects to be considered in the implementation plan and concluded that the following, at least, should be specifically mentioned in guidance material:

- For task escalation, the start of the new interval period starts at the last time (hours, cycles, or date) that the task was accomplished.
- When determining the schedule for a de-escalated task, the urgency of the reliability concern should be reviewed to select an appropriate time to introduce the reduced interval. The operator should take into consideration a phased implementation approach for those aircraft that have already exceeded the revised interval.

Draft AC-MRPWG Reference

Section 6–2

Dissenting Opinion

None

Recommendation No. 28

The FAA guidance materials should state an operator's reliability program manual should define the reporting content and timetable that documents the program activities.

Explanation

The MRPWG agreed that the operator's manual should define how the reliability program activities will be described by defining the content and schedule for reliability reporting. The MRPWG agreed that guidance material should include direction on minimum reporting content, which may be included in one or multiple reports, such as—

- Defining the means of displaying data and summarizing activity during the last reporting period;
- Providing sufficient detail to enable a reviewer to evaluate the effectiveness of the maintenance schedule on all the aircraft systems that are controlled by the reliability program;
- Including data to accurately describe the carrier's operations;
- Setting the reporting frequency at an interval that would allow the identification of degradation trends;
- Identifying deviations from the operator's defined reliability performance standards; or
- Continuing to review deviations identified in prior reporting periods, together with actions taken or ongoing.

Draft AC-MRPWG Reference

Section 7–1

Dissenting Opinion

None

3.3 Roles and Responsibilities of an Organization With an Approved Reliability Program

Recommendation No. 29

The FAA guidance materials should clearly define that the operator's director of maintenance (DOM) or designee has overall authority over the reliability program. In addition, an operator's reliability program manual should identify the reliability program participants within the organization and include roles, responsibilities and authority.

Explanation

The MRPWG identified that there is existing FAA guidance stating that the DOM has overall authority for the operator's CAMP. Therefore, the MRPWG recommends guidance materials align with that direction by stating the DOM or his or her designee has overall authority for the reliability program. In addition, the MRPWG recommends that guidance material include direction that the operator's program manual should include the roles and responsibilities of participants in the program, including the approval authorities within the levels of the organization.

Draft AC-MRPWG Reference

Section 2–1(c)

Dissenting Opinion

None

Recommendation No. 30

The FAA guidance materials should define minimum personnel training and experience levels to ensure that individuals applying the operator's reliability program possess no less than the minimum technical competency required to support effectiveness of the program.

Explanation

The MRPWG discussed the need for guidance material to include a definition of the technical competencies required by personnel that are implementing the various elements of a reliability program. MRPWG members expressed concern that including specific training or expertise in guidance material might exclude operators unable to meet minimum levels. The MRPWG concluded that accurate technical decision making is critical to an effective reliability program and requires a full understanding of the consequences of decisions. This understanding is the result of applicable training and experience in areas such as data analysis and interpretation. As a result, the MRPWG recommends that guidance material includes direction that the operator should establish in the reliability program manual its own standards for training, experience and demonstration of competency within the organization. The MRPWG provided a sample of training subjects and standard competencies in Figure 2–1 of the draft AC and recommends that a similar table would support operator's understanding of the MRPWG intent.

The MRPWG also recommends that guidance material define the expectation that all approval authorities within the reliability program can describe their program roles and responsibilities.

Draft AC-MRPWG Reference

Section 2–1(d)

Dissenting Opinion

None

3.4 Recommendation for Harmonization with Other Regulatory Material

Recommendation No. 31

The FAA should reconcile and harmonize all internal and external guidance documents to the language, scope, and philosophy expressed in updated guidance material stemming from the recommendations of this report.

Explanation

The MRPWG, in accordance with item 3 if the tasking, gathered and reviewed all pertinent internal and external reference documents impacted by amendment to AC 120–17A and related guidance material. The MRPWG created the following list of materials in need of harmonization, while recognizing this list may not be exhaustive:

- AC 00−46, Aviation Safety Reporting Program;
- AC 00−58, Voluntary Disclosure Reporting Program;
- AC 120−16, Air Carrier Maintenance Programs;
- AC 120−59, Air Carrier Internal Evaluation Programs;
- AC 120−66, Aviation Safety Action Programs;
- AC 120−72, Maintenance Resource Management Training;
- AC 120−79, Developing and Implementing an Air Carrier Continuing Analysis and Surveillance System;
- AC 120−92, Introduction to Safety Management Systems for Air Operators;
- AC 121−22C, Maintenance Review Boards, Maintenance Type Boards, and OEM/TCH Recommended Maintenance Procedures;
- FAA Order 8040.4, Safety Risk Management; and
- FAA Order 8900.1, Flight Standards Information Management Systems (FSIMS).

Dissenting Opinion

None

U.S. Department
of Transportation
Federal Aviation
Administration

Advisory Circular

Subject: Reliability Program Methods and Standards for Determining Maintenance Schedule Revisions	**Date:** xx/xx/xxxx **Initiated by:**	**AC No:** 120–MRPWG

This advisory circular (AC) provides guidance to develop and maintain a reliability program as part of a Continuous Airworthiness Maintenance Program (CAMP). The guidance includes systems for data collection and analysis, corrective action, statistical performance standards, data display and reporting, scheduled maintenance adjustments, and process changes.

This AC is not mandatory and does not constitute a regulation. This AC describes an acceptable means, but not the only means, of complying with the identified portions of Title 14 of the Code of Federal Regulations (14 CFR). This AC uses the terms “must” or “will” only in the sense of ensuring applicability of these particular methods of compliance when operators use the acceptable means of compliance described herein. This AC does not change any regulatory requirement and does not authorize any change in, or deviation from, any regulatory requirement.

You may elect to follow an alternative method provided your method is acceptable to the FAA. Because the method in this AC is not mandatory, the term “should” applies only when you choose to follow this method without deviation. You may use another acceptable means of compliance if you establish it is adequate for compliance with an enumerated regulation or requirement.

(name)
(title)
(office)

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CONTENTS

CHAPTER 1. GENERAL INFORMATION

1-1. PURPOSE. This publication provides guidance regarding maintenance reliability programs and information on establishing standards for determining required time limitations related to an operator's maintenance schedule. Reliability programs afford an operator the authority and formal means of adjusting maintenance, inspection, and restoration intervals without Federal Aviation Administration (FAA) approval. An operator's operations specifications (Ops Specs) (that is, D074 or Part 91K–M Ops Specs) allow the operator to adjust its maintenance schedule without FAA approval. This does not relieve the operator or FAA of their responsibility for the program's effects on safety; the program should include standards for adjusting maintenance intervals.

1-2. CANCELLATION. AC 120–17A, Maintenance Control by Reliability Methods, dated March 27, 1978, is cancelled.

1-3. AUDIENCE. This AC applies to Title 14 of the Code of Federal Regulations (14 CFR) part 119 operators conducting operations under part 121 and/or part 135 using reliability control methods as an integral part of their approved aircraft maintenance program. This AC also applies to part 91, subpart K (part 91K) operators choosing to maintain a CAMP under §§ 91.1413 through 91.1443.

> **NOTE:** For operators that do not have FAA-approved reliability program Ops Specs, the standards in this AC may be used but will require subsequent FAA approval of recommended changes to the maintenance schedule.

1-4. LEGAL BASIS.

a. Title 49 of the United States Code (49 U.S.C.). Section 44701 of 49 U.S.C. is the primary authority for all Federal aviation regulations. Section 44701 instructs the FAA to promote the safe flight of civil aircraft in air commerce by prescribing regulations and standards in the interest of safety.

b. Methods of Compliance. This AC describes processes, techniques, and procedures that will lead to an effective and viable reliability program. None of the information in this AC is mandatory or constitutes a regulation. This AC contains no material that imposes, reduces, or changes regulatory burdens. If an operator uses the means of compliance presented in this AC, the term "should" used herein applies only if the operator chooses to follow these particular methods. Each operator has a unique operating environment; therefore, a single means of compliance that applies to all certificate holders required to develop, implement, and maintain a reliability program cannot be provided.

1-5. BACKGROUND.

a. 14 CFR part 121 or part 135 operators of aircraft, aircraft engines, and appliances subject to the requirements of part 91 must establish and maintain an approved maintenance schedule (for example, restoration or repair, or specific continue-in-service inspection or replacement). In addition, part 91K operators may choose to establish and maintain an approved maintenance schedule pursuant to a Continuous Airworthiness Maintenance Program (CAMP).

b. The previous version of this AC integrated the Maintenance Steering Group 2 (MSG–2) process, which focused on the maintenance of individual part failure rates. This revision integrates the Maintenance Steering Group 3 (MSG–3) process, which focuses on maintaining functions while considering maintenance cost-effectiveness. In addition, the MSG–3 process identifies functional failure effect consequences and allows a wider selection of maintenance task types. This revision does not identify any specific revision level of MSG as it relates to the processes, methods, and standards in this AC.

1-6. DEFINITIONS. For the purposes of this AC, the following definitions are applicable:

a. Acceptable Level of Reliability. Maintaining failure rates below a value determined by the operator to support operational objectives.

b. Airworthiness Limitation. Instructions for mandatory replacement items, inspection intervals, related inspection procedures, and/or configuration control limitations.

c. Effective. Capable of achieving the desired result. An indicator of scheduled maintenance effectiveness is the availability of your aircraft for flight or operations.

d. Failure. The inability of an item to perform within previously specified limits.

e. Failure Cause. The fundamental mechanism leading to a failure mode.

f. Failure Effect. The result of a functional failure.

g. Failure Mode. The way in which an item ceases to perform its intended function.

h. Function. The normal characteristic actions of an item.

i. Functional Failure. The inability of an item to perform its intended function within specified limits.

j. Hidden Failure Mode. A failure mode which is not detected through routine flight crew operations or in-flight monitoring systems.

k. Hidden Function.

(1) A function that is active when a system is used but where there is no indication to the operating crew when that function ceases to exist.

(2) A function that is normally inactive and whose readiness to perform will not be evident before a demand for use.

l. Inherent Level of Reliability. The level of reliability established by the design and manufacturing of each item. This is the highest level of reliability that can be expected from a unit, system, or aircraft. To achieve higher levels of reliability generally requires modification or redesign.

m. Item. Any level of hardware (that is, a system, subsystem, module, accessory, component, unit, part, or structure).

n. Limitation. A binding limit (calendar, hours, or cycles) for scheduled maintenance task intervals.

o. Maintenance Program. Refers to the CAMP as defined in AC 120–16, Air Carrier Maintenance Programs.

p. Maintenance Schedule. An element of CAMP as defined in AC 120–16, Air Carrier Maintenance Programs.

q. Operational Reliability. The reliability of an item calculated from service data for a specific set of usage conditions.

r. Operational Data. Data used to measure the ability of a specific fleet to perform the required functions over a stated time period of scheduled operations and to indicate the effectiveness of a routine task or to substantiate an interval adjustment. Operational data is usually in the form of Non-Routine Events, Pilot Reports, Logbook items, Unscheduled Parts removals, maintenance findings during troubleshooting, delays or cancellations etc.

s. Optimization. Revisions to the maintenance schedule (for example, a task revision, addition or deletion, or interval adjustment up or down) to improve overall task applicability and effectiveness.

t. Performance Standards. The goals or standards developed by an operator to define an acceptable level of reliability or other defined areas of the operator's CAMP or business objectives related to fleet performance.

u. Predicted Reliability. The estimated reliability of an item.

v. Reliability. The probability that an item will perform a required function, under specified conditions, without failure, for a specified period of time (calendar, hours, or cycles).

w. Routine Task Findings - Data generated to document failures, defects or degradation findings that are identified during the execution of a scheduled maintenance task. This data is usually in the form of non-routine work cards or maintenance finding recorded in the aircraft logbook and may be used to determine the effectiveness of a routine task or to substantiate an interval adjustment.

x. Scheduled Maintenance. A defined set of maintenance tasks performed at stated intervals which, when completed as a whole, comprises the maintenance schedule element of the operator's CAMP.

y. Scheduled Maintenance Task. An action performed at defined intervals, with the objective of retaining or restoring an item to a serviceable condition or to allow discovery of a hidden failure mode, or to ensure that a hidden function is available.

z. Serviceable Condition. The subject item is capable of supporting continued airworthiness.

aa. Task Interval. The specified parameter between consecutive occurrences of a maintenance task expressed in flight hours, flight cycles, calendar time, engine/auxiliary power unit (APU) operating times, or special opportunities where a specific task scope of work is required to be completed.

bb. Task Scope. The appropriate procedures that satisfy the objective of an effective task order to identify, maintain, or restore an item to a serviceable condition, to allow discovery of a failure mode, or to ensure a hidden function is available

cc. Task Type. Standard classifications for a specific task scope (for example, inspection, lube, or functional check).

dd. Task Yield. A percentage measure of the actual interval for accomplishing a task against the maximum allowed interval defined in the operator's program.

CHAPTER 2. RELIABILITY PROGRAM EVALUATION AND REVIEW

a. The main elements of an operator's reliability program are as follows:

(1) A data collection system,

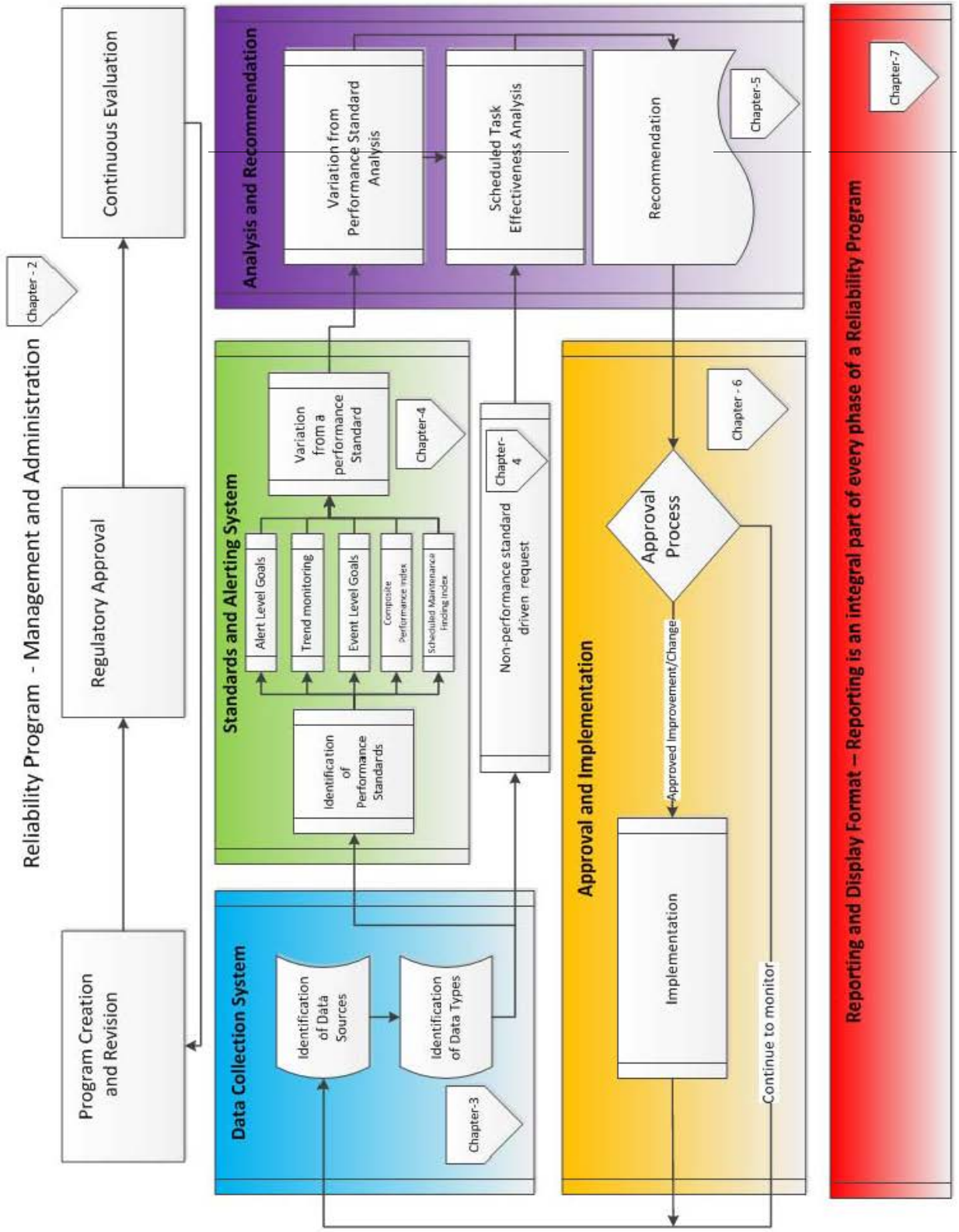
(2) A standards and alerting system,

(3) Analysis and recommendation,

(4) Approval and implementation, and

(5) A reporting and display format.

FIGURE 2–1. RELIABILITY PROGRAM MANAGEMENT AND ADMINISTRATION



2-1. PROGRAM CREATION AND REVISIONS.

b. Documentation within the Operator's Manual. Sections 121.135(b) (18), 135.427, and 91.1427 state that an operator's manual system must contain the standards for determining time limitations of the operator's maintenance schedule. You should ensure documentation in your manual captures the following:

(1) A general description of the reliability program, including definitions of (or reference to) significant terms used in the reliability program.

(2) The application of the reliability program by aircraft fleet type and model (per Maintenance Review Board Report (MRBR) definitions), as appropriate.

(3) Data collection and applicability of data.

(4) The organizational responsibilities for monitoring the performance standards or alert/event levels, specified together with associated time scales.

(5) The procedures for monitoring and revising, as necessary, the reliability performance standards.

(6) The corrective action process.

(7) Reports and frequencies of reports.

(8) Standards for adjusting time limitations.

(9) Reference to all forms that are unique to the reliability program.

(10) A reliability program revision control process and procedure for approving revisions to the reliability program document.

(11) Requirements for self-audit of performance and monitoring for effectiveness of the reliability program.

(12) Reliability program organization authority. The administration of a reliability program requires a specific organizational structure within an operator's maintenance organization that has decision making authority to approve changes to the operator's maintenance schedule.

c. Identifying Participants. Operators should identify participants in the administration of its reliability program within its manual system, including:

(1) The Director of Maintenance (DOM) or designee with overall authority and responsibility for the reliability program within the organization, and

(2) The individual participants in the operator's organizational structure and within the reliability program, including roles, responsibilities, and authority.

d. Reliability Personnel Training/Technical Competency.

(1) The operator must determine its own specialized technical standards for persons whose role is to collect, analyze, and compile reliability abstracts or reports derived from operational or scheduled maintenance discrepancy data. The desired competency and capability standards are based on the level of complexity of the operational and scheduled maintenance discrepancy data the operator collects. These personnel may work in an entity conducting an FAA-approved reliability program or in an independent data collection and analysis system. (Refer to table 2–1).

(2) The content, amount, and method of training provided to an individual may be adjusted as deemed appropriate by the operator depending on the individual's roles and responsibilities, previous training, experience, and/or demonstration of aptitude.

(3) Your manuals system should reflect that the operator has considered the type of reliability analysis experience and training (initial and recurrent) appropriate to the analysts or technicians performing that role (refer to table 2–1).

(4) It is expected that reliability program members with approval authority understand their roles and responsibilities relative to the reliability program.

TABLE 2–1. COMPETENCY TRAINING

Subject Training	Reliability Personnel Knowledge Standards
14 CFR part 125/135 (as applicable): Ops Specs	Familiarization and awareness
Systems analysis training	General training in quality standards and statistical analysis methods
Reliability data training	Experience or training in conducting and reporting results of operational and scheduled maintenance finding analyses
Maintenance Steering Group (MSG): current or applicable	Understanding of applicable MSG methodology used in developing the maintenance schedule
Risk assessment training	The ability to determine risks related to a situation, failure, or hazard
Root cause analysis training, including human factors	Method of problem solving that tries to identify the root causes of faults or failures
Failure Mode and Effects Analysis (FMEA) training	Method of analysis that identifies the failure modes and failure effects related to specific faults or failures
Technical training	Aircraft-specific

2-2. REGULATORY APPROVAL. There is no regulatory requirement that an operator must have or maintain a reliability program. However, if an operator elects to use a reliability program, certain regulations, Ops Specs, and requirements must be taken into consideration.

a. 14 CFR.

(1) Part 91.

(2) Part 119.

(3) Part 121.

(4) Part 135.

b. Ops Specs.

(1) D072, Aircraft Maintenance—Continuous Airworthiness Maintenance Program (CAMP) Authorization.

(2) D074, Reliability Program Authorization: Entire Aircraft.

(3) D075, Reliability Program Authorization: Airframe, Powerplant, Systems or Selected Items.

(4) D079, Reliability Program Contractual Arrangement Authorization.

(5) D088, Maintenance Time Limitations Authorization.

(6) Management specifications (refer to § 91.1015).

c. The manual system must identify areas of the reliability program requiring FAA approval. The operator may elect to have its entire reliability program approved by the FAA or may elect to identify and isolate certain elements which would require FAA approval, to include the following:

(1) Procedures relating to reliability measurement and performance standards, such as—

(a) Addition or deletion of aircraft types, or

(b) Addition or deletion of the components and/or system being monitored;

(2) Changes involving performance standards, including instructions relating to the development of these standards;

(3) Methods to ensure accuracy and applicability of data collected to support the program;

(4) Data analysis methods and application to maintenance program; and

(5) Any changes associated with approval authority.

d. Initial reliability program approval and subsequent revisions require FAA approval from the operator's principal maintenance inspector.

2-3. CONTINUOUS EVALUATION. In addition to Continuing Analysis Surveillance System (CASS) monitoring, the operator must continually monitor the effectiveness of the items identified in paragraph 2–1 of this chapter in its reliability program and make revisions, as necessary. The operator should conduct a periodic review to determine that the established performance standard is still realistic.

CHAPTER 3. DATA COLLECTION SYSTEM

3-1. IDENTIFICATION OF DATA SOURCES. An operator may identify data sources from one or more of the four general categories of an operator's fleet:

a. Systems,

b. Components/line-replaceable units (LRU),

c. Structures, and

d. Engines/APUs.

3-2. IDENTIFICATION OF DATA TYPES. The data collection system should include the identification of data types. Table 3–1 lists typical sources of performance information; however, all of these data types do not need to be included in the reliability program nor does this list prohibit the use of other types of information.

TABLE 3–1. DATA TYPES

Data Type	Operational Data	Routine Task Findings
Aircraft logbook	X	X
In-flight shutdown (IFSD)	X	
Mechanical (technical) interruptions/delays and cancellations	X	
Unscheduled removals	X	
Component maintenance findings		X
Sampling inspections	X	X
Special inspections	X	X
Maintenance deferred with Minimum Equipment List (MEL)	X	X
Chronic systems	X	X
Unscheduled maintenance		X
Integrated Vehicle Health Monitoring a) Aircraft health monitoring b) Engine health monitoring		X
Materials usage	X	X
Extended Operations (ETOPS), Reduced Vertical Separation Minimum (RVSM), CAT II/III		X
Scheduled maintenance findings	X	X

Data Type	Operational Data	Routine Task Findings
Accidents or incidents		X
Unconfirmed components or part removal		X
Unscheduled engine removal	X	X
Air carrier aircraft/engine utilization report		X

3-3. ENSURING VALIDITY AND ACCURACY OF DATA. Data sources and associated data types form the foundation of any reliability program, specifically serving as inputs for surveillance techniques and analytical processes. An operator should validate the accuracy of data to be used in support of its reliability program. Several considerations for an operator seeking consistently effective data include but are not limited to—

a. Adopting comprehensive data standards;

b. Using uniform forms designed to achieve compliance with the data standards;

c. Documenting data auditing processes to detect and correct data irregularities;

d. Documenting a method for providing feedback to organizational elements demonstrating deviations from the data standards; and

e. Associating the data to the applicable Air Transport Association of America (ATA) code, aircraft system, or routine maintenance task (or a combination).

3-4. DATA FROM OTHER OPERATORS.

a. Under specific conditions, an operator may elect to use data from other operators to help substantiate revisions to its maintenance schedule by benchmarking other operators' fleet performance using a larger data pool. The data should be from operators who operate the same fleet type of aircraft under similar operating environments.

b. A part 91K operator with a CAMP may combine its data with data from other CAMP operators in cases where the operator has a limited quantity of data from its own fleet. This is only acceptable if the operator can show that the fleet, duty cycles, operating environments, and relevant maintenance schedule are sufficiently similar for the other operators' data to be applicable. This approach would only be applied to expand a data set to gain additional confidence on the original results, not to significantly change a recommendation that was based on the operator's own data.

CHAPTER 4. STANDARDS AND ALERTING SYSTEM

4-1. IDENTIFICATION OF PERFORMANCE STANDARDS. A performance standard is expressed numerically, as a rate, ratio, or percentage calculated by the number of events occurring in a specified operating period expressed in flight cycles, flight hours, operating hours, or calendar time in terms of system or component failures, pilot reports, delays, scheduled maintenance findings, or some other event which serves as the basis for the standard. The development of control limits or alert values is usually based on accepted statistical methods, such as standard deviation or the Poisson distribution. However some applications use the average or baseline method. The program should include procedures for periodic review and adjustment of the standards as indicated, as well as monitoring procedures for new fleet types until sufficient operating experience is available for computing performance standards. Performance standards may be adjustable with reference to the operator's experience, fleet age, and operational, seasonal, and environmental considerations. Measurements capturing both scheduled and unscheduled events associated to the specific system (ATA code) related to the data types being measured are addressed in table 3–1.

4-2. TECHNIQUES FOR DETERMINING DEVIATION FROM PERFORMANCE STANDARDS. An operator may elect to use one or a combination of the techniques listed in table 4–1.

TABLE 4–1. TECHNIQUES FOR DETERMINING DEVIATION FROM PERFORMANCE STANDARDS

	Method	Inputs Required for Analysis	Action Driver	Reliability Program Requirement
Alert-Based	Identifies deviations from a previously defined standard of performance. The alert level is set so an alert is driven by a major increase in failure rate or scheduled findings but not by normal variation.	Statistical characterization of typical failure rate or scheduled maintenance findings is required to determine the appropriate alert threshold for the system under consideration	Investigation required when the metric falls outside normal variation.	Definition of the method used to calculate the alert level.
Trend Monitoring	Graph or table that tracks current performance to identify out-of-limit conditions or trends of deterioration.	Understanding of the measurement units that have a relationship to system failures (for example, hours vs. cycles). System metric data is typically supplemented by data on component removals and confirmed failures.	Investigation required when a metric falls outside performance limits or is predicted to do so in the near term based on the current trend.	Timeframes selected for monitoring performance (for example, monthly, quarterly, or yearly averages). Definition of units of measurement and demonstration so they are appropriate to the type and frequency of events being recorded.
Event-Based	An event-based program monitors and develops recommendations to specific operational events.	The number and range of inputs must be sufficient to allow data analysis that results in meaningful conclusions. Much of the information that is compiled to assist in the day-to-day operation of the operator's maintenance program may be effectively used as a basis for this type of continuous mechanical performance analysis.	Investigation of the lowest performing items or of any item with a significant change in performance rank.	Definition of performance level or rate of change that would drive investigation.
Index-Based	Multiple data types combined to produce an index ranking of performance (for example, pilot reports, delays/cancellations, or routine task findings).	Knowledge of the parameters that can be used to indicate operational reliability drivers.	Investigation of the lowest performing items or of any item with a significant change in performance index trend.	Definition of the index calculation method. Definition of performance level or rate of change that would drive investigation.

a. Alert-Based Program. The purpose of an alert level is to identify significant deviations from a previously acceptable standard of performance. The level should not be set so high that a major increase in the failure rate does not produce an alert, nor so low that the normal distribution of failures results in excessive alerts. The actual setting of the alert level will therefore normally depend on the distribution or "scatter" observed in the failure rates of the system under review. It should be recognized that alert levels are not minimum acceptable airworthiness levels, but rather means of identifying those increases in failure rate that fall outside the bounds of normal distribution and therefore warrant further investigation. There are several recognized methods of calculating alert levels, any one of which may be used provided that the method chosen is fully defined in the operator's program document.

b. Trend Monitoring-Based Program. When data is prepared as a running graphical or tabular display of current performance, these data depict trends as well as show out-of-limits conditions. The system performance data is usually reinforced by reports of component removals or confirmed failures. The choice of units of measurement is not critical provided that they are constant throughout the operation of the program and are appropriate to the type and frequency of the events being recorded. To assess deteriorating performance, the operator should determine timeframes associated with monitoring performance. For example, a program could monitor the performance standards to measure the most current month, 3-month, and 12-month performance.

c. Event-Based Program. An event-based program monitors and develops recommendations to specific operational events. Event-based programs may be used by any size of organization and applied to any size of fleet. This technique should have sufficient data input in order to have the capability of analyzing the data to arrive at meaningful conclusions. Much of the information compiled to assist in the day-to-day operation of the operator's maintenance program may be effectively used as a basis for this type of continuous mechanical performance analysis.

d. Index-Based Program. An index can be created using multiple data types to produce an index ranking of unacceptable performance. The data types could be determined based on the key indicators of operational reliability drivers.

e. The following are examples of variations to performance standards:

(1) Alert-Based.

(a) Chronic aircraft alerts.

(b) Component alerts.

(2) Trend Monitoring-Based.

(a) Exhaust gas temperature (EGT) exceedances/trends.

(b) Integrated Vehicle Health Monitoring data.

(c) Oil consumption.

(3) Event-Based.

(a) In-flight shutdowns.

(b) Air turnbacks.

(4) Index-Based.

(a) Top performance drivers.

(b) Trending ATA codes.

(c) Routine task findings.

4-3. NON-PERFORMANCE STANDARD DRIVEN REQUEST.

a. The operator may have other reasons to consider an adjustment to the maintenance schedule which are not related to a variation to a performance standard, for example—

(1) A review of all or part of the current maintenance schedule to ensure maintenance is not occurring too frequently,

(2) Appearance concerns,

(3) Modification/product improvement response—review of tasks for effectiveness in light of modification/product improvement, or

(4) Maintenance concerns that do not surface as a deficiency in the maintenance program.

b. . Design approval holder (DAH) source document revisions, including MRBR or Maintenance Planning Document (MPD) revisions, are generated to benefit the aircraft operator community and are a function of aggregating in-service operating experience of the type. These revisions address global in-service experience and reflect new design configurations and new rules. Therefore, when revisions occur, the operator should review them and determine if they necessitate a change in the maintenance schedule based on the operator's particular needs and experience, and its program's goals and philosophy. The DAH will have substantiated the interval for the global fleet and the operator should review and analyze its current reliability metrics and performance standards related to the revised tasks to determine if they indicate acceptable levels of reliability are being realized with no further task interval substantiation required. The following analysis guidelines should be followed:

(1) Unless mandated by regulation, operators are not required to adopt DAH changes; however, it is a best practice for an operator to review the source document changes and compare the task changes to their current reliability metrics and performance standards directly related to the revised task.

(a**)** For source document task deletions or task interval increases—

i. If the operator's reliability metrics and performance standards related to the revised tasks show acceptable levels of reliability, the operator may or may not elect to adopt the change.

ii. If the operator's reliability metrics and performance standards related to the revised tasks show unacceptable levels of reliability, the operator should not adopt the change until the operator develops recommendations addressing this variation to performance standards per this AC and proves they are effective at bringing the performance standards back to acceptable levels.

(b) For source document task additions or interval decreases—

i. If the operator's reliability metrics and performance standards related to the revised tasks show acceptable levels of reliability, the operator may or may not elect to adopt the change

ii. If the operator's reliability metrics and performance standards related to the revised tasks show unacceptable levels of reliability, the operator should consider adopting the change unless it has developed its own recommendations as outlined in this AC for addressing variations from performance standards.

(2) The operator may elect to adopt all, some, or none of the DAH source document revisions based on its reliability metrics and performance standards. Revisions that are not adopted upon initial review should be archived for review against future operational reliability concerns.

NOTE: Because a new entrant operator for the aircraft type is permitted to adopt the extant MRBR/MPD without any prior operational experience or involvement with an MRBR/MPD evolution exercise, the Administrator should not create a competitive disadvantage by disallowing operators with an existing approved maintenance program the ability to adopt revised MRBR/MPD items regardless of the percentage increase from the current interval based on the above process.

CHAPTER 5. ANALYSIS AND RECOMMENDATION

5-1. SYSTEM/COMPONENT ROOT CAUSE ANALYSIS OF VARIATION FROM PERFORMANCE STANDARD. An operator should perform certain analysis techniques in response to variations identified in its performance standards. The operator may determine, anticipate, and/or respond to system component variation from a performance standard based on the following:

a. Areas to consider for root cause analysis include—

(1) Flight defects and reductions in operational reliability,

(2) Defects occurring at line and main base,

(3) Deterioration observed during routine maintenance,

(4) Post-heavy maintenance findings,

(5) Service bulletins and modification evaluations,

(6) Adequacy of maintenance equipment,

(7) Technical publications and instructions,

(8) Staff training (refer to table 2–1),

(9) Utilization (high/low/seasonal), and

(10) Fleet commonality.

b. Examples of analytical techniques and tools that may be used include—

(1) Comparisons of operational data types from internal and external sources.

(2) Interpretation of data type trends.

(3) Evaluation of repetitive defects, including—

(a) No Fault Found (NFF). NFF occurs when a system is tested after a fault is reported but is not replicated during the test.

(b) Rogue Units. A rogue unit is a single serialized LRU which has demonstrated a history of identical system faults resulting in an exceedance of an operator’s defined number of repetitive unscheduled removals with an associated short service life.

(c) Chronic Units. A chronic unit is a single serialized LRU which has demonstrated a history of different system faults resulting in an exceedance of an operator’s defined number of repetitive unscheduled removals with an associated short service life.

(d) Chronic Systems/Aircraft. A chronic system or aircraft is identified by a specific aircraft serial number which has demonstrated a history of repetitive unscheduled maintenance defects with the same ATA code during an operator-defined period of time.

(4) Confidence testing of expected and achieved results.

(5) Studies of life-bands and survival characteristics.

(6) Investigative testing/sampling programs.

(7) Structural Review/Analysis. To monitor and control structural integrity, structural service bulletins and industry reports should be reviewed by structures engineers for applicability and urgency. Structural discrepancies and major structural discrepancies should be reviewed.

(8) Weibull Analysis. Weibull analysis determines the failure distribution profile and the predictability of failure for a component, and is used to determine whether a component or system shows signs of deteriorating performance with age. This statistical method helps in determining benefit from a restoration task or regular preventative maintenance for a component.

(9) Pareto Analysis. Pareto analysis is a simple rank ordering of the highest quantity of failures for a given data source, and is often performed on the delay and cancellation events to show which ATA code subjects are most problematic. The same graphical representation is used for aircraft out-of-service events, MEL applications, and other subject matter as deemed necessary. Pareto charts are used for the top subjects, which are often targeted for performance improvements.

(10) FMEA.

(11) MSG analysis methods.

(12) Other root cause analysis tools.

5-2. SCHEDULED TASK ANALYSIS EFFECTIVENESS. An operator should perform routine analysis to determine the applicability and effectiveness of the tasks contained within the maintenance schedule. In addition, an operator may elect to analyze those tasks to optimize the task while ensuring it maintains task applicability and effectiveness. The desired result of a program evolution is not to increase a discrete task interval, but to substantiate accomplishing an effective task at the appropriate interval without compromising operational performance.

a. Data Selection Criteria. An operator should include in its reliability program manual a defensible methodology for determining a sample size or data set that adequately represents its fleet with respect to the maintenance task under consideration. A defensible method is a process that is consistent, measurable, unbiased, factual, accurate, and repeatable. Data sampling allows an operator to analyze a defined portion of data from a relevant data set, rather than analyzing the entire amount of data that may be available. Regardless of the method used to determine how much data is required, the documented process must result in confidence that the selected data set is representative of the entire fleet. This avoids the possibility that optimization decisions are based on data from aircraft that are at the extremes of the data set.

(1) The process for selecting a data pool that reflects the fleet composition should consider the following criteria:

(a) Operational history,

(b) Configuration,

(c) Utilization and environmental conditions,

(d) Seasonal duty,

(e) Previous operator ownership,

(f) Time elapsed since major conversions or refurbishments,

(g) Sustained storage periods, and

(h) Task yield:

.i. A minimum acceptable value for yield of 90 percent on average for all task accomplishments contributing data to the task escalation analysis.

.ii. No task accomplishment within the data set used for task escalation analysis should have a yield less than 80 percent.

.iii. For each data point, the yield may be obtained by a single accomplishment of the task. Alternatively, multiple consecutive accomplishments of the same task may be included as long as both nil and positive findings are evaluated for each accomplishment and special consideration is given to degradation patterns. For example, a task completed at 45 percent yield on two consecutive occasions could be used as a combined data point to achieve a 90 percent task yield, assuming no findings on the first task completion.

(2) Include one or more of the following means of defining a data selection method from the data pool that is generated by the criteria above, such as—

(a) A defined number of aircraft,

(b) A percentage of fleet size,

(c) A statistical formula, or

(d) A percentage of data over a defined period of time.

(3) The operator should filter the data to ensure fleet representation is maintained in the data set used for analysis (refer to figure 5–1).

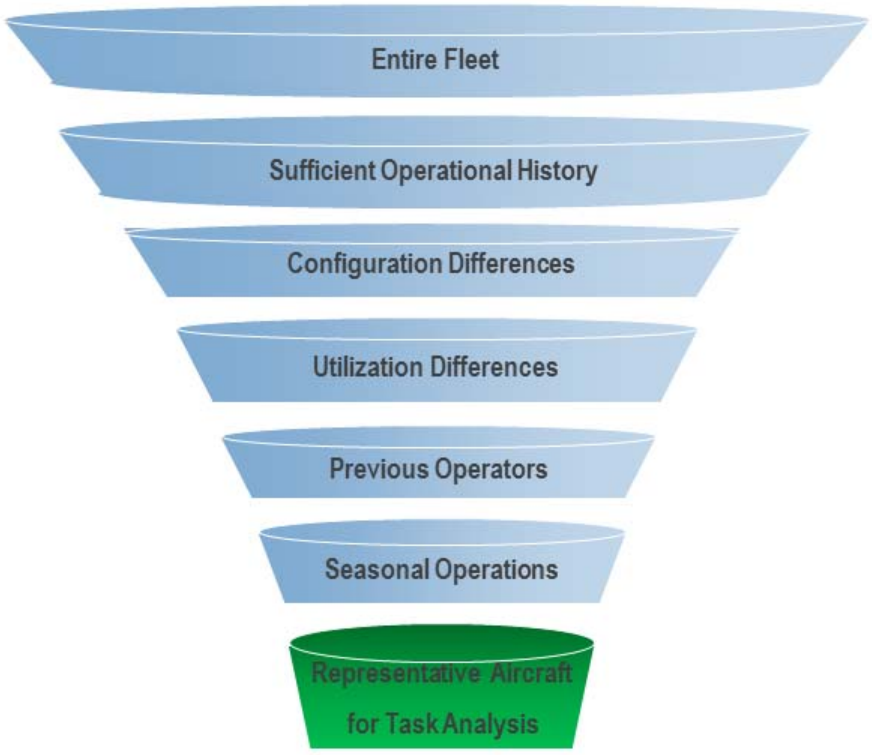
(4) Sample data should meet the following task yield criteria:

(a) A minimum acceptable value for yield of 90 percent on average for all task accomplishments contributing data to the task escalation analysis.

(b) No task accomplishment within the data set used for task escalation analysis should have a yield less than 80 percent.

(c) For each data point, the yield may be obtained by a single accomplishment of the task. Alternatively, multiple consecutive accomplishments of the same task may be included as long as both nil and positive findings are evaluated for each accomplishment and special consideration is given to degradation patterns. For example, a task completed at 45 percent yield on two consecutive occasions could be used as a combined data point to achieve a 90 percent task yield, assuming no findings on the first task completion.

FIGURE 5–1. DATA SELECTION EXAMPLE



b. Task Yield. Any analysis that includes defects generated (or the lack of defects generated) from scheduled maintenance tasks should consider respective interval yield. This is because the current task interval is established with the intent of detecting degradation or potential failure at that interval, and if the task is performed significantly earlier than the specified interval, the data may not be valid to support an escalation of the specified interval. Therefore, a validity consideration associated with yield is important. To arrive at a yield solution, the defined interval and the actual interval at which the task was accomplished must be calculated using the same parameter (flight hours, flight cycles, or calendar). In some cases, the

operator will need to perform a conversion (dimensional analysis) of values to arrive at the same usage parameter. The yield calculation should divide the actual interval at which the task was accomplished by the defined interval to calculate the percentage of the defined interval yield.

Example:

Task defined yield: 7,500 flight hours.

Actual task yield: 7,000 flight hours.

Calculation: 7,000 flight hours/7,500 flight hours = 93.34 percent task yield.

c. Data Preparation, Scrubbing, and Related Consideration. Typically, maintenance findings are collected and consistently coded so correlation to the subject task is evident to the analysts or engineers performing the analysis (refer to paragraph 3-3 above). To ensure comprehensiveness and relevance of data when performing analysis of effectiveness and interval of a given scheduled maintenance task, the operator should ensure all data findings are directly related to the task being analyzed regardless of data source. All unrelated data should be excluded from the analysis.

(1) Related Data. Related data is a maintenance record discovered during scheduled or unscheduled maintenance to which the corrective action is directly associated to the task being analyzed or its consequence of functional failure.

(2) Unrelated Data. Unrelated data is a maintenance record discovered during scheduled or unscheduled maintenance for which the corrective action is not directly associated to the task being analyzed or its consequence of functional failure.

(3) Significant Finding. A significant finding is a maintenance record considered directly related to the task being analyzed that indicates a functional failure or significant degradation/wear has occurred. These are primary analysis concerns. Examples of significant findings include—

(a) Systems tasks that—

i. Affect airworthiness or safety on the ground or in flight.

ii. Are undetectable or unlikely to be detected during operations.

iii. Have significant operational impact.

iv. Have significant economic impact.

(b) Structures that—

i. Affect airworthiness or safety on the ground or in flight.

ii. Have defects resulting in SDRs.

(4) Non-Significant Finding. A non-significant finding is a maintenance record considered directly related to the task being analyzed that does not indicate a functional failure or significant degradation/wear and which does not fall into an example category for significant finding. These are not primary analysis concerns.

d. Summary of Data. Each interval adjustment based on the data derived from the operator's reliability program should include a summary of the data that was used for the analysis. Data constitutes the foundation for standards determining task accomplishment time limits. This summary should demonstrate that the guidelines of the operator's FAA-approved reliability program regarding data selection were followed.

e. Evaluation of Data Sources. Table 5–1 contains recommended data sources by task type that an operator may use for analysis to determine time limitations for tasks contained in the operator's maintenance schedule. The data is divided into primary and secondary sources.

(1) Primary data elements should be used as the main data source for analysis by the operator to substantiate an effective task interval.

(2) Secondary data elements should be used to further support or validate analysis conclusions requiring further investigation. This data should not be used as the sole source for determining time limitations of a task.

TABLE 5–1 DATA SOURCES BY TASK TYPE

Task Type	Primary Data	Secondary Data
Systems tasks[1] (excluding Failure Effect Categories (FEC) 8 & 9)	Operational reliability data	Routine task findings
Propulsion tasks[1] (excluding FEC 8 & 9)	Operational reliability data	Routine task findings
Structures tasks	Routine task findings[2]	Operational reliability data
Zonal tasks	Routine task findings[2]	Operational reliability data[1]
FEC 8 & 9 tasks	Routine task findings/sampling at proposed interval[2]	FEC 8 ONLY: MSG derived functional failure data/expand data set/previous accomplishment of task
Enhanced zonal analysis program (EZAP)/electrical wiring interconnection system (EWIS) tasks	Routine task findings[2]	Operational reliability data
Lube tasks	Reservoir size and consumption rates/sampling at proposed interval	Operational reliability data

Task Type	Primary Data	Secondary Data
Filter tasks	Analysis of remaining life at current interval/sampling at proposed interval	Operational reliability data[3]

[1] The primary data source for systems and powerplant tasks (excluding FEC 8 & 9 tasks) is the operator's operational reliability data. The effectiveness of these tasks is measured by the ability of the maintenance program task to detect and correct defects in the system before the defect impacts the operational environment.

[2] It is important to note that because failures associated with these tasks are normally found during the accomplishment of the routine task, this data may not be captured as part of an operator's normal reliability data elements. Therefore, some means of capturing those failures for analysis is necessary.

[3] Only for those tasks where failures would be evident to the flightcrew or maintenance personnel and would be recorded in the operational data (such as logbook write-ups).

f. Analysis Process. Once the operator has identified and obtained the data, the operator must analyze the data in order to substantiate interval adjustment or task revision. To perform the correct level of analysis, the operator should develop standardized decision logic based on the type of task and data being analyzed. For examples of this decision logic, refer to appendix A.

g. Result of Analysis. If the analysis shows the operational impact for a given system is low, the task may be considered effective regardless of the number of scheduled maintenance findings. Conversely, a high level of operational impact could indicate an ineffective task, even if the number of scheduled maintenance task findings is low. Other combinations are also possible. Table 5–2 represents examples of situations that may be identified during the analysis. This table is not definitive or exhaustive, but provides operator guidance.

TABLE 5–2. REVIEW OF SYSTEMS/POWERPLANT TASKS (NON-FEC 8 & 9)

	Low Unscheduled Maintenance Defects		**High Unscheduled Maintenance Defects**	
	Low Operational Impact	**High Operational Impact**	**Low Operational Impact**	**High Operational Impact**
Low Scheduled Maintenance Defects	Effective but not optimized	Ineffective	Note 1	Ineffective
High Scheduled Maintenance Defects	Effective and optimized	Ineffective	Effective but not optimized	Ineffective

Note 1: Analysis is required to determine if the task is effective or ineffective.

h. The operator should develop a standard for how to capture, display, and archive this task data along with the results of the data analysis. The operator should provide a summary report of this analysis to be used to communicate recommendations and for the approval process. The operator should consider adding a special emphasis task section to this summary report. This section should contain information related to certain tasks that would warrant special analysis or consideration, such as—

(1) FEC 5 and FEC 8 tasks,

(2) Level 2 or higher corrosion findings, and

(3) EWIS and fuel tank safety.

5-3. RECOMMENDATIONS. Operators are expected to develop recommendations in response to any variation from a performance standard revealed by the reliability program.

a. The purpose of a reliability program is to allow an operator a means to determine effective time limitations related to the operator's maintenance schedule; therefore, most recommendations will take the form of a proposed adjustment to the maintenance schedule. Recommended maintenance schedule adjustments could include—

(1) Escalating (increase) or de-escalating (decrease) the current maintenance schedule interval,

(2) Deleting an existing task,

(3) Adding a new task, or

(4) Accepting current performance and continue to monitor.

b. An FAA-approved reliability program should be a part of an operator's CASS; however, it cannot replace or substitute for a CASS. As part of CASS, the recommendation resulting from the reliability program analysis could go beyond a maintenance schedule adjustment as an input to the operator's broader CASS program. Some recommendation examples are—

(1) CAMP element changes. The ten elements of a CAMP are—

(a) Airworthiness responsibility,

(b) Air carrier maintenance manual,

(c) Air carrier maintenance organization,

(d) Accomplishment and approval of maintenance and alterations,

(e) Maintenance schedule,

(f) Required inspection items,

(g) Maintenance recordkeeping system,

(h) Maintenance providers,

(i) Personnel training, and

(j) CASS.

(2) Fleet modifications or configuration changes.

(3) Changes to maintenance, operational procedures, or techniques, including—

(a) One-time special maintenance for the fleet,

(b) Initiation of modifications to aircraft and aeronautical products,

(c) Changes to provisioning of spare parts for maintenance,

(d) Changing to manpower and equipment planning for maintenance, and

(e) Training of maintenance personnel.

(4) Requests for external original equipment manufacturer (OEM) support.

c. The operator's CASS program procedures should be followed for any recommendations outside the scope of an adjustment to the maintenance schedule.

CHAPTER 6. APPROVAL AND IMPLEMENTATION

6-1. APPROVAL PROCESS.

a. The operator's maintenance schedule adjustment recommendation should follow an approval plan. An approval plan should be comprised of procedures initiated by the competent review and disposition of a recommendation by the designated decision authority. A party responsible for the implementation of the approval should be identified and defined. The operator should also develop methods to—

(1) Resolve non-concurrence.

(2) Ensure closure of all proposals.

(3) Archive the disposition of a recommendation.

b. FAA approval of revisions to an operator's maintenance schedule is not required unless otherwise restricted (such as airworthiness limitations, certification maintenance requirements, or airworthiness directives). However, the operator should be prepared to demonstrate to the FAA oversight office, as requested, that the process used to determine the maintenance schedule intervals was accomplished in accordance with the standards for determining time limitations contained in the operator's FAA approved reliability program.

6-2. IMPLEMENTATION PROCESS. The operator should have a documented process for implementing the changes into the maintenance schedule or CAMP. The implementation plan should be documented as part of the approval process of the change.

a. Escalated task accomplishment intervals and deletions of tasks will normally become effective immediately upon attaining approval per the operator's defined task amendment approval process.

b. For escalated intervals, the operator must ensure the time span between the last task accomplishment and next accomplishment for the affected task, to include calendar control task related to date checks of life limited items, does not exceed the newly established interval. In most cases, the introduction of individually escalated task intervals is relatively transparent but will require coordination with maintenance support organizations such as resource allocation, logistics, and planning groups. If the entire check interval is escalated (for example, a check formerly performed at an interval of 5,500 flight hours is now to be performed at 7,500 flight hours), significant coordination with impacted organizations must be taken into consideration.

c. For de-escalated intervals, the operator should determine, based on the urgency of the reliability concern, when to implement the reduced interval. Options could range from waiting until the next scheduled completion of the task, based on the original interval, before implementing the change (a phase-in schedule should be part of the approved implementation plan) to immediately implementing the reduced interval. Similarly, the timing for the implementation of new tasks should be based on the urgency of the reliability concern.

d. After the changes are implemented, the operator's reliability program should continue to monitor the effectiveness of the overall maintenance schedule. A best practice would be for an operator to specifically follow up and report on changes which have been previously implemented, to confirm the operational reliability of the affected system has not been adversely impacted by the implementation of the change.

CHAPTER 7. REPORTING AND DISPLAY FORMAT

7-1. GENERAL. All programs will require a means of displaying and reporting the collected data as documented in the operator's manual.

a. Reliability program reporting should—

(1) Develop one or more means of displaying and reporting collected data, including data displays summarizing the activity since the last reporting period.

(2) Cover all aircraft systems controlled by the program in sufficient detail to enable the Administrator and other recipients of the information to evaluate the effectiveness of the maintenance schedule, including changes in maintenance and inspection intervals and changes from one process category and/or task to another.

(3) Include enough data to accurately portray the carrier's particular operation(s).

(4) Be frequent enough to identify degrading trends before significant operational impact occurs.

(5) Identify areas which have not achieved the established performance standards.

(6) List continuing exceedance conditions carried forward from previous reports, together with details of the progress of any responsive action taken.

(a) Highlight any taken or planned recommendations.

(b) Monitor the effectiveness of revisions to the maintenance schedule.

b. Reliability reporting methods and frequency of reporting will vary by operator and will be dependent upon the complexity of the operator's program, particularly the sophistication of the data collection and data analysis processes.

c. Operators may choose to incorporate all reporting elements into a single report or incorporate individual elements into multiple forms and forums, including electronic data displays, structured reports, and/or presentations.

CHAPTER 8. ADMINISTRATIVE

8-1. WHOM TO CONTACT. If you have questions about the material in this AC or would like to provide feedback, you may use the following communication links. By mail: Federal Aviation Administration Headquarters, 5th Floor, 950 L'Enfant Plaza, S.W., Washington, DC 20024. By phone at: 202-385-6435.

8-2. REGULATORY REFERENCES. Refer to the following 14 CFR parts:

a. Part 91.

b. Part 119.

c. Part 121.

d. Part 135.

8-3. GUIDANCE REFERENCES. Refer to the following FAA ACs and orders:

a. AC 0–46, Aviation Safety Reporting Program.

b. AC 26–1, Continued Airworthiness and Safety Improvements.

c. AC 00–58, Voluntary Disclosure Reporting Program.

d. AC 120–16, Air Carrier Maintenance Programs.

e. AC 120–59, Air Carrier Internal Evaluation Programs.

f. AC 120–66, Aviation Safety Action Programs.

g. AC 120–72, Maintenance Resource Management Training.

h. AC 120–79, Developing and Implementing an Air Carrier Continuing Analysis and Surveillance System.

i. AC 120–92, Introduction to Safety Management Systems for Air Operators.

j. AC 121–22, Maintenance Review Boards, Maintenance Type Boards, and OEM/TCH Recommended Maintenance Procedures.

k. FAA Order 8040.4, Safety Risk Management.

l. FAA Order 8900.1, Flight Standards Information Systems (FSIMS) (Volume 6; Chapter 2, Part 121, 135, and 91 Subpart K Inspections; Section 31).

8-4. OTHER SOURCE REFERENCES. Refer to the following additional sources:

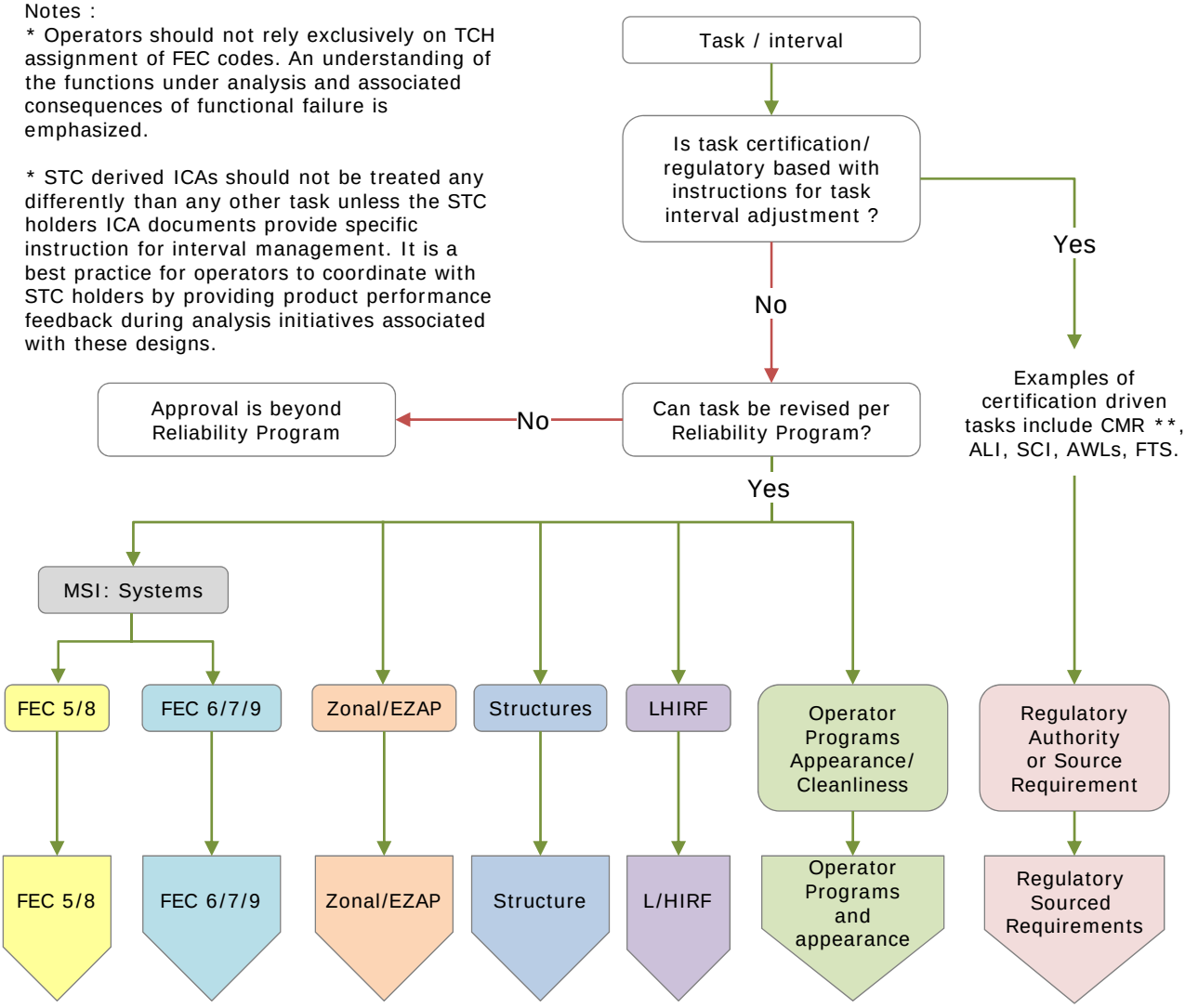
a. "E.M.A.C. Maintenance Program Optimization 1," January 1985.

b. "Reliability-Centered Maintenance," F.S. Nowlan, et al, December 1978 (report number AD–A066–579, DD Form 1473, January 1, 1973).

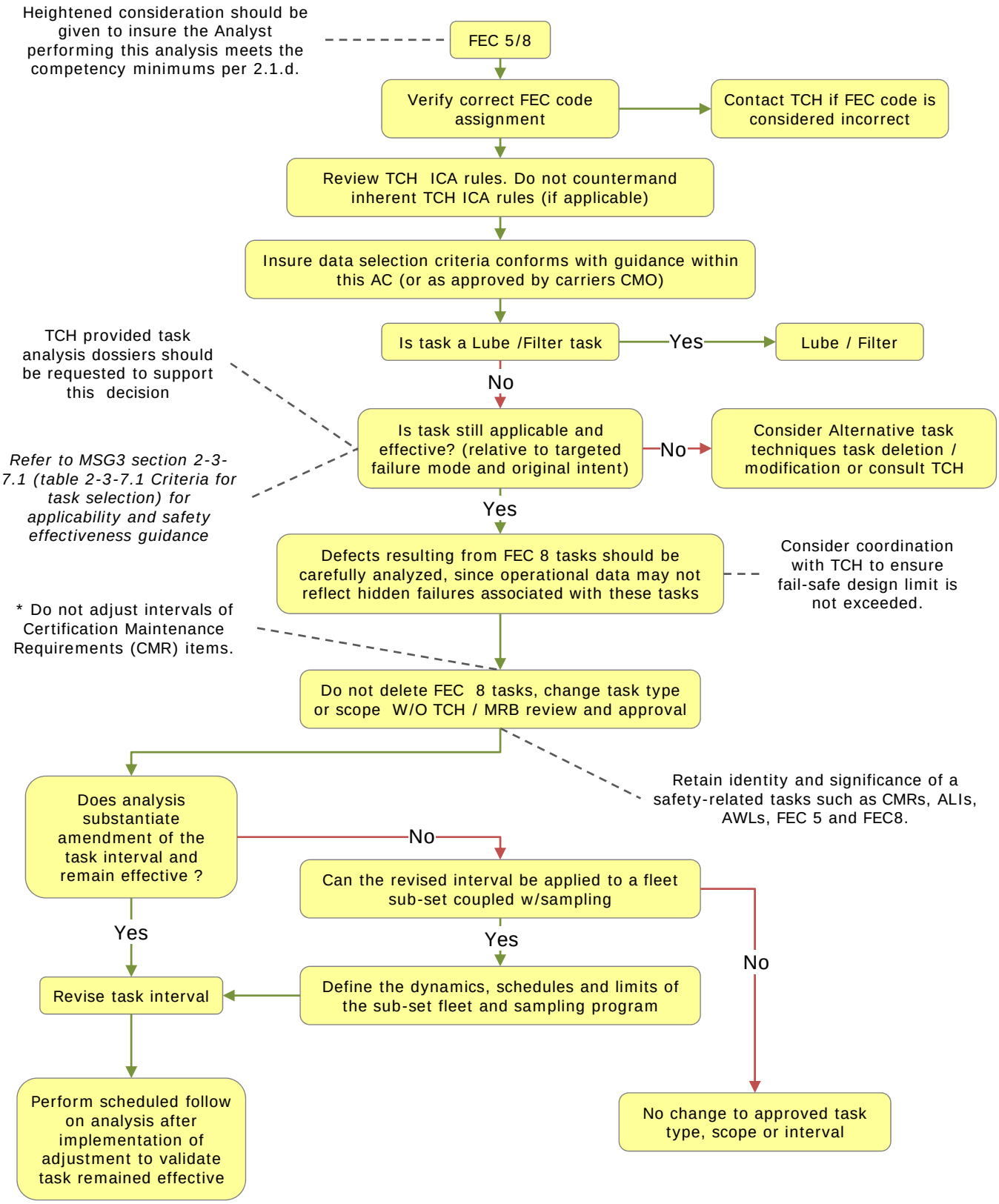
APPENDIX A. TOP-LEVEL CHART

Notes :
* Operators should not rely exclusively on TCH assignment of FEC codes. An understanding of the functions under analysis and associated consequences of functional failure is emphasized.

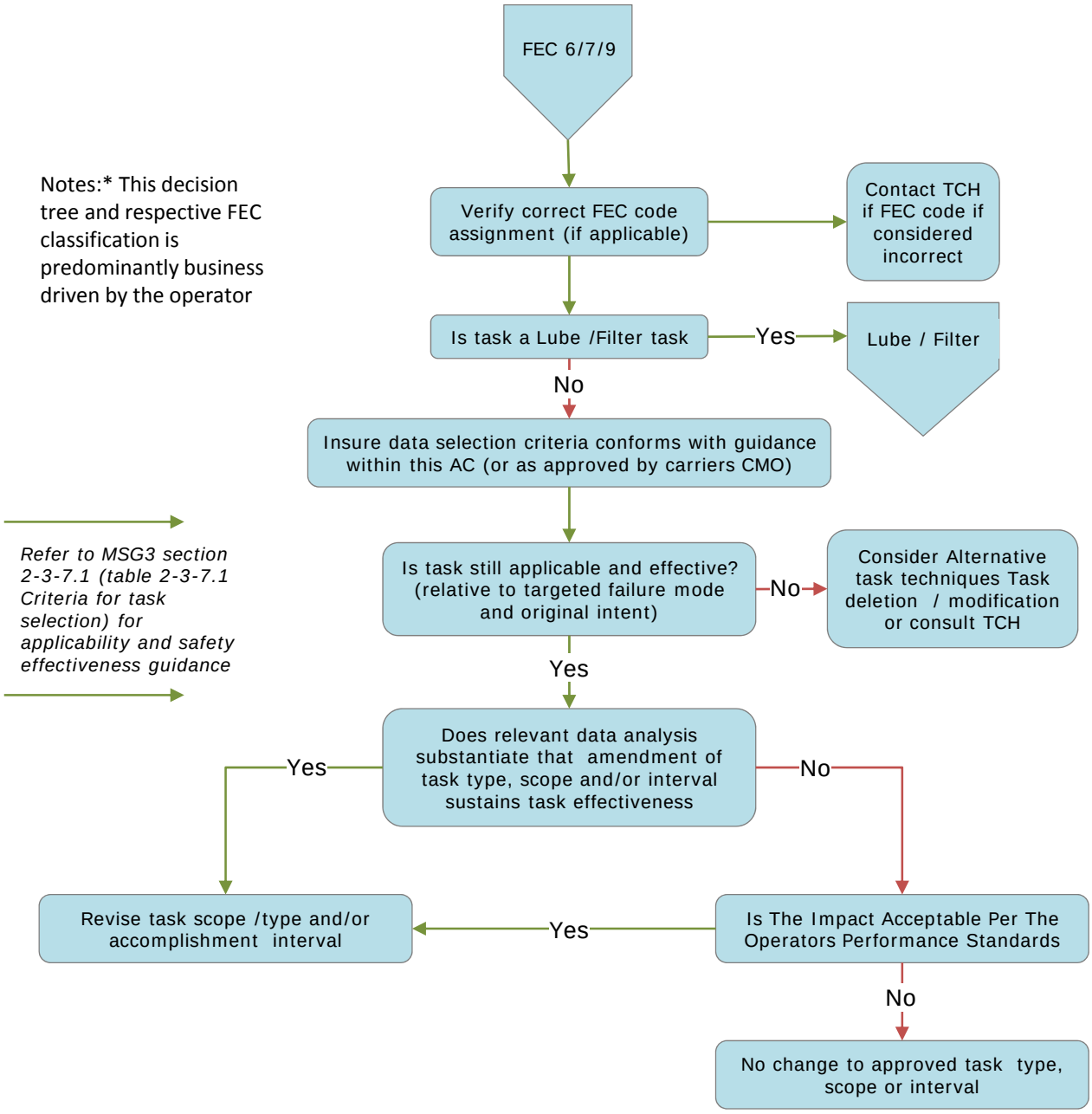
* STC derived ICAs should not be treated any differently than any other task unless the STC holders ICA documents provide specific instruction for interval management. It is a best practice for operators to coordinate with STC holders by providing product performance feedback during analysis initiatives associated with these designs.



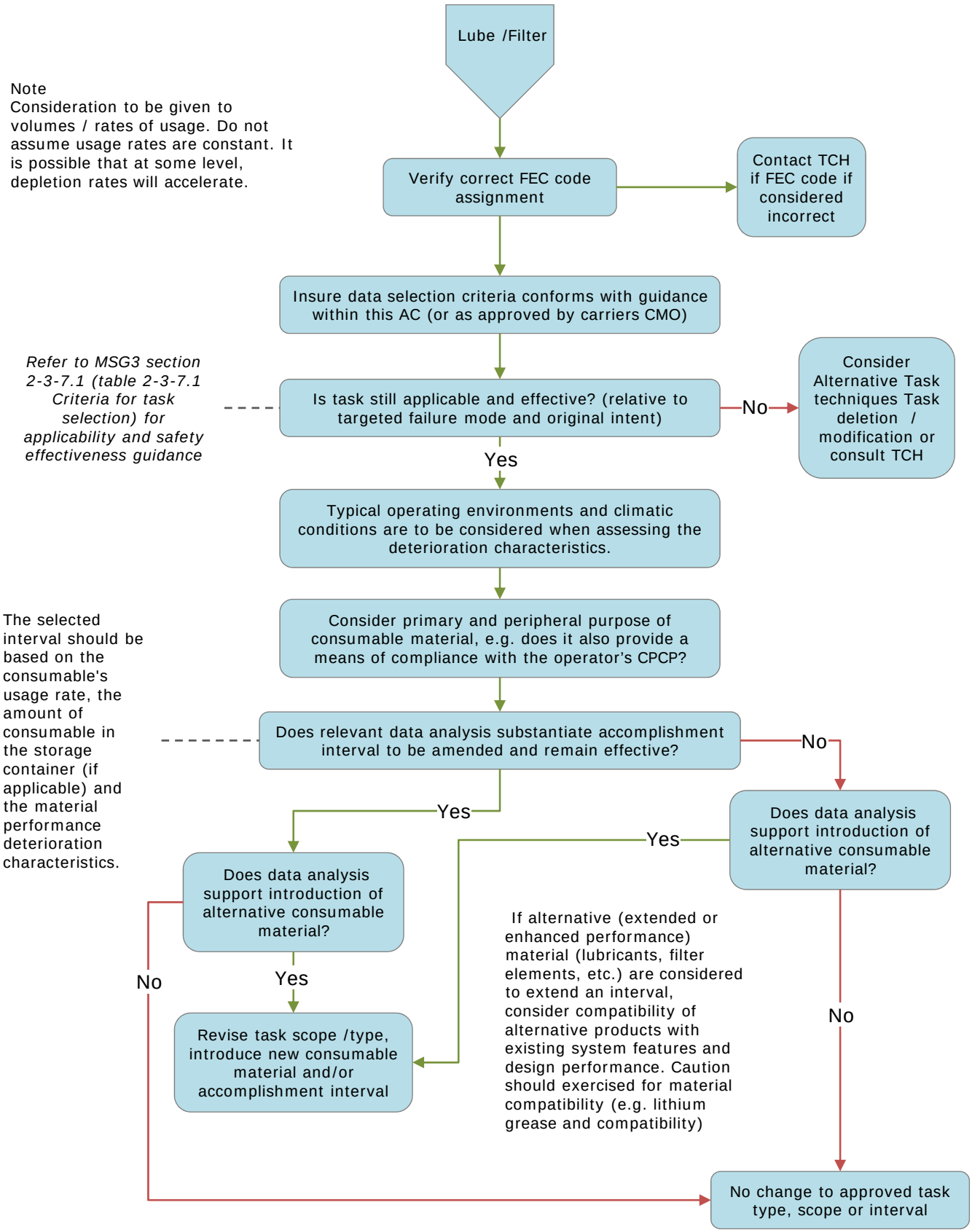
APPENDIX B. FEC 5/8



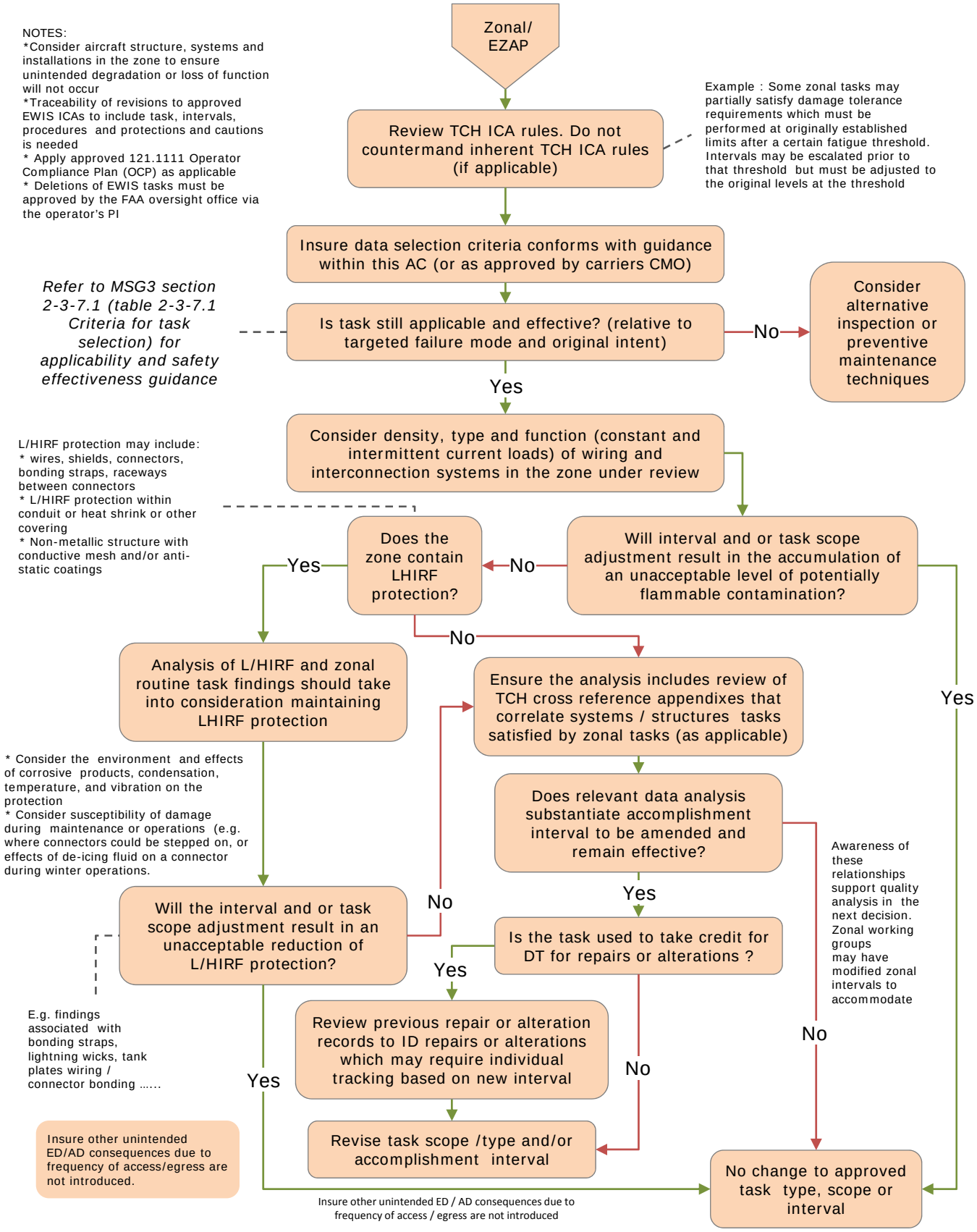
APPENDIX C. FEC 6/7/9



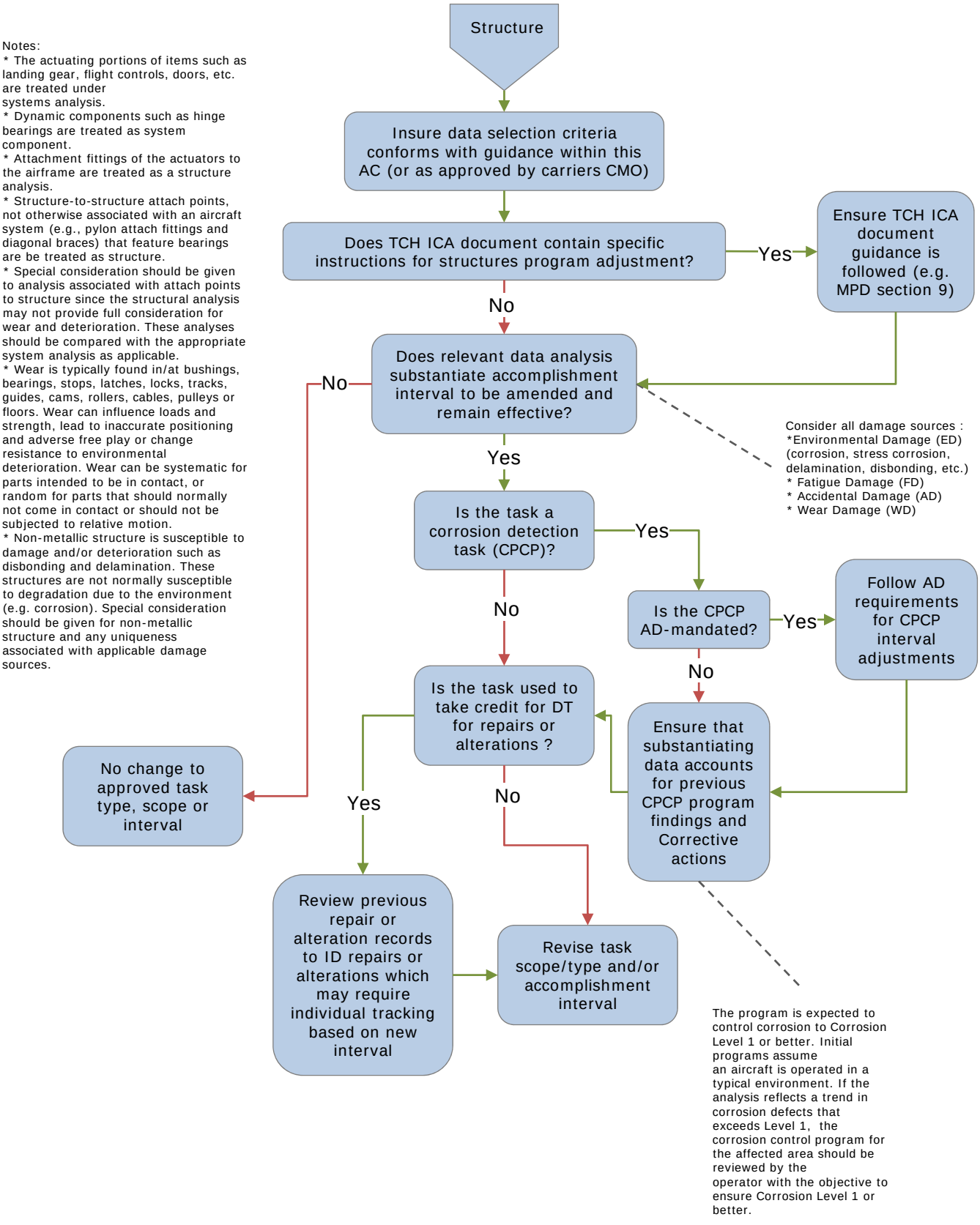
APPENDIX D. LUBE/FILTER



APPENDIX E. ZONAL/EZAP



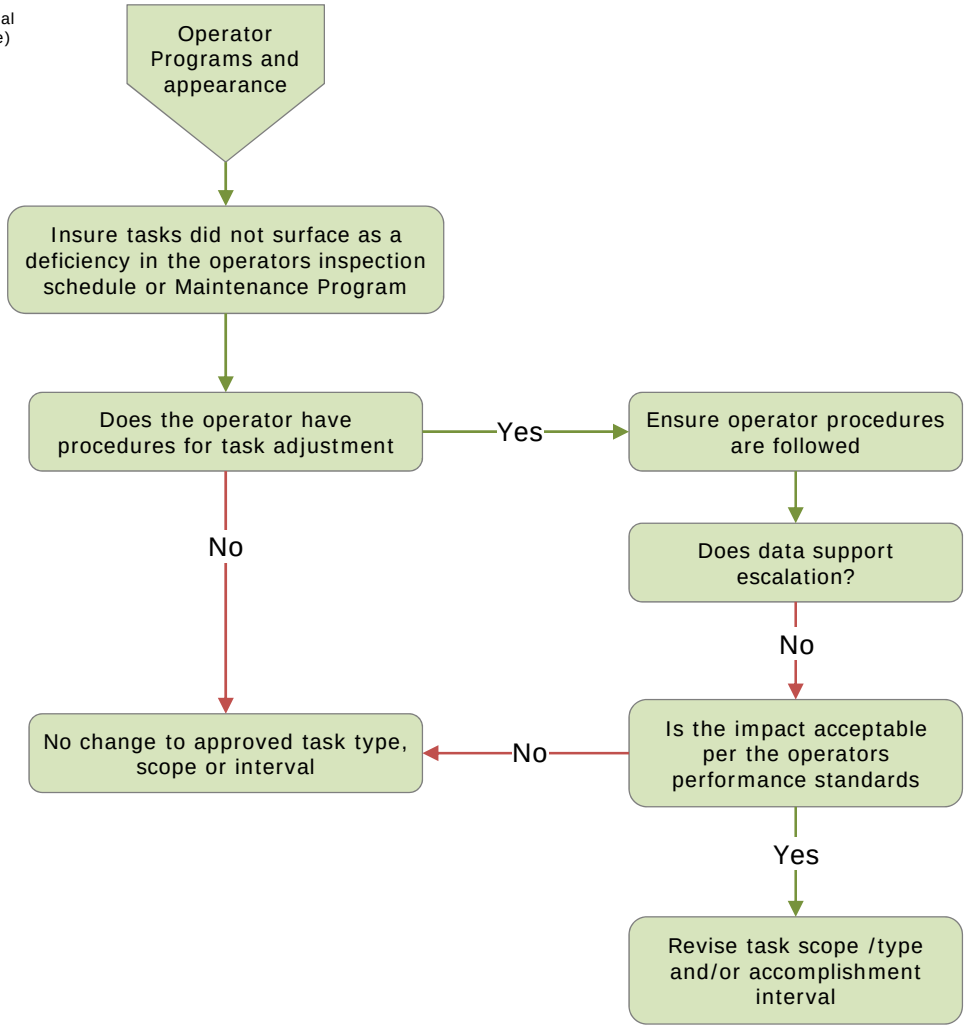
APPENDIX F. STRUCTURE



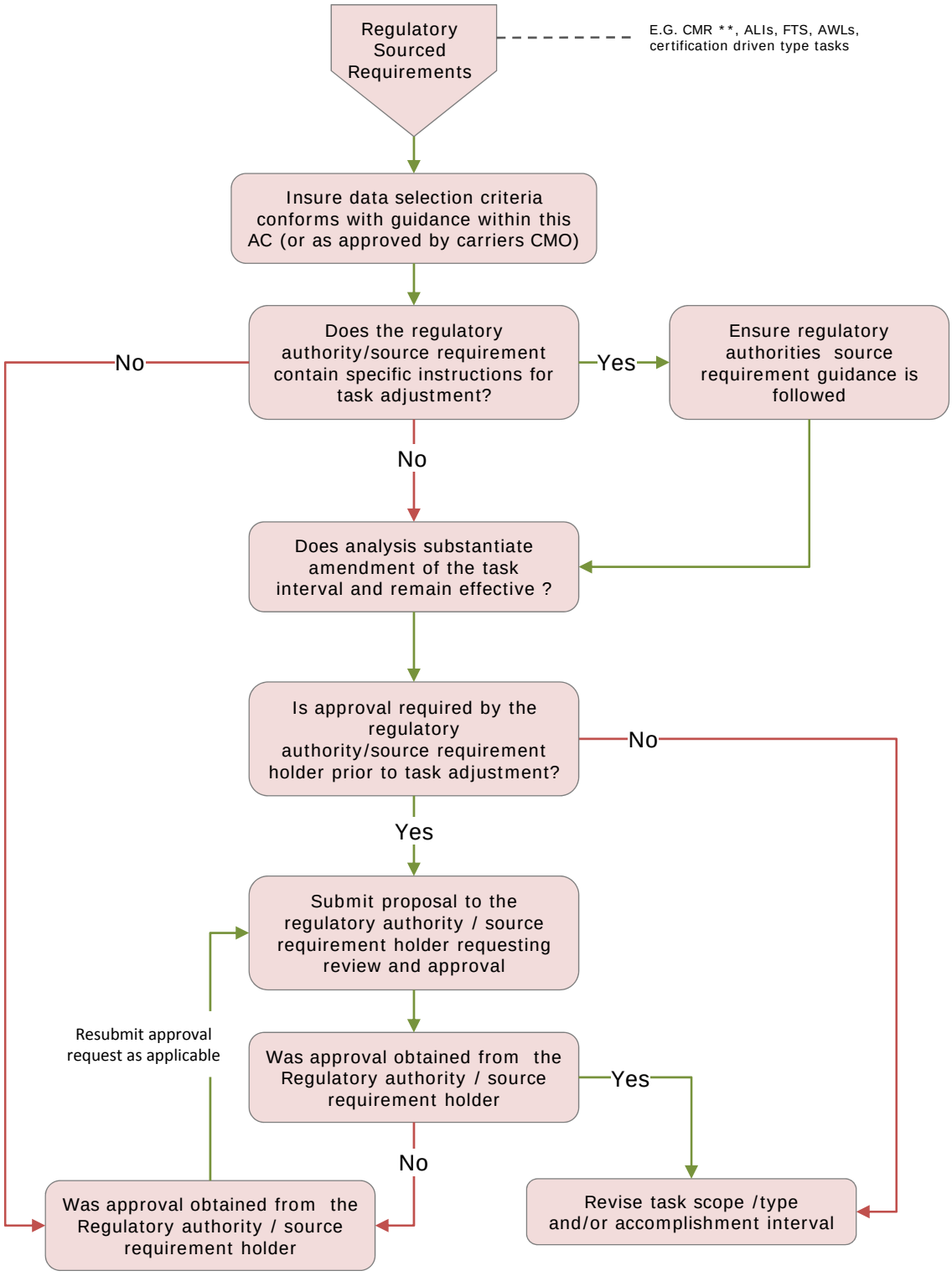
Notes:
* The actuating portions of items such as landing gear, flight controls, doors, etc. are treated under systems analysis.
* Dynamic components such as hinge bearings are treated as system component.
* Attachment fittings of the actuators to the airframe are treated as a structure analysis.
* Structure-to-structure attach points, not otherwise associated with an aircraft system (e.g., pylon attach fittings and diagonal braces) that feature bearings are be treated as structure.
* Special consideration should be given to analysis associated with attach points to structure since the structural analysis may not provide full consideration for wear and deterioration. These analyses should be compared with the appropriate system analysis as applicable.
* Wear is typically found in/at bushings, bearings, stops, latches, locks, tracks, guides, cams, rollers, cables, pulleys or floors. Wear can influence loads and strength, lead to inaccurate positioning and adverse free play or change resistance to environmental deterioration. Wear can be systematic for parts intended to be in contact, or random for parts that should normally not come in contact or should not be subjected to relative motion.
* Non-metallic structure is susceptible to damage and/or deterioration such as disbonding and delamination. These structures are not normally susceptible to degradation due to the environment (e.g. corrosion). Special consideration should be given for non-metallic structure and any uniqueness associated with applicable damage sources.

APPENDIX G. OPERATOR PROGRAMS AND APPEARANCE

Notes:
This decision tree pertains to optional maintenance tasks (operator unique) such as:
* Best practices
* Tasks that support other tasks
* Administrative support tasks
* Brand / image
* Cleanliness standards



APPENDIX H. REGULATORY SOURCED REQUIREMENTS



APPENDIX I. L/HIRF