

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p><b>Commenter: AIA</b>                      The Aerospace Industries Association (AIA) represents the nation’s leading manufacturers and suppliers of civil, military and business aircraft, helicopters, unmanned aircraft systems, space systems, aircraft engines, missiles, materiel and related components, equipment, services and information technologies. A large portion of AIA membership would be impacted, either directly or indirectly, by the proposal contained in the subject draft Advisory Circular (AC). We appreciate the opportunity to review the draft and present the following comments that generally address high level concerns rather than specific dissection of the material.</p>	<p>None.</p>	<p><i>We appreciate AIA’s submittal of these comments. We are fully aware of AIA’s membership interests in our proposed revision to AC 25-19, which was originally published in 1994. Our proposal was based on lessons learned through the years in numerous certification projects, Certification Maintenance Coordination Committee meetings, and Industry Steering Committee (ISC) meetings. In developing the proposal, we also considered and incorporated feedback provided through in-depth discussions with joint industry/authority working groups, such as the group that responded to the Commercial Aviation Safety Team’s Safety Enhancement #24 (CAST SE-24) and the CAST SE172RI Taskforce. The proposal was developed in coordination with EASA, TCCA, and ANAC, incorporating their feedback and lessons learned as well. The need to improve/revise the AC was expressed both by industry and the authorities involved in these discussions.</i></p>

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<p><b>Commenter: AIA</b> AIA is concerned the draft proposal introduces practices that are unproven and has the potential to overlook those which have an extremely successful history. Behind the unproven practices seems to reside an approach that uses excessively conservative latent failure scenarios with little or no consideration of service history or data driven risk assessment. The following excerpts are examples that cause the underlying concern the FAA is moving away from experience and data-driven risk assessments:</p> <p>• <b>Identification of Candidate Certification Maintenance Requirements (CCMR)</b> – “Tasks may be selected from those intended to detect latent failures that would, in combination with one or more specified failures or events, lead to a hazardous or catastrophic failure condition.” Judgment to include tasks could include identification of “latent failures that would, in combination with one or more specified failures or events lead to a major failure condition that is not identified and assigned a task via the MSG-3 process.”</p>	None.	<p>It is not clear how the excerpts explain the concerns:</p> <p>• <b>Identification of CCMR:</b> The first quote is the <u>original</u> wording in the existing AC. The wording has been in use since 1994. Because the guidance has been used successfully for over 15 years, we do not agree that is “unproven practice,” “excessively conservative,” or “no consideration of service history.”</p> <p>The second quote regarding Major effects is not in the original AC but is <u>currently applied by EASA and TCCA</u>. Our experience is the identification of CCMR for Major failure conditions is rare; but it is occasionally necessary when the certification process needs to supplement the MSG-3 process.</p>
<p>• <b>Selection of Certification Maintenance Requirements (CMR)</b> – “The CMR designation should be considered for the significant latent failure(s) that could leave the airplane one failure away from a catastrophic or hazardous failure condition, or if a wear out could result in a catastrophic or hazardous failure condition. Particularly, the CMR designation should be applied in the case of dual failures where one failure is latent, or in the case of a wear out, that could result in a catastrophic failure condition.”</p>	None.	<p>• <b>Selection of CMR:</b> The quoted material reflects the high-risk conditions that often result in CMR designations in <u>current</u> practice. What is new is the consideration for wear out. This additional consideration is congruent with the Aviation Rulemaking Advisory Committee (ARAC) Airplane-level Safety Analysis Working Group’s (ASAWG) recommendation, submitted to the FAA in May 2010.</p>

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<p><b>Commenter: AIA</b>            Furthermore, it appears the FAA leaves considerable leeway for failure analysis to be conducted, or expected, based on hypothetical, extremely unlikely cases. Without more definitive guidance to accurately focus CMR related activity, the ‘what if’ scenarios will result in additional work which provides little to no safety benefit.</p>	None.	<p>The commenter did not illustrate what is meant by “considerable leeway”. The safety analysis data used for compliance with § 25.1309 is the same data used for the CMR process. The CMCC uses the safety analysis data that has been accepted by the Aircraft Certification Office (ACO) (see Figure 1 in the AC). The CMR process itself does <u>not</u> generate failure scenarios. The guidance for conducting the safety analysis is the subject of AC 25.1309-1A, ARAC-recommended AC 25.1309-Arsenal, and EASA’s AMC 25.1309.</p> <p>By regulation, Catastrophic and Hazardous failure conditions are required to be “extremely unlikely cases,” while Major failure conditions are allowed to occur more frequently. The purpose of CMRs is to ensure Catastrophic and Hazardous cases remain “extremely unlikely” throughout the airplane life.</p>
<p><b>Commenter: AIA</b>            As aviation safety has continued to improve, industry recognizes new approaches will need exploration in order to maintain this momentum; however, this proposal does not seem consistent with ensuring efforts are supported by quantitative analysis to better ensure the success. Once again, AIA is grateful for the opportunity to review and comment on the proposed CMR policy.</p> <p>END OF AIA COMMENTS.</p>	None.	<p>The commenter implies the proposed CMR process is not supported by quantitative analysis. This is incorrect and does not reflect actual practice. Quantitative analysis has been used in the CMR process since 1994, because the task intervals are calculated based on the numerical safety objectives used in compliance with § 25.1309.</p>

## DISPOSITION OF PUBLIC COMMENTS

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<p><b>Commenter: AIRBUS</b></p> <p>General comment: The original 25-19 was developed as a harmonised document with JAA who released an equivalent AMJ 25-19 at the same time. EASA published the identical document as AMC 25-19 several years later. The harmonisation effort led to only one significant difference between the FAA and European documents (this related to the credit that could be taken for MSG-3 tasks). All other text was essentially identical. For a TC Applicant, it is highly desirable to minimise the differences and thus avoid two separate certification exercises. Unless AMC 25-19 is similarly updated, the changes proposed by FAA in AC 25-19X will lead to two sets of dossiers and two CMR documents for the same aircraft type. Such a situation would lead carriers to question the justification for differences that could impact their operation and cause difficulties when transferring aircraft from one register to another.</p>	<p>FAA is requested to liaise with EASA Rulemaking to permit coordinated release of AC 25-19X and a revision to AMC 25-19. If this is not achieved, there is risk that two standards of 25-19 become applicable to applicants for new aircraft requiring both EASA and FAA TC.</p>	<p><i>We thank Airbus for their comments, and we recognize the comments reflect Airbus' considerable experience with the CMR process.</i></p> <p>We concur with the request to liaise with EASA. In fact the FAA coordinated the development of this draft AC with EASA, TCCA, and ANAC. We intend to continue liaison with EASA, ANAC, and TCCA prior to issuing the final AC. However, it would be EASA's decision whether to revise their AMC 25-19.</p> <p>Regarding the commenter's concern for "two sets of dossiers and two CMR documents for the same aircraft type," we note that this situation <u>already</u> exists today, even with the current harmonized AC and AMC. The lack of clear guidance for CMR selection in both documents that has led to varying interpretation of the CMR process, and differing CMR selection practices between agencies and applicants.</p>
<p><b>Commenter: AIRBUS</b></p> <p>General comment: Comments have been provided to address concerns and anomalies with the proposed text understanding that the decision to cancel the Two Star CMR categorisation is not open to debate. Airbus wishes to record their objection to this decision since it removes a powerful tool that permits a task to be mandated while allowing some controlled flexibility on the interval. Identifying all CMRs as equal will now lead to hard limits which, in many cases, are not justified due to the difficulty in identifying the maximum acceptable interval</p>	<p>Airbus encourages FAA to re-examine the pros and cons of deleting the Two Star category. Known issues arising from 15 years of application of AC 25-19 can be addressed without cancelling the Two Star category.</p>	<p>Although no examples were offered, the commenter's requested change acknowledges "known issues" that have arisen with the current Two-star categorization in the last 15 years. We have found that the availability of the Two-star category, in conjunction with the existing guidance that prefers MSG-3 task over CMR has often led to improper justification to broadly avoid CMRs altogether, regardless of One-star or Two-star category. Further, the existing AC allows Two-star CMRs to be escalated <u>without limits</u> and without ACO and design engineering's knowledge. This can severely impact safety and undermine the validity of the compliance data upon which</p>

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<p>with a high degree of accuracy. This is particularly the case where the determination includes the probability of an event (fire, cabin depressurisation, evacuation, etc). Hard limits may be justified in specific situations but in the majority of cases the flexibility to permit the task to be performed under optimum conditions (during a recognised check package) outweighs any benefit of enforcing the task at a hard interval a few hundred hours earlier.</p>		<p>compliance to certification regulations was based. We do not agree that flexibility (i.e., the ability to make small adjustments in the intervals) in carrying out CMR tasks would no longer be permitted by the deletion of the Two-star category. The operators have always had the flexibility to schedule the CMR tasks as they see fit, as long as the intervals are within the allowed tolerances determined in the certification process.</p> <p>If “flexibility” means allowing unlimited or unchecked escalation of Two-star CMRs, to the point it invalidates the certification basis, such “flexibility” is not appropriate. <u>FAA Flight Standards (AFS) policy does not allow operators to escalate any CMR task, regardless of the CMR category.</u> This was recognized in the industry/FAA working group (on which Airbus has a representative) CAST SE#172R1. This working group found that FAA Order 8900.1, V3C40S1, Paragraph 3-3793.J. 2 <u>does not allow</u> an operator to use its maintenance/reliability program to escalate <u>any</u> CMR task. The Order states that CMRs are the responsibility of FAA engineering as far as approval and escalation. Therefore removing the Two-star category should have no practical effect on operators’ flexibility.</p>
<p><b>Commenter: AIRBUS</b></p> <p>General comment:            Within the document the terms <i>Major, Hazardous and Catastrophic</i> are used in relation to defined 25.1309 failure condition effects. Within the text of 25-19X, these are written as <i>major, hazardous and catastrophic</i>.</p>	<p>When the 25.1309 definition is implied these terms shall be written with a capital first letter. This is seen as more important now that it is declared that CMRs may be necessary to address Major failure conditions (para. 11c)</p>	<p>We concur with the request to write the terms Major, Hazardous, Catastrophic consistently, both in AC 25-19X and in § 25.1309 materials when they are associated with the correspondingly named failure conditions.</p> <p>More importantly, we note that Airbus does not object to the consideration of the Major category in the CMR process.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

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<p><b>Commenter: AIRBUS</b> Page 1, para. 1 <i>‘It also provides flexibility to the operator’s maintenance planning.’</i></p> <p>The proposed AC 25-19X removes the planning flexibility afforded by the Two Star category. There is now no opportunity for an operator to make small adjustments to intervals to allow tasks to be retained within recognized check packages performed under optimum conditions</p>	<p>Delete the sentence ‘It also provides flexibility to the operator’s maintenance planning’</p> <p>or</p> <p>Reconsider deletion of Two Star category.</p>	<p>We agree to delete the sentence as requested. This is not because we agree that the operators will no longer have flexibility to make small adjustments; it is because how operators plan their activities is not the objective of the CMR process – which is to define the maintenance tasks and intervals necessary for compliance with the certification requirements. Neither the certification requirement nor certification guidance prohibits “small adjustments” in the intervals. On the contrary, the certification guidance does accommodate small adjustments, although it does not accommodate unchecked escalations.</p>
<p><b>Commenter: AIRBUS</b> Page 2, para. 5 <i>‘The CMRs are a subset of the instructions for continued airworthiness identified during the type certification process’</i></p> <p>CMRs may also be identified during certification of design changes performed throughout the life of the aircraft. Furthermore, CMRs may result from reanalysis of original design taking into account information or knowledge not previously recognized.</p>	<p>Modify sentence to read:</p> <p>‘The CMRs are a subset of the instructions for continued airworthiness identified during either the initial certification of the design or subsequent revision of the certification analyses after initial certification’</p> <p>If this is not accepted, as a minimum, delete the word ‘type’</p> <p>‘The CMRs are a subset of the instructions for continued airworthiness identified during the certification process’</p>	<p>We concur with removing the word “type” as suggested, although having the word in the sentence is not necessarily incorrect even when applied to post-initial certification.</p>
<p><b>Commenter: AIRBUS</b> Page 5, para. 7 The Background paragraph does not state anything of value to the reader.</p>	<p>Delete Paragraph 7 or replace it by a more informative history of CMRs starting with the identification of what we now refer to as Candidate CMRs in § 25.1309 (in the early 1970s), explaining the first use of the term ‘CMR’ in FAA Order 8320 in 1984 and the subsequent development of AC 25-19 in 1994/95.</p>	<p>We concur. Paragraph 7 is deleted. Follow-on paragraphs are renumbered.</p>

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### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

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<p><b>Commenter: AIRBUS</b> Figure 1, page 6 The CMRs should no longer be required to be Appendix 1 of the MRB Report. Until a clear requirement is issued, OEMs should be permitted to attach the CMR document to any recognized Maintenance document (e.g., ALS, AMM, MRBR, MPD)</p> <p>The reference to <i>FAA MRB report</i> is unnecessary since AC 25-19 is applicable to all TC applicants requiring US Type Certification. Only US manufacturers have an FAA MRB report. Foreign manufacturers have a NAA MRB Report with a section within it specific to FAA.</p>	<p>Delete ‘Appendix 1 CMRs’ and replace by ‘CMR document.’ If possible, separate this box from the MRB Report</p> <p>Delete ‘FAA’ from ‘FAA MRB Report’</p>	<p>We concur. Figure 1 is revised according to commenter’s suggestion by doing the following: -Delete “FAA” from the “FAA MRB Report” box -Delete “Appendix 1” from the “Appendix 1 CMRs” box, and then move the box into the Certification Process boundary.</p>
<p><b>Commenter: AIRBUS</b> Page 9 Paragraphs 10 and 11 have identical titles.</p>	<p>Delete the title: 11. Identification of Candidate CMRs (CCMRs)</p>	<p>We concur with the comment. Instead of deleting the title for section 11, we will revise the title for section 10 to “Overview of the Scheduled Maintenance Task Development Process.”.</p>
<p><b>Commenter: AIRBUS</b> Page 9, para. 11a (really 10a)</p> <p>In order to be more positive, SE172 taskforce recommended removal of the word ‘may’ from two sentences in this paragraph</p> <p><i>‘..SSA, which may establish the need for tasks to be carried out..’</i></p> <p><i>‘Tasks may also be selected from those intended..’</i></p>	<p>Reword the two sentences:</p> <p><i>‘..SSA, which establishes whether there is a need for tasks to be carried out..’</i></p> <p><i>‘CMRs are selected from those intended...’</i></p>	<p>We concur. These are the same recommendations as in the CAST SE172R1 report. The sentences under section 11.a will be revised accordingly.</p> <p>Note: the 2<sup>nd</sup> sentence was further revised based on a comment from TCCA.</p>
<p><b>Commenter: AIRBUS</b> Page 9, para. 11b (really 10b) <i>‘All significant latent failures (including latent-for-life items) should be CCMRs.’</i></p>	<p>Replace the sentence by:</p> <p><i>‘All latent failures (including latent-for-life items)</i></p>	<p>We agree that if there is a high level of redundancy, it may be acceptable to relax the identification of CCMRs for latent-for-life items. However, this is done in the system safety assessment (SSA) review process where intervals are set. The intervals are</p>

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### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

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<p>-It is not the failure that should be a CCMR but the task /interval to find that failure</p> <p>-Guidance needed to understand what is a <b>significant</b> latent failure</p> <p>-Not reasonable to include <b>all</b> latent-for-life items as CCMRs. This promotes minimum design concepts. Redundancy should not be discouraged. 25-19X should identify a cut-off point when they do not need to be identified as CCMRs. Recall that with highly redundant design any corresponding MSG-3 task to identify the failure will be FEC9 and thus CMR will have to be declared. At the very least, limit to hazardous &amp; catastrophic failure conditions. Would be more acceptable if only those latent-for- life failures involved in failure conditions demonstrated to have a probability of <math>10^{-7}</math> (Haz) and <math>10^{-9}</math> (Cat) need to be declared. It is those involved with FCs with demonstrated probabilities of greater than 25.1309 objectives that cause concern.</p> <p><u>Discussion</u></p> <p>The concept of forcing qualitative CMR status on tasks that are shown to be unnecessary for quantitative 25.1309 compliance introduces the anomaly that if the design was just slightly less reliable, the task would have been identified as a CMR at, say, 90% of aircraft life but because it is reliable enough not to require a task the CMCC will now be required to identify a CMR at 33% or 50% of aircraft life (i.e., once or twice within aircraft life). This policy is unrealistic and may lead to artificially increasing failure rates simply to ensure a greater CMR interval.</p>	<p>associated with hazardous or catastrophic failure conditions having a probability equal to the § 25.1309 numerical objective should be addressed by CCMRs'</p> <p>Related to 'discussion':</p> <p>It is understood that FAA wishes to prevent the current practice whereby a hidden failure is not declared as a CCMR because it can be demonstrated by theoretical analysis that it is not required in aircraft life due to another task being performed more frequently. In these cases the probability of the Failure Condition will be the maximum permitted and thus there is no margin to account for a systematic defect in a component due to manufacturing oversight.</p> <p>Airbus proposes two possible means to address this:</p> <p>1) only those latent failures included in a</p>	<p>not determined in the AC 25-19 process. By definition, the term "significant latent failure" limits the identification of CCMRs to Catastrophic and Hazardous failure conditions. The definition is consistent with the term used in AC 25.1309-1 for many years.</p> <p>The sentence in question will be changed, partially adopting the commenter's suggestion. It will read "All significant latent failures (including latent-for-life items) should be <b>addressed in the SSA.</b>"</p> <p>Our intent is to ensure that there is no conflict nor discontinuity between the guidance for identifying CCMR as provided in the ARAC recommended AC 25.1309-Arsenal (which EASA adopted as AMC 25.1309) and the guidance for handling CCMRs in AC 25-19. The CCMRs come from the safety analysis process in AC 25.1309-Arsenal, not in AC 25-19. In AC 25.1309-Arsenal, (and AMC 25.1309), the guidance is as follows: "<b>A periodic maintenance or flightcrew check may be used in a safety analysis to help demonstrate compliance with § 25.1309(b) for Hazardous and Catastrophic failure conditions. Where such checks cannot be accepted as basic servicing or airmanship they become Candidate Certification Maintenance Requirements (CCMRs). AC 25-19 defines a method by which Certification Maintenance Requirements (CMRs) are identified from the candidates.</b>" This guidance has no provision for treating a "latent-for-life" item differently from other latent items.</p> <p>We have found that some applicants blanketly bypass reviewing the latent-for-life items without consideration for the other failures or events</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

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<p>Furthermore, many faults within aircraft systems are identified by interrogation of centralized maintenance systems. The design concept is to have sufficient redundancy to permit dispatch and enhance aircraft availability. Tasks to read such systems would never be FEC8 and thus the proposed ruling will infer CMR status on all tasks to read for these fault messages. Corrective action has to be taken immediately since the Master Minimum Equipment List (MMEL) can only be used to address failures with flightdeck effect. Consequently where today the aircraft can be released with known fault, this will not be possible once a CMR is declared. This policy will be unmanageable in service and will either encourage creation of immediate flightdeck effect or revert to an earlier generation of aircraft where faults are only detected during infrequent functional checks at subsystem level.</p>	<p>Failure Condition demonstrated to have the maximum allowable probability be declared as CCMRs.</p> <p>2) only those latent failures involved in Failure Condition that results from one evident failure or event and either one or two latent failures be declared as CCMRs</p> <p>During subsequent CMCC review of these CCMRs that are not required to satisfy quantitative objectives, it should be permitted that credit can be taken for:</p> <p>a) Any MSG-3 task that will identify the hidden fault (irrespective of FEC and Cat/Haz FC effect)</p> <p>b) A design concept that added redundancy in order to enhance dispatch reliability</p> <p>This does not mean that a CMR would never be selected but with justification it allows CMR status to be avoided.</p> <p>It may be noted that if the Two Star category still existed it would be easier to accept that some qualitative CMRs are appropriate but their intervals need not be rigidly enforced.</p>	<p>involved in the failure conditions, raising questions on the validity of their <u>safety</u> analysis (not just <u>numerical</u> analysis).</p> <p>Regarding the suggestion for taking credit during CMCC reviews, this is addressed in section 13 of the draft AC 25-19X.</p> <p>We disagree with the comment on MMEL because if a fault is not detected, then there would also be no Minimum Equipment List (MEL) action. Conversely if the fault is detected, then the MEL process still applies if a corresponding MEL item exists regardless of the CMR status, because the CMR is a fault finding task, not a corrective task. We do not believe the proposed policy would lead to CMR for latent failures of on-board maintenance systems.</p>
<p><b>Commenter: AIRBUS</b> Page 9/10, para 12c (really 11c)</p> <p><i>'The results of the CMCC (proposed CMRs to be included in the type design definition, and proposed MRB tasks and/or intervals that meet the intent of the CCMRs) are forwarded by the TC applicant to the ISC for consideration. Proposed MRB tasks and/or intervals accepted by the ISC are reflected in the MRB report proposal. Proposed MRB tasks and/or intervals rejected by the ISC will result in CMR tasks only.'</i></p>	<p>Replace by the following:</p> <p>'The results of the CMCC are forwarded by the TC applicant to the ISC for consideration of the failure modes and failure condition effects that led to CMRs. The ISC shall check that these failure modes are identified in MSG-3 analyses as failure causes and that the consequences of failure combinations are equivalent. Revision to MSG-3 analyses to address this new information may lead to new MRBR tasks and intervals. These may subsequently be assessed as sufficient to address</p>	<p>The paragraph will be revised, but not in the same manner as suggested. The revision is to remove the word "only" at the end of the paragraph.</p> <p>The AC 25-19X is guidance for certification. It is not guidance for how the ISC should perform their MSG-3 analysis. Although the CMR and MSG-3 processes complement each other (together they fully cover the safety-related maintenance requirements) they do not have identical analytical process, assumptions, or objectives. Allowing them to influence each other via the suggested wording</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>This para. should be revised (the original 25-19 . needs revising but not in the way proposed). It incorrectly implies that the CMCC may propose changes to the MRB tasks in order to avoid a CMR. In reality, the feedback from the CMCC to the ISC should be limited to an explanation of the failure modes and failure condition consequences that led to CCMRs. The ISC must confirm that their MSG-3 analyses identify the same failures and effects. If not, their analysis is deficient and must be updated. This update might then allow a CCMR to be considered as adequately addressed by the MRBR.</p> <p>Note also that if MSG-3 is confirmed to result in a FEC9 task, then the CCMR becomes a CMR (at the SSA interval) and the MRBR includes the task (at the MSG-3 interval). It is incorrect to state that the task will be a CMR only.</p>	<p>the CCMR and thus revise the CMCC result.</p>	<p>would create errors or confusion between their roles.</p> <p>Because the two processes are independent, there can be cases where there may be a CMR and an MSG-3 task (of whatever category and interval). Therefore, we agree to change the paragraph by deleting the word “only” at the end to recognize that fact.</p>
<p><b>Commenter: AIRBUS</b> Page 10, para 13 (really 12) General comment: The original AC 25-19 provided a selection process that categorized CMRs into One Star or Two Star. This methodology was introduced to address differences in the way applicants may choose to satisfy § 25.1309 compliance. Despite recent attempts to harmonize such compliance demonstrations there is still no evidence that applicants perform quantitative analysis on a similar set of Catastrophic and Hazardous Failure Conditions. Under bilateral agreement and concerns with release of proprietary information, SSAs are provided only to the national Authority. As a result, knowledge is not available within either the Regulatory or OEM community to assess that a ‘level playing field’ has been achieved and thus the</p>	<p>FAA is requested to reassess the decision to delete the categorization of CMRs.</p> <p>Alternatively, given that CMRs are determined from theoretical analysis, FAA might wish to acknowledge that the accuracy of the individual failure and event rates is not so high to warrant rigid enforcement of intervals. Thus the single CMR category might be better managed in the manner intended for Two Star CMRs. Operators would be permitted to justify escalations to their local authorities in the same way as for other safety related tasks. This practice would allow CMRs to be performed in regular check packages performed under controlled conditions rather than on the ramp, away from their maintenance base in variable weather conditions. Controls could be identified to limit such escalations to values needed to retain the</p>	<p>The proposal to remove the Two-star category was coordinated among FAA, EASA, TCCA, and ANAC. The commenter’s suggestion to allow escalation of CMRs by individual operators “in the same way as for other safety related tasks”, i.e., without ACO view, is not accepted. As discussed previously, CMR escalation or modification is not allowed under current AFS policy. So the issue of justifying escalation of two-star CMRs to local authorities is moot.</p> <p>The concern for performing the task under controlled conditions rather than on the ramp is well understood. However, because the CMR interval is known well in advance, the operator should be able to plan and schedule their tasks in advance so that the work can be done in suitable conditions. In unplanned situations, paragraph 14.b</p>

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### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

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<p>categorization of CMRs is no longer valid. The Two Star category is used in situations where compliance might equally be demonstrated by qualitative analysis which has no potential for identifying maximum acceptable intervals. The Two Star category provided assurance that the task would always be included in the carrier’s program but gave some flexibility on the interval. The acceptability of such flexibility is assessed through consideration of the relative accuracy of specific failure and event rates used and any conservatism in the failure condition classification. Two Star category is used in circumstances where it is unreasonable to declare a hard limitation that could force the task to be performed in less than optimum conditions.</p>	<p>task within the same check package.</p>	<p>of the AC continues to allow “exceptional short term extension” for CMR intervals to allow the airplane to return to its maintenance base. This flexibility does not increase risk, but allowing blanket escalation, as the commenter suggested, could increase risk.</p> <p>The suggestion to define CMR categories or intervals in accordance with “check packages” is not accepted. “Check packages” are operators’ prerogatives to manage their maintenance activities. The AC 25-19X is certification guidance. It is not appropriate to complicate the means of compliance by adding considerations of various operators work packaging practices.</p> <p>We do not concur with the comments on quantitative vs. qualitative analyses, bilateral agreements preventing visibility of SSA data, etc. The means of compliance with § 25.1309 are described in the AC/AMC 25.1309 and includes both qualitative and quantitative analyses. Bilateral agreements do not prevent Certification Authorities’ visibility of SSA data. The SSA does <u>not</u> specify a task as One-star or Two-star. The “star” categorization was introduced only in the current AC 25-19, and is not needed for showing compliance to § 25.1309.</p>
<p><b>Commenter: AIRBUS</b> Page 10, para. 13 intro <i>The applicant should provide the failure conditions involving the CMRs to the CMCC for their analysis</i></p> <p>The applicant presents a summary of the failure condition analysis to the CMCC to explain the background to the CCMR (at this stage it is not the CMR). Since SSAs contain proprietary information,</p>	<p>Replace by</p> <p>The applicant should provide sufficient information to the CMCC to enable an understanding of the failure conditions and the failure/event combinations that result in the CCMR.</p>	<p>We concur. The sentence is changed accordingly.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>actual fault trees cannot be shared. The analysis performed by the CMCC is not the same as the safety analysis performed by the applicant. Thus it is better to avoid the term ‘analysis’ in this sentence.</p>		
<p><b>Commenter: AIRBUS</b>            Page 10, para. 13a  <i>CMR designation should be considered for the significant latent failure(s) that could leave the airplane one failure away from a catastrophic or hazardous failure condition, or if a wear out could result in a catastrophic or hazardous failure condition.</i></p> <p>This statement is not helpful. CMR designation should be considered for all latent failures irrespective of whether they could leave the airplane one failure away from a Cat or Haz failure condition.</p> <p>Secondly, the understanding of how ‘wear out’ is expected to be considered is unclear. This should be addressed in a dedicated sentence. Furthermore, it is not clear whether FAA mean ‘wear out’ as ‘wear’ or all aging related failure modes (including fatigue)</p> <p>If FAA mean that ‘CMR designation should be <b>applied to ...</b>’ rather than ‘...should be <b>considered</b>’ then the whole sense of the sentence changes. It is noted that para. 13b (2) does not apply in the case of Cat failure conditions. Is it FAA’s intention to require all CCMRs to be identified as CMRs in this situation? Haz &amp; Cat failure conditions that lead to CCMRs generally have one active failure or event in combination with one, two, or more latent failures (if there is more than one active failure, the failure condition</p>	<p>Either delete the sentence (since it provides no guidance/rule) or modify it so that it helps define what shall be identified as a CMR. The former would seem the best option since the next sentence can be modified to clarify FAA’s intent.</p> <p>If the sentence is modified then it needs to clarify when a CMR designation must be applied in addition to the dual failure scenario addressed in the next sentence. Once this is clear, further review may be necessary within Industry.</p> <p>Note that if para. 13b (2) was extended to include Catastrophic failure conditions then there would no longer be a concern.</p> <p>Add a definition of ‘wear out’</p>	<p>In light of the suggested change in the row below, we agree to delete this sentence from paragraph 13a.</p> <p>We added a definition for “wear out.”</p> <p>Guidance for the safety analysis of “wear out” can be found in AC 25.1309-Arsenal and AMC 25.1309.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>probability objective can usually be satisfied without CCMRs). Since it is not possible to identify which of the latent failures will occur last, all of them need to be assumed as the last one. Thus the check of each of them would need to be declared as a CMR.</p>		
<p><b>Commenter: AIRBUS</b>            Page 10, para. 13a  <i>Particularly, the CMR designation should be applied in the case of dual failures where one failure is latent.</i></p> <p>This is a new rule and addresses situations where 25.1309 compliance might previously have been satisfied without any check on the latent failure. It is now clear that whatever the probabilities of the two individual failures, it is now impossible to avoid a CMR. Thus doubling or tripling the thickness of a component might be acknowledged as good design practice to reduce its failure rate but it cannot relieve the CMR.</p> <p>Clarification required that para. (a) does not dictate that CMR designations be applied if conditions of para. (b) are satisfied.</p> <p>Clarification required on the handling of an event plus a latent failure. If the event has to be considered as a single evident failure (e.g., engine fire, cabin depressurization, need for evacuation.) then many tasks will need to be identified as CMRs. In this situation, credit should be allowed for FEC8 MSG-3 task.            (see also comment against para 13b(2).</p>	<p>Modify to read:</p> <p><i>Unless addressed by appropriate MSG-3 tasks (see para (b) below):</i></p> <p><i>The CMR designation should be applied in the case of dual failures leading to Hazardous or Catastrophic failure conditions where one failure is latent.</i></p> <p><i>The CMR designation should also be applied in the case of tasks that address wear out of a component if the consequent failure would lead to a Hazardous or Catastrophic failure condition.</i></p> <p>Consider adding a statement to advise that events do not need to be considered as single evident failures for the purposes of compliance to this paragraph</p>	<p>Although the commenter’s suggested change is more conservative than our proposal, i.e., applying the CMR designation to Hazardous failure conditions <u>and</u> Catastrophic, we’ve determine that some tasks related to Hazardous failure conditions may be allowed for MSG-3 FEC8 “trade-off,” as described in paragraph 13b.</p> <p>Regarding the comment on “good design practice to reduce failure rate,” unless the applicant can substantiate the component will <u>never</u> fail during the life of the airplane, there is no basis for excluding it from the CCMR/CMR consideration.</p> <p>There is no need to add the suggested sentence “Unless addressed by…” as it is said in the opening sentence of paragraph 13b.</p> <p>We agree to have separate sentences for latent failure and wear out. We revised the guidance as follows:</p> <p>Particularly, the CMR designation should be applied in the case of catastrophic dual failures where one failure is latent. The CMR designation should also be applied to tasks that address wear out of a component involved in a Catastrophic failure condition that results from two failures.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p><b>Commenter: AIRBUS</b> Page 10, para 13a</p> <p><i>... or in the case of a wear out, that could result in a catastrophic failure condition.</i></p> <p>It is not clear whether FAA intend that the wear out shall be considered by itself or as one of the failures in a dual failure Haz or Cat condition. 25.671 could not be satisfied if a single wear out resulted in a Cat condition. The sentence should be reworded to clarify.</p>	<p>Reword (text proposal not possible without knowing FAA intent):</p> <p>Reassess how the consideration of wear out shall be included. Clarify whether a CMR to address wear out is required when the failure combined with another failure results in Haz or Cat failure condition or whether the wear out by itself results in Haz or Cat failure condition. There should be no cases where such a single failure can result in Cat failure condition.</p>	<p>See revised text in the above row. We agree there should be no single wear out failures that result in Catastrophic failure conditions. However, in AC 25.1309-1 a common mode failure affecting multiple components is treated as a single failure. Wear out may be a common mode.</p>
<p><b>Commenter: AIRBUS</b> Page 10, para 13a</p> <p><i>The interval for the CMR task should be chosen such that the system safety analysis assumptions are protected in service, while allowing flexibility for the airplane operators to manage their maintenance programs</i></p> <p>Whatever interval is selected, from that point on there is zero flexibility. The desired flexibility has to be built into the subsequent management and control of the CMRs. It cannot be built into the Airworthiness Limitation itself. The only option for the applicant is to define the maximum interval that satisfies § 25.1309. Even if this were to be divided by two (for example), there would be no flexibility for the operator to escalate the value declared in the CMR document.</p> <p>Secondly, this sentence is in conflict with para 12b (really 11b). That para states that the CMR task interval should be based solely on the results of the safety analysis.</p>	<p>Delete this sentence.</p> <p>It is noted that FAA understand the operators need for some flexibility. It is suggested that FAA provide this means in the manner they require CMRs to be managed in service.</p>	<p>During our development of this AC, discussions with operators indicated that they prefer a CMR with the <u>maximum</u> interval determined by the SSA at the outset, over an MSG-3 task that has a shorter interval which causes them to perform the task more often, and then having to seek approval for escalations. We also found that operators rarely escalate any CMR, regardless of the two-star category. The comment that there will be “zero flexibility” is contrary to operators’ feedback we received.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p><b>Commenter: AIRBUS</b> Page 10, para 13b(1)</p> <p><i>The SSA allows the failure to be latent for the life of the airplane. Even though the failure conditions containing the latent-for-life item(s) meets the quantitative probability objective, a qualitative assessment to determine the required maintenance before end of airplane life is still necessary, or</i></p> <p>The determination whether the latent-for-life failure needs to be assessed as a CCMR or not is made in para 11b (really 10b). Having made that decision it is not necessary to complicate the text in b(1). Only the first sentence is necessary.</p> <p>If this is not accepted then the following comment becomes valid:</p> <p>The consideration of ‘latent-for-life’ failures should be limited to failure conditions that have been demonstrated to have a probability equal to the 25.1309 allowable rate, e.g., 10<sup>-9</sup> for a Cat failure condition. Latent-for-life failures in failure conditions with probability of 10<sup>-10</sup>, 10<sup>-11</sup> etc should be excluded or there will be a large increase in CMRs. Note that such latent failures are less likely to be addressed by MSG-3 tasks due to number of failures required before a safety issue arises. This new criteria does not encourage the introduction of additional redundancy (over and above what is required to satisfy regulation) and therefore works against good design principles.</p>	<p>Revise to read:</p> <p><i>The SSA allows the failure to be latent for the life of the airplane, or</i></p>	<p>We agree to revise the paragraph as suggested.</p> <p>The sentence beginning with “Even though...” is moved to paragraph 11.b to assure the understanding that numerical probability estimates alone aren’t sufficient to determine if a maintenance task will be required.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p><b>Commenter: AIRBUS</b></p> <p>Page 10, para 13b(2)  <i>Latent failures leaving the airplane one failure away from hazardous failure conditions, or</i></p> <p>Further to comment on para 13a, it is suggested that this criteria be extended to include catastrophic as well as hazardous failure conditions.</p> <p>If this is not done, then every hidden failure in a catastrophic failure condition will automatically need to be addressed by a CMR if it is shown to be required within aircraft life.</p> <p>MSG-3 logic was modified in 2001 to drive FEC8 for all safety/emergency systems.</p> <p style="padding-left: 40px;">For hidden functions of safety/emergency systems or equipment, the additional failure is the event for which this function of the system or equipment is designed, and in these cases, a FEC 8 is to be selected. This applies irrespective of whether the function is required by regulation or is carried as an operator option.</p> <p>The proposed AC 25-19X will not allow these FEC8 tasks to satisfy CCMRs. Thus all tasks to maintain safety/emergency equipment will be declared as CMRs unless it can be demonstrated by § 25.1309 analysis that no task is required within aircraft life (this is unlikely).</p>	<p>Rewrite as:</p> <p><i>Latent failures leaving the airplane one failure away from hazardous <b>or catastrophic</b> failure conditions, or</i></p>	<p>We disagree with the comment that “every hidden failure in a catastrophic failure condition will automatically need to be addressed by a CMR if it is shown to be required within aircraft life.” For Catastrophic failure conditions consisting of <u>more than two</u> failures, for example two latent failures and one evident failure. Depending on the nature of the failure and its required task, it is possible that <u>only one</u> of the two latent failures needs to be assigned as CMR (e.g., the one with a shorter interval calculated by the SSA), and the other failure can be managed by an MSG-3 FEC8 task (if one exists).</p> <p>For safety/emergency systems and equipment, we note that</p> <ul style="list-style-type: none"> <li>• § 25.1309(b) does <u>not</u> cover emergency systems associated with evacuation. This is also explicitly stated in the AC 25.1309. CMRs have not been, and will not be applied to these systems. As the commenter indicates, they are typically covered by MSG-3 FEC8 tasks.</li> <li>• § 25.1309 does cover other safety systems (e.g., fire protection, cabin depressurization). The CCMR and CMR identification criteria described in AC 25-19X will apply.</li> </ul>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p><b>Commenter: AIRBUS</b> Page 10, para 13b(3) <i>A wear out failure condition that is classified as hazardous.</i></p> <p>Wear out is not a failure condition in § 25.1309 terminology.</p> <p>It is understood that catastrophic failure conditions are not mentioned since, according to 21 25.671, no single event may lead to a catastrophe. If FAA do not limit this criteria to direct effects of the wearout then it is questioned why MSG-3 tasks cannot be used to address wear out tasks involved in catastrophic failure conditions</p>	<p>Reword:</p> <p><i>A wear out failure mode that directly leads to a hazardous failure condition</i></p> <p>If FAA determine that the word ‘directly’ is inappropriate, then rewrite as:</p> <p><i>A wear out failure mode that directly, or in combination with one other failure, leads to a hazardous or catastrophic failure condition</i></p>	<p>Although we disagree with the comment that “wear out is not a failure condition in § 25.1309 terminology,” the requested change has merit. We revised the sentence to read “A wear out failure mode that directly or in combination with another failure, leads to a Hazardous failure condition.”</p> <p>We did not include “catastrophic” in the sentence because for those high-risk dual-failure situations, MSG-3 trade-offs are not appropriate, given the risk of escalation as discussed previously.</p>
<p><b>Commenter: AIRBUS</b> Page 10/11, para 13b(4)(a)1 <i>It is a Failure Effect Category 8 task (FEC8). Note that because the MSG-3 logic does not consider a failure condition containing three or more failures, it is possible that there is no MSG-3 task identified for a CCMR, in which case the CCMR should be designated a CMR.</i></p> <p>This interpretation of MSG-3 is not fully correct. The question asks:</p> <p><b>DOES THE COMBINATION OF A HIDDEN FUNCTIONAL FAILURE AND ONE ADDITIONAL FAILURE OF A SYSTEM RELATED OR BACK-UP FUNCTION HAVE AN ADVERSE EFFECT ON OPERATING SAFETY?</b></p> <p>This does not imply that only two failures are considered. As explained in the comment against para 13b(2), the additional failure is the event for which this function of the system or equipment is</p>	<p>Delete the note and thus limit to:</p> <p><i>1 It is a Failure Effect Category 8 task (FEC8).</i></p>	<p>The question in the MSG-3 logic contains the words “AND <b>ONE</b> ADDITIONAL FAILURE” and has led to considerable misunderstanding of the equivalency between the MSG-3 process and the CMR process. It is possible that MSG-3 does not consider failure conditions that have three or more failures. Therefore it is beneficial to clearly discern the difference between the two processes to avoid misapplication of either one.</p> <p>Regarding safety/emergency systems covered by § 25.1309, the CCMR/CMR process will apply. Depending on the system architecture and failure modes, some latent failures may not need to be covered by CMRs, as discussed in elsewhere in these responses, and in AC 25-19X.</p> <p>We agree it does not matter to the CMCC how the MSG-3 logic led to the FEC8 category. By the same logic it does not matter to the MRB how the certification process led to CMRs.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>designed. It does not matter whether one, two, three or more failures have to occur first, the latent function of the safety / emergency device will be assessed under FEC8 safety logic and a task selected.</p> <p>To avoid complicating AC 25-19X, it is suggested that no attempt is made to explain how MSG-3 does or does not work. It is sufficient to simply state the first line. It does not matter to the CMCC how the MSG-3 logic led to this category.</p>		<p>We revised the Note sentence as follows:  <i>Note that because the MSG-3 logic <b>may</b> not consider a failure condition containing three or more failures, it is possible that there is no MSG-3 task identified for a CCMR., <del>in which case the CCMR should be designated a CMR.</del></i></p>
<p><b>Commenter: AIRBUS</b>  Page 11 para 13b(4)(a)2  <i>The FEC8 task interval is <u>shorter</u> than the interval that would be required for the CMR.</i></p> <p>This should be reworded as ‘equal or shorter.’ Failure to accept this will lead to either SSA or MSG-3 intervals being quoted with values that suggest more accuracy than the logic allows. If the SSA says that checking firex pipes for blockage is needed every 10000FH then credit could be taken for an MRBR task at 9999FH but not at 10000FH. Considering the ‘accuracy’ of the calculations it should be acceptable to take credit provided the interval is not greater than the SSA value.</p>	<p>Reword as follows:  <i>The FEC8 task interval is <u>equal or shorter</u> than the interval that would be required for the CMR.</i></p>	<p>We do not agree with the requested change. It is well understood that component failure rates and probabilities of events are not known precisely. This fact is clearly recognized in AC 25.1309-1. It is why the phrase “on the order of” is used in establishing numerical probability objectives in AC 25.1309-1, and a thick line is used to illustrate the relationship between probability and hazard category. The intent of the sentence (and the paragraph) is to convey that there should be a large margin between the FEC8 task interval and the SSA interval to account for the potential of over-escalation.</p> <p>Although the case presented by the commenter (i.e., difference of 1 hr. out of 10000 hrs.) is theoretically possible, safety analysts and maintenance personnel have not assumed such degree of accuracy in actual practice.</p>
<p><b>Commenter: AIRBUS</b>  Page 11 para 13b(4)(a)2  <i>For example, some applicants have applied, and the Authorities have accepted, a factor of one half of the CMR interval as a margin to guard against potential inappropriate escalation of FEC8 task intervals.</i></p>	<p>Delete the sentence</p>	<p>We do not agree with the requested change. We agree that in the context of numerical probability analysis, depending on the intent of the probability criterion (i.e., whether it’s a guidance or a hard limit required by a rule), a factor greater than 1 on the probability values may or may not mean there is a safety concern, or a non-compliance. The sentence that the commenter requests deletion of</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>This statement is not helpful to the Applicant. It suggests that individuals may request whatever factor they feel comfortable with. This will lead to unacceptable disparities between applications of AC 25-19X. It is too complex to identify factors that apply to all intervals ranging from 100FH to 100000FH. A 50% factor (as quoted) would lead to a 50FH margin at one end and 50000FH at the other which is clearly nonsensical. A sensitivity analysis could be proposed based on the impact on the fc objective of doubling the check interval. This was trialed previously and can work but it is of questionable necessity given the accuracy of the failure rate data. Failure rates of component failure modes in FMEAs/SSAs are generally good to the nearest half order. Operators are looking for an opportunity to justify, with experience, no more than a doubling of an interval over aircraft life. If this is genuinely unacceptable then declare a CMR. If not, accept the control of the MSG-3 FEC8 task.</p> <p>Even in the former system, any concern that inappropriate escalation might occur should have resulted in definition of a One Star CMR. The current Two Star criteria accepts that escalation performed by operators in accordance with their normal procedures for safety related tasks (i.e., FEC8 tasks) is acceptable even if it may lead to some intervals slightly exceeding the certification values. The acceptance of this situation is part of the CMCC activity. It is not sensible to reduce the interval by a factor to provide a margin. Operators would prefer a One Star limit at the highest value even if, in reality, no hard limit can be calculated.</p>		<p>serves as a guidance and reminder for the CMCC to evaluate any proposed margin, potential for missing a MSG-3 task, and determine the flexibility they may be able to offer to the operators.</p> <p>We concur with the comment that operators would generally prefer a CMR if it affords them the longest interval accepted in the SSA process, and not have to deal with escalation. This has been a direct feedback from operators.</p>
<p><b>Commenter: AIRBUS</b> Page 11, para 13b(4)(a)3 <i>It can be ascertained that the FEC8 task would not</i></p>	<p>Reword as follows:  <i>It can be ascertained that the FEC8 task would not</i></p>	<p>The requested change is partially accepted. The sentence is revised as follows:</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p><i>be overlooked in service, or be susceptible to escalation beyond the interval that would otherwise be required by a CMR.</i></p> <p>It is outside the scope of AC 25-19 to question whether the FAA’s operational rules are sufficient to ensure correct handling of FEC8 safety tasks. It should be assumed that if such tasks are overlooked in service it is the result of an error that is not avoided by applying CMR status (this only provides FAA with a reason to litigate).</p> <p>The CMCC could never declare that no operator will exceed the value quoted in the SSA at some point in the aircraft life. However, the CMCC should consider how likely it is that an operator may exceed the certification value. This will depend on the task complexity, tooling required, the understanding of the reason for the task and the typical interval the same task is performed on other aircraft in addition to the interval and the likelihood that the interval of the check package that it will be placed in will be escalated. This discussion reflects the ‘routine’ requirement in the EASA AMC 25-19.</p> <p>As written, the AC 25-19X text is unclear and will be interpreted as reason to forbid credit to be taken for any MSG-3 tasks.</p>	<p><i>be susceptible to escalation beyond an interval that could be justified in the § 25.1309 compliance demonstration.</i></p> <p>This wording allows for the fact that even if the SSA declares 10000FH, if the operator wished to perform it at 12000FH the TC applicant would normally find justification to support it, this being within the ‘accuracy’ of the quantitative calculation. This assessment will only need to be made by the CMCC, TC applicant and Regulator who will be in possession of the required data.</p>	<p><i>It can be ascertained that the FEC8 task would not be susceptible to escalation beyond the interval that would otherwise be required by a CMR.</i></p> <p>The reference to CMR is retained because this is guidance for selection between CMR and MSG-3 FEC8 tasks. We want the CMCC to uphold and apply the SSA results, but not to evaluate the SSA.</p>
<p><b>Commenter: AIRBUS</b> Page 11, para 13b(4)(a)3</p> <p><i>For example, due to difficulty in accessing the item, engineering judgment indicates that a FEC8 task may be overlooked and that a CMR is appropriate. As stated previously, the CMR determination is a <u>Certification</u> process, and the CMCC process is fundamentally different from the MSG-3 process.</i></p>	<p>Delete this text</p>	<p>We agree the material repeats the intent of paragraph 5.b. We deleted the text, including the reference to Appendix 1. Appendix 1 is referred to elsewhere.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p><i>Therefore one should not replace a CMR task with a MSG-3 task without having a process in place to ensure that the certificated level of safety will be protected for the life of the airplane. See further guidance in appendix 1 of this AC.</i></p> <p>Suggest that this text is deleted since it does not assist in the selection of CMRs. It repeats statements made earlier. The reference to Apx 1 is not understood since this does not include any guidance to help address the issue raised in this paragraph.</p>		
<p><b>Commenter: AIRBUS</b> Page 11, para 13b(4)(b) <i>'Tasks covered by the approved airplane flight manual (AFM) procedures.</i></p> <p><i>...or the procedure should be in the approved section of the AFM.</i></p> <p><i>The first line of the paragraph states that CCMR need not become a CMR if the task is included in the <b>approved</b> AFM procedures. This implies that it would need to be a CMR if it is not in the approved section. It is thus not necessary to add the 2<sup>nd</sup> and 3<sup>rd</sup> sentences.</i></p>	<p>Either delete the text:</p> <p><i>If the CMCC proposes an AFM normal procedure in lieu of a CMR, the governing ACO must determine whether the task might be altered during the operational life of the airplane. If it is determined that the AFM normal procedure could be changed without the governing ACO approval, then a CMR should be used, or the procedure should be in the approved section of the AFM.</i></p> <p>Or</p> <p>Delete the word 'approved' from the first line</p>	<p>We agree to delete the text as requested.</p>
<p><b>Commenter: AIRBUS</b> Page 11, para 14a <i>The latest version of the CMR document should be controlled by an FAA-approved log of pages.</i></p> <p>This requirement is not strictly correct and may confuse US operators of foreign aircraft where the CMR document is approved under a bilateral agreement between the FAA and the foreign Authority. Though a dedicated FAA TCDS will</p>	<p>Replace by:</p> <p><i>The latest version of the CMR document should be controlled by a log of pages approved by the governing ACO.</i></p>	<p>We agree to revise the sentence as requested because it is more precise and consistent with other paragraphs to indicate "governing ACO" as the approver.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>exist, the referenced CMR document does not contain an FAA approved log of pages. It should be acceptable to indicate that the approval of the foreign Authority satisfies this requirement.</p>		
<p><b>Commenter: AIRBUS</b> Page 11, para 14(b)</p> <p><i>The local regulatory authority (e.g., a Principle Maintenance Inspector) must <u>concur</u> with any exceptional short-term extensions allowed by the CMR document <u>before</u> they take place using procedures established with the local regulatory authority in the operators’ manuals.</i></p> <p>This sentence is accepted but it has replaced a previous sentence that required carriers to notify their local authority as soon as practicable after any short-term extension has taken place. Is that no longer required in the US? How do Principle Maintenance Inspectors (PMI) confirm that this provision is not being abused? It is intended to only be used in exceptional circumstances, not as an aid to planning.</p>	<p>It is proposed that FAA reconsider the deletion of the sentence:</p> <p><i>The local regulatory authority (e.g. a Principle Maintenance Inspector) must be notified as soon as practicable if any short-term extension allowed by the CMR document has taken place</i></p>	<p>The deleted sentence is not needed. The deleted sentence says the operators only <u>notify</u> the PMI <u>after</u> the exceptional short-term extensions have taken place, thereby allowing a potential for abuse (proceed with the extensions without the PMI’s knowledge). With the revised sentence, the PMI <u>concurs</u> (not just being notified) to the extensions <u>before</u> they happen, thereby eliminating the potential for abuse. This revision was coordinated with our AFS personnel.</p>
<p><b>Commenter: AIRBUS</b> Page 11, para 14(b)</p> <p><i>It should not be confused with the operator’s “short-term escalation” program for normal maintenance tasks described in the operators’ manuals and in the Flight Standards Information Management System, Order 8900.1.</i></p> <p>It is unclear why this has been added. The term ‘exceptional short-term extension’ was chosen to be in line with the concept used by operators for ‘normal’ maintenance tasks. That policy declares that it does not apply to Limitations. The wording</p>	<p>Delete the sentence or modify it to read:</p> <p><i>This provision is complementary to the operator’s “short-term escalation” program for normal maintenance tasks described in the operators’ manuals and in the Flight Standards Information Management System, Order 8900.1.</i></p>	<p>The sentence was added at the request of our AFS and Aircraft Evaluation Group (AEG) personnel when they found there was confusion between the similar names used in two different processes, i.e., “<b>exceptional short-term extension</b>” for CMR vs. “<b>short-term escalation</b>” for maintenance program. We need stronger wording than the requested term “complementary” which could perpetuate the confusion.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>in the CMR document is intended to clarify that the concept does apply to CMRs in exceptional circumstances (unless stated otherwise against a specific CMR). The new sentence will lead to questions on why the same term has been chosen if it applies to something different.</p>		
<p><b>Commenter: AIRBUS</b> Page 12, para 15 (correct spelling of Certification in the title)</p> <p><i>Any post-certification changes to CMRs should be reviewed by the CMCC</i></p> <p>Experience has shown that the concept of the CMCC is only valid at the time of development of the new aircraft type. Changes to the CMRs arising from revisions to SSAs do not warrant maintaining an active CMCC. Established practice is for carriers and MRB to be briefed on new / revised CCMRs during ISC activity. Their comments are then taken into account during discussions between Applicant and governing ACO at time of modification approval.</p> <p>While a CMCC may be active post certification for the purpose of consideration of new models, it is likely that the ISC activity provides a more appropriate opportunity. The AC should be modified to acknowledge this situation.</p>	<p>Change the sentence to read:</p> <p><i>Any post-certification changes to CMRs should be reviewed by the same entities that participated in the CMCC ....</i></p>	<p>We corrected the spelling of “Certification” in the title.</p> <p>We agree to change the sentence as requested.</p>
<p><b>Commenter: AIRBUS</b> Page 11, para 15b</p> <p><i>The introduction of a new CMR or any change to an existing CMR should be reviewed by the same process used during initial certification</i></p> <p>It has been shown to be impracticable to maintain</p>	<p>Change to read:</p> <p><i>The introduction of a new CMR or any change to an existing CMR should be reviewed by the same entities that were involved in the CMCC at time of initial certification</i></p>	<p>We agree to revise the sentence as requested.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>an active CMCC throughout aircraft life. Thus it is unrealistic to require the same process to be used. In order to provide the opportunity for carriers to be involved in the CMR determination, established practice is to brief the ISC/MRB on potential changes to the CMR document.</p>		
<p><b>Commenter: AIRBUS</b> Page 12, para 15c <i>...the change may be documented by an FAA-approved change to the CMR document.</i></p> <p>US operators of foreign airplanes hold CMR documents that are approved by the governing authority (ie the foreign authority). This is accepted by FAA under a bilateral agreement. The carrier has no evidence that it is FAA approved. FAA only issue ADs to address changes to CMRs that introduce increased burden . This paragraph refers to relaxation of CMRs. Thus there will be no FAA approval of such changes. The important point is that any changes to CMRs must be approved by the governing ACO. It is not necessary for this to be the FAA.</p>	<p>Change to read:</p> <p><i>...the change may be documented by a revision to the CMR document approved by the governing ACO.</i></p>	<p>We agree to revise the sentence as requested.</p> <p><i>...the change may be documented by a revision to the CMR document <b>and</b> approved by the governing ACO.</i></p>
<p><b>Commenter: AIRBUS</b> Page 12, para 15d <i>If the FAA determines that the requirements of an existing CMR must be increased (more restrictive actions to be performed), the new requirements will be mandated by an airworthiness directive (AD).</i></p> <p>Revision to AC 25-19 provides an opportunity to clarify that the AD will mandate a revision of the CMR document. This will avoid an interpretation</p>	<p>Change to read:</p> <p><i>If the FAA determines that the requirements of an existing CMR must be increased (more restrictive actions to be performed), the new requirements will be mandated by an airworthiness directive (AD) <b>on the CMR document revision that includes the change.</b></i></p>	<p>We agree with the comment and revised the sentence as follows.</p> <p><i>If the FAA determines that the requirements of an existing CMR must be increased (more restrictive actions to be performed), the new requirements will be mandated by an airworthiness directive (AD) <b>and the CMR document will be revised to include the change.</b></i></p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
that a dedicated AD must be released to address the new/revised CMR and another one to mandate the CMR document revision.		
<p><b>Commenter: AIRBUS</b> Page 12, para 15e <i>The only basis for the FAA requiring a new CMR is in association with certification of design changes that necessitates a new CMR, or with continued airworthiness corrective actions.</i></p> <p>Experience has shown that this paragraph in the earlier AC 25-19 caused applicants more difficulties than any other paragraph in the document. It was introduced to reflect carrier concern that applicants would use CMRs in preference to ADs to address issues found during service. Since this might by-pass their due process mechanisms, it was accepted that new CMRs could only result from design changes. However, this subsequently led to difficulties with promulgation of new / revised CMRs that arose from reassessment of SSAs to address errors, new Failure Conditions, new assumptions, extensions to service goals, etc. Such limitations applied to aircraft already in service but were not due to any known unsafe condition on the type. Since they are not associated with a design change they could not (or should not) have been declared as CMRs. The only other option was an Airworthiness Directive but since there is no known problem with the aircraft there could never be a modification to eliminate the new limitation. As a result, applicants are reluctant to use the AD process for such issues.</p> <p>FAA have proposed to address this concern by</p>	<p>Change to read:</p> <p><i>The only basis for a new CMR is in association with:</i></p> <ul style="list-style-type: none"> <li>- <i>certification of design changes or</i></li> <li>- <i>changes to the applicant’s certification compliance documentation resulting from issues unrelated to in-service events on the aircraft type in question. These may include regulation changes, awareness of additional hazardous or catastrophic failure conditions, revised failure rates, consideration of extended service goals, etc.</i></li> </ul>	<p>After many discussions in industry/authority working groups, paragraphs e and f were our attempt to respond to airplane manufacturers requests to introduce in the AC guidance for the addition of new CMRs that are not associated with unsafe conditions. The commenter is correct that our intent is not to misuse the AD process to promulgate new CMRs that did not result from unsafe condition findings.</p> <p>Based on Airbus comments, we combined paragraphs e and f, to read:</p> <p>e. New CMRs that are unrelated to in-service events (therefore no ADs are issued) may be created and they should be documented and approved by the governing ACO. New CMRs can arise in situations such as :</p> <ul style="list-style-type: none"> <li>- Certification of design changes, or</li> <li>- Updates to the applicant’s certification compliance documentation. These may result from regulation changes, awareness of additional hazardous or catastrophic failure conditions, revised failure rates, consideration of extended service goals, etc.</li> </ul> <p>Paragraph f will be deleted.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>modifying para (e) and (f). FAA proposal to add the words <i>'or with continued airworthiness corrective actions'</i> could lead to the use of CMRs to address unsafe conditions seen in service on the aircraft type in question. Is this FAA's intention? If so, it represents a major departure from previous understanding (and is contrary to the carrier's expectations).</p> <p>Understanding that this is not FAA's intention, the wording should be modified to restrict the <i>'continuous airworthiness'</i> actions to issues that do not relate to an in-service issue identified on the aircraft in question. This however duplicates the intent of the revised para (f). The reworded para e continues to state <i>'the only basis...'</i> which, with the introduction of para (f), is now wrong.</p> <p>It is suggested that para (e) and (f) are combined.</p>		
<p><b>Commenter: AIRBUS</b> Page 12, para 15f</p> <p><i>f. A new CMR created for any justified reason, for example, regulation changes, awareness of additional hazardous or catastrophic failure conditions, revised failure rates, etc., including new CMRs recommended by the manufacturer, should be a part of the FAA-approved change and added to the CMR document.</i></p> <p>It is suggested that since this provides another reason to update CMR documents it should be combined with para (e) that currently provides the <u>only</u> basis for introducing a new CMR.</p> <p>END OF AIRBUS COMMENTS</p>	<p>Delete para (f) and merge with para (e) resulting in the following:</p> <p><i>The only basis for a new CMR is in association with:</i></p> <ul style="list-style-type: none"> <li>- certification of design changes or</li> <li>- changes to the applicant's certification compliance documentation resulting from issues unrelated to in-service events on the aircraft type in question. These may include regulation changes, awareness of additional hazardous or catastrophic failure conditions, revised failure rates, consideration of extended service goals, etc.</li> </ul>	<p>Agreed. See revision in the above row.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p><b>Commenter: American Airlines</b>                      The original release of this document addressed “one star” and “two star” CMRs. “One star” CMRs were defined as those tasks and intervals that were mandatory and could not be changed, escalated, or deleted without the concurrence of the responsible ACO. “Two star” CMRs were defined as those which could be adjusted in accordance with an operator’s approved escalation process. These terms are no longer defined in the proposed AC.</p>	None.	<p><i>We thank American Airlines for submitting their comments.</i></p> <p>The comment is correct that the “Two star” category is no longer used.</p>
<p><b>Commenter: American Airlines</b>                      The current document addresses an “exceptional short term extension” but it only specifies that any exception to CMR intervals must be defined in the CMR document. I believe that elimination of the identification of “one star” and “two star” from the advisory circular may lead to problems since our current MRB documents have this annotation.</p>		<p>The commenter did not identify what “problems” American Airlines may encounter. As we responded to similar Airbus comments above regarding the effects of deleting the Two-star category, our discussion with the airlines who participated on joint industry-authority working groups revealed that operators rarely escalate two-star CMRs. Further, current AFS policy does not allow escalation of <u>any</u> CMR. The policy also states that CMRs are the responsibility of FAA engineering as far as approval and escalation.</p>
<p><b>Commenter: American Airlines</b>                      In addition, paragraph 14.b.(1) defines “exceptional short term extension” as an increase in a CMR interval that may be needed to cover an “uncontrollable or unexpected situation.” I believe that these two terms, uncontrollable and unexpected, leave too much to interpretation.</p> <p>END OF AMERICAN AIRLINES COMMENTS.</p>		<p>The phrase “uncontrollable or unexpected situation” has been used since the original publication of the AC in 1994. The main purpose is to recognize, and accommodate, occasions where it is not possible to carry out the CMR at the required check interval, due to the airplane being away from a maintenance base, weather conditions, etc. In these situations, the “exceptional short-term extension” clause allows temporary relief so the operator can bring the airplane to a condition/location suitable to perform the CMR.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p><b>Commenter: Willer Alves da Silva Cruz (Brazilian Civil Aviation Authority – ANAC)</b>                      Section 4.c: Internet address provided for availability of EASA AMC 25.1309 is a broken link. Correct link should be <a href="http://easa.europa.eu/agency-measures/certification-specifications.php">http://easa.europa.eu/agency-measures/certification-specifications.php</a></p> <p>END OF ANAC COMMENTS</p>	<p>4.c: Other Documents (...)                      European Aviation Safety Agency (EASA) Acceptable Means of Compliance (AMC) 25.1309, System Design and Analysis. Available on the internet at <a href="http://easa.europa.eu/agency-measures/certification-specifications.php">http://easa.europa.eu/agency-measures/certification-specifications.php</a> (...)</p>	<p>We thank ANAC for the cooperation during the development of this draft AC, and the comment herein.</p> <p>The corrected link is verified and included in the AC.</p>
<p><b>Commenter : Boeing Intro 1</b></p> <p>Boeing Commercial Airplanes appreciates the opportunity to review and comment on the subject proposed AC. We have some significant general concerns about the proposal, which are discussed below. We also have detailed responses to specific items throughout the proposed AC, which are contained in the enclosure to this letter.</p>		<p><i>We thank Boeing for your comments. Your concerns and detailed comments on specific items in your enclosure are documented and addressed in the rows below.</i></p>
<p><b>Commenter : Boeing Intro 2</b></p> <p>We welcome the clarifications to appropriately taking credit for MSG-3 tasks and the definition of candidate certification maintenance requirements (CMR), as explained in the proposed AC. However, we find that the proposed AC also significantly expands the definition of “candidate CMRs” to include maintenance tasks that are not required by numerical analysis to comply with 14 CFR 25.1309(d). While history has demonstrated the requirement for freeplay checks to detect wearout; we are unaware of the FAA’s justification for expanding the definition of candidate CMRs to include all latent failures, as well as expanding the scope of CMRs beyond § 25.1309(b) to include major failure effects. We would like to understand more about the factors that give reason for</p>		<p>Regarding the comment on expanding “the definition of candidate CMRs to include maintenance tasks that are not required by numerical analysis to comply with 14 CFR 25.1309(d),” we clarify this is <u>not</u> an expansion beyond what the rule requires, because the existing AC already had this provision, per paragraph 9.b.2. The very first sentence of that paragraph says “<b>Other tasks, not derived from formal safety analyses but based on properly justified engineering judgment, may also be candidates for CMR’s.</b>” The proposed revision does not change this practice. We will also reiterate that numerical analysis supplements but does not replace qualitative analysis, according to AC 25.1309-1. The numerical objectives of <math>1 \times 10^{-9}</math>, <math>1 \times 10^{-5}</math>, etc., are means of compliance, and not in themselves the rules.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>expanding the scope of CMRs in the proposed AC. If this expansion is intentional, then it should more appropriately be implemented by way of normal rulemaking, rather than through this AC.</p>		<p>Regarding the comment on “expanding the definition of candidate CMRs to include <u>all</u> latent failures, as well as expanding the scope of CMRs beyond § 25.1309(b) to include major failure effects,” we clarify that not ALL latent failures are included in the proposal. The current definition of “Significant Latent Failures” (i.e., those that contribute to Hazardous or Catastrophic failure conditions) is maintained in the proposed revision. As we responded to a similar comment from AIA, the coverage for Major failure condition was not in the original AC, but it is currently in practice at EASA and TCCA. Our experience is the identification of CCMR for Major failure conditions has been and is expected to be rare; but it is occasionally necessary when the certification process needs to supplement the MSG-3 process.</p> <p>Regarding the comment on rulemaking to cover the Major failure conditions, we note that § 25.1309(b) does regulate Major failure conditions, so rulemaking is not necessary to provide a means of compliance in support of the Major failure category. In fact, the opposite case can be made that the existing AC does not fully cover compliance with § 25.1309(b). However, as stated above, we intend to focus on the Hazardous and Catastrophic categories, and would consider CMR for Major failures only in rare cases where the MSG-3 process needs to be supplemented.</p>
<p><b>Commenter : Boeing Intro 3</b></p> <p>Greatly expanding the use of CMRs as a means of compliance with § 25.1309(d) could result in wider acceptance of CMRs as a design solution in lieu of active failure monitoring. Our overarching</p>		<p>As discussed in the above row, there is no significant expansion of the use of CMRs. Promoting the use of active failure monitoring is already covered in AC 25.1309-1 and needs not be re-emphasized in AC 25-19X.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>comment is that the FAA should be able to work internally to use the MSG-3 process to the greatest extent possible, thus making AC 25-19 either unnecessary or designed to only address the few remaining gaps in the coverage provided by MSG-3. Over time, it should also be a goal for MSG-3 to adapt to the latest safety methods and allow AC 25-19 to be rescinded. We note that FAA recently revised AC 121-22A (“Maintenance Review Board”) to address some of the same concerns addressed in proposed AC 25-19X, such as enhanced controls on safety-related MSG-3 tasks. We understand that AC 121-22B is currently in the revision process, and we welcome continued coordination within the FAA on AC 25-19X as well as AC 121-22X.</p> <p>Again, we thank you for the opportunity to review this proposal and trust that you will consider our comments prior to finalizing the document.</p>		<p>Because the MSG-3 logic is completely different from the SSA method, there is no basis to rescind AC 25-19. On the CAST SE172R1 (where Boeing maintenance and safety engineering were represented) it was clear to the taskforce membership that MSG-3 and CMR processes are independent but complementary. They cannot replace one another.</p> <p>Further, if MSG-3 were used as the primary means of compliance to § 25.1309 as the commenter suggests, then not only would the MSG-3 outputs be approved by the ACO, the development process itself would be under ACO’s oversight, in addition to being under the oversight of AFS/AEG. We do not believe this is Boeing’s intention in their comment, nor do we believe such complication is necessary.</p> <p>Boeing’s rationale for the use of the MSG-3 process “to the greatest extent possible” is contradictory with the concern for potential greater use of CMRs “in lieu of failure monitoring.” If a latent failure is not monitored, greater use of MSG-3 will not result in an active monitor design. On contrary, greater reliance on MSG-3 could result in greater safety risk because escalation of FEC8 tasks may not be congruent with the SSA, which is where the engineering rigor and rationale for accepting the latent failures without a monitor is determined.</p> <p>The draft AC 25-19X was coordinated with AFS and AEG. We disagree with the comment that the proposed changes to AC 121-22B address the same concerns intended in the draft AC 25-19X, because the MRB process in AC 121-22B is first and foremost a maintenance process in support of</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
		§ 25.1529, and is not intended for § 25.1309 compliance.
<p><b>Commenter: Boeing 1 of 18</b>  <b>Page 1</b>  <b>Paragraph 1. PURPOSE</b>  <b>Sentence 2</b>  <i>“... supporting the compliance with the requirements of Title 14, Code of Federal Regulations (14 CFR) 25.1309, and other system safety rules are protected in service. ...”</i></p>	<p>We request that specific safety rules be specified or the text be revised as follows:  <i>“... supporting the compliance with the requirements of Title 14, Code of Federal Regulations (14 CFR) 25.1309, <del>and other system safety rules</del> are protected in service. ...”</i>                      System safety rules need to be specified and not be subject to interpretation or open-ended.</p>	<p>We disagree with the requested strikethrough. But we agree to indicate the rules that typically require SSA. We added the existing rules that require system safety analyses for compliance; however, this list may change in the future, so there is no inference that it is a “complete” list.</p>
<p><b>Commenter: Boeing 2</b>  <b>Page 3</b>  <b>Paragraph 5.e.</b>  <b>Sentence 1</b>  <i>“e. The CMRs are required tasks, and associated intervals, developed to achieve compliance with 25.1309 and other regulations requiring safety analysis. ...”</i></p>	<p>We request that other regulations requiring safety analysis be specified or the text be revised as follows:  <i>“e. <del>The</del> CMRs are required tasks, and associated intervals, developed to achieve compliance with 25.1309 <del>and or</del> other regulations requiring safety analysis <u>to show hazardous failures are improbable and catastrophic failures are extremely improbable.</u> ...”</i>                       Other regulations requiring safety analysis needs to be more specific and not be subject to interpretation or open-ended.</p>	<p>We concur with the intent of the comment to identify the regulations that require safety analyses. However, we do not concur with adding the words <b><i>“to show hazardous failures are improbable and catastrophic failures are extremely improbable”</i></b> because not all system safety rules (besides § 25.1309) specify such requirements. We will modify the sentence the same way we respond to the comment #1.</p>
<p><b>Commenter: Boeing 3</b>  <b>Page 4</b>  <b>Paragraph 6.c.</b>  <b>Sentence 1</b>  <i>“c. <u>Failure Condition.</u> A condition having an effect on the airplane and/or its occupants, either direct or consequential, which is caused or contributed to by one or more failures or errors, ...”</i></p>	<p>We request that errors be more specific or the text be revised as follows:  <i>“c. <u>Failure Condition.</u> A condition having an effect on the airplane and/or its occupants, either direct or consequential, which is caused or contributed to by one or more failures <del>or errors</del>, ...”</i>                       Errors need to be specific and not subject to interpretation.</p>	<p>To be consistent with AC 25.1309-Arsenal and to harmonize with EASA AMC 25.1309, we will use the same definitions for “error” and “failure condition” as used in those advisory materials.                       -Add definition of “error” from AMC 25-1309                      -Copy the definition of “failure condition” from AMC 25-1309</p>
<p><b>Commenter: Boeing 4</b>  <b>Page 5</b>  <b>Paragraph 6.f,</b>  <b>Sentence 1</b></p>	<p>We request that this be replaced with the definition that appeared in the original AC 25-19:  <b><i>“6.d. Qualitative: Those analytical processes that assess system and airplane safety in a subjective,</i></b></p>	<p>The proposed definition is the same as those used in AC 25.1309-1A (existing) and in AC 25.1309-Arsenal. Because the definition is used in the context of the safety analysis process, it should be</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p><i>“f. Qualitative: Analytical processes that assess system and airplane safety in an objective, non-numerical manner.”</i></p>	<p><b><u>non-numerical manner, based on experienced engineering judgment.”</u></b></p>	<p>consistent with the above ACs. Also the word “subjective” in the original AC 25-19 should be corrected.</p>
<p><b>Commenter: Boeing 5</b> <b>Page 6</b> <b>Paragraph 9.</b></p> <p><b>“9. Design Considerations Related to Candidate CMRs (CCMRs)...</b> A decision to create a CCMR should follow the guidelines given in the current AC 25.1309 and Appendix 1 of this AC. Practical and reliable failure monitoring and indication systems to detect significant latent failures should be implemented in lieu of CMRs. [Editorial: statement about “does not comply with 25.1309(c) and (d)(4)” has been removed for consistency with AC 25-1309-Arsenal.] A practical failure monitoring and indication system is one that is considered to be within the state of the art. Reliable failure monitoring and indication should utilize current state of the art technology to minimize the probability of falsely detecting and indicating non-existent failures. Experienced judgment should be applied when determining whether or not a failure monitoring and warning system would be practical and reliable. Comparison with similar, previously approved systems is sometimes helpful. Appendix 1 of this AC outlines design considerations that should be followed in any decision to create a CCMR.”</p>	<p>We recommend that the highlighted sentence above be deleted.</p> <p>A simple method of failure monitoring is often preferable over a complex “state-of-the-art” one. The wording of the highlighted statement implies that the FAA will insist on a monitoring method as long as it is within the “state-of-the-art.” There are often design solutions within the state-of-the-art that are impractical or undesired for other reasons, for example cost, negative impact on procedures, etc. This more encompassing set of considerations is more fully and appropriately described in Appendix 1.</p> <p>The highlighted sentence does not agree with the sentence that follows it, or with the guidance in Paragraph 2 of Appendix 1. These sentences referencing “state-of-the-art” are unnecessary, and detract from the salient points following, that rely on experienced judgment, and Appendix I considerations, when determining the efficacy of a CCMR.</p>	<p>We note that the commenter adds the word “complex” which is not in the proposed AC. The phrase “state-of-the-art” is used in the existing AC 25-19, as well as in AC 25.1309. A “state-of-the-art” does not necessarily mean “complex.” It can be simple, accurate, reliable, cost effective, etc.</p>
<p><b>Commenter: Boeing 6</b></p> <p><b>Page 6</b> <b>Paragraph 10</b> <b>Sentence 3</b></p> <p><i>“... The details of the process to be followed in</i></p>	<p>We request that the text be revised as follows: <i>“... The details of the process to be followed in defining, documenting, and handling CMRs are given in paragraphs 11 through <del>13</del> 14, below. ...”</i></p> <p>Our recommended change is meant to clarify the intent.</p>	<p>We agree. The sentence will be revised accordingly.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<i>defining, documenting, and handling CMRs are given in paragraphs 11 through 13, below. ...”</i>		
<p><b>Commenter: Boeing 7</b></p> <p><b>Page 7</b> <b>Paragraph 10</b> <b>Figure 1</b></p> <p>The proposed figure shows “<i>ACO acceptance</i>” immediately following Re-evaluation/Redesign.</p>	<p>We request that “<i>ACO acceptance</i>” immediately following Re-evaluation/Redesign be deleted from Figure 1.</p> <p>FAA-ACO acceptance immediately following Re-evaluation/Redesign is too early in the process because neither the FAA-ACO nor the OEMs will be able to identify every latent failure at the beginning of an airplane early in the development program. This would create unrealistic requirements for new certification deliverables at the front end of an airplane program.</p>	<p>There is no implication of chronology in the flowchart. The “<i>ACO acceptance</i>” note was added to indicate SSA data that have been accepted by the ACO should be used in the CMCC meetings. We have observed that some CMCC used SSA data that was not reviewed/accepted by the Certification authority, causing much confusion and unnecessary burden for the CMCC.</p>
<p><b>Commenter: Boeing 8</b></p> <p><b>Page 8</b> <b>Paragraph 11</b></p> <p>Paragraph 10 is titled: “<i>Identification of Candidate CMRs (CCMRs)</i>”</p> <p>Paragraph 11 is titled: “<i>Identification of Candidate CCMRs (CCMRs)</i>.”</p>	<p>We recommend eliminating the title in Paragraph 11 and connecting it to Paragraph 10.</p> <p>The Paragraph 11 heading is confusing since the term “<i>Candidate</i>” is the first “<i>C</i>” in “<i>CCMR</i>.” This section appears to belong to Paragraph 10.</p>	<p>We recognize the errors in the titles of sections 10 and 11. We will correct them as follows:</p> <ul style="list-style-type: none"> <li>-Section 10 title will be “<i>Overview of the Scheduled Maintenance Task Development Process</i>”.</li> <li>-Section 11 title will be revised by deleting the extra C from CCMRs.</li> </ul>
<p><b>Commenter: Boeing 9</b></p> <p><b>Page 8</b> <b>Paragraph 11.b.</b></p> <p>“b. All significant latent failures (including latent-for-life items) should be CCMRs. All dispositions of those CCMRs should be handled by the Certification Maintenance Coordination Committee (CMCC).”</p>	<p>We request that the text be revised as follows:  “<i>b. All significant latent failures (including latent-for life items) should be CCMRs. <u>A candidate CMR may be used to limit the exposure of significant latent failures to comply with FAR 25.1309(b) where the design contains safety-significant latent failures that cannot practically (weight or cost) be mitigated by system redundancy or detected by onboard failure monitoring equipment. All dispositions of those CCMRs should be handled by the Certification Maintenance Coordination Committee (CMCC).</u></i>”</p> <p>Our recommended change is meant for clarification</p>	<p>As we responded to a similar comment from Airbus, the purpose of the paragraph is to ensure the CMCC has visibility of all the Significant Latent Failures, whether they are latent-for-life items or otherwise.</p> <p>The requested change is technically incorrect for the following reasons:</p> <ul style="list-style-type: none"> <li>• A <u>candidate</u> CMR has no ability to limit exposure to Significant Latent Failures. Either a CMR, or a MSG-3 FEC8 task is used for that purpose.</li> <li>• “weight or cost” cannot be the only criteria for defining the practicality of mitigating</li> </ul>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
	of intent, since many latent-for-life items are not CCMRs today. The scope needs to be limited to compliance with 14 CFR § 25.1309(b).	<p>Significant Latent Failures in a system design.</p> <ul style="list-style-type: none"> <li>CCMR identification is not limited to § 25.1309(b) as discussed previously.</li> <li>Not <u>all</u> latent failures are associated with CCMRs because CCMR identification is guided by the very definition of “Significant Latent Failures” (i.e., those that contribute to a Hazardous or Catastrophic failure condition.)</li> <li>The commenter did not explain why a latent-for-life item that involves in a Hazardous or Catastrophic condition is not identified as a CCMR today. According to AC 25.1309-1, they should be.</li> </ul>
<p><b>Commenter: Boeing 10</b> <b>Page 8</b> <b>Paragraph 11.c.</b></p> <p><b>11. Identification of Candidate CCMRs (CCMRs).</b> ... <i>c. Per the advisory material on § 25.1309, numerical analysis supplements, but does not replace, qualitative engineering and operational judgments. Therefore, other tasks, that are not derived from numerical analysis of significant latent failures, but are based on properly justified engineering judgment, may also be candidates for CMRs. The justification should include the logic leading to identification as a candidate CMR, and the data and experience base supporting the logic. These may include latent failures that would, in combination with one or more specified failures or events, lead to a major failure condition that is not identified and assigned a task via the MSG-3 process.”</i></p>	<p>In reference to the highlighted text above: This is a new expansion of CMRs to “Major,” which is not supported by typical design practices. Regulations allow single failures to result in Major failure conditions; further, quantitative analysis is most often not required for Major failure conditions.</p> <p>We are concerned that this could be misconstrued by specialists interpreting the requirements of the AC and drive a large number of systems that previously complied by way of qualitative analysis to perform unnecessary quantitative assessments. This also contradicts Figure A2-2, Depth of Analysis Flowchart (from AC 25.1309 Arsenal, Appendix A). CMRs should be limited to compliance with 14 CFR § 25.1309(b) (hazardous and catastrophic failure effects only).</p>	<p>We concur the inclusion of “Major” is new, as it was not considered in the original AC 25-19. Please see related discussion in the comment marked “Boeing Intro 2” above. We fully expect, based on experience with EASA and TCCA, CMRs are rare for Major failure conditions.</p> <p>Regarding the comments in this row:</p> <ul style="list-style-type: none"> <li>The regulation § 25.1309(b) allows single failures to result in Major failure conditions AS WELL AS allowing single failures to result in Hazardous failure conditions. So the rationale for excluding Major on the basis of single failures is not accepted.</li> <li>We disagree with the concern that including Major failure conditions in this AC would drive “unnecessary quantitative assessments.” The commenter implies that CMR can only be defined by quantitative safety analysis. That assumption is incorrect. Qualitative analyses have been used to identify CCMRs, as shown in the current AC 25-19.</li> </ul>
<p><b>Commenter: Boeing 11</b> <b>Page 8</b></p>	<p>We request that the text be revised as follows: “... <i>This committee should be made up of</i></p>	<p>We agree with the intent of the comment that ACO specialists play an important role in the CMCC.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p><b>Paragraph 12.a.</b> <b>Sentences 3 &amp; 4</b></p> <p>“... This committee should be made up of manufacturers, operator representatives designated by the Industry Steering Committee (ISC) Chairperson, FAA Aircraft Certification Office (ACO) <u>and ACO specialists, and the MRB Chairperson. The ACO participation in the CMCC process is often necessary to provide regulatory guidance to the selection of CMRs. ...</u>”</p>	<p><i>manufacturers, operator representatives designated by the Industry Steering Committee (ISC) Chairperson, FAA Aircraft Certification Office (ACO) <u>and ACO specialists, and the MRB Chairperson. The ACO participation in the CMCC process is often necessary to provide regulatory guidance to the selection of CMRs. ...</u></i></p> <p>We request that FAA-ACO participation is clearly shown to be mandatory, not just “<i>is often necessary.</i>” They play a critical role in this activity.</p>	<p>We will revise the sentence by deleting the word “often.”</p> <p>We disagree with adding “and ACO” as requested, because it is the personnel (i.e., the specialists) in the ACO who participate on the CMCC.</p> <p>We do not concur with the request to delete the sentence about ACO participation. Clearly, section 12.c states the CMCC is an advisory committee <u>for the TC applicant</u>, and that the governing ACO will approve the final CMR document <u>after</u> the document has gone through CMCC and ISC reviews. Unlike the MRB, the ACO does not chair the committee. The ACO specialists’ role on the CMCC is primarily to provide regulatory guidance to the committee.</p>
<p><b>Commenter: Boeing 12</b> <b>Page 8</b> <b>Paragraph 12.b</b> <b>After Sentence 1</b></p> <p>The proposed text (end of sentence 1 and start of sentence 2) states the following: “... and other relevant factors. In addition, where multiple tasks ...”</p>	<p>We request that the text be revised to re-insert a sentence from the currently approved AC 25-19 to read as follows: “... and other relevant factors. <u>During the CMCC’s discussions, participants’ experience may suggest alternatives to a given CMR that would satisfy the intent of the Regulation, while allowing reduced operational impact. In addition, where multiple tasks ...</u>”</p> <p>We request the text be added, as it is a critical part of the CMCC discussions in understanding the airline operators’ perspective and their experience.</p>	<p>The intent of the request is understood, but the requested additional wording is not necessary because there is already a sentence in the same paragraph that grants “operators an opportunity to participate in the <u>selection</u> of CMRs” (underline added for emphasis). However, we reiterate that the CMR process is first and foremost a certification process. Showing compliance to the certification rules is not the operators responsibility, unless they are also the applicant.</p>
<p><b>Commenter: Boeing 13</b> <b>Page 9</b> <b>Paragraph 12.c.</b> <b>Sentence 3</b></p> <p>“... The results of the CMCC (proposed CMRs to be included in the type design definition, and</p>	<p>We request that the text be revised to read as follows: “... The results of the CMCC (proposed CMRs to be included in the type design <del>definition</del> <u>limitations</u>, and proposed MRB tasks and/or intervals that meet the intent of the CCMRs) are forwarded by the TC applicant to the ISC for</p>	<p>We agree to this revision.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p><i>proposed MRB tasks and/or intervals that meet the intent of the CCMRs) are forwarded by the TC applicant to the ISC for consideration. ...”</i></p>	<p><i>consideration. ...”</i></p> <p>Our recommended change is meant to clarify the intent.</p>	
<p><b>Commenter: Boeing 14</b> <b>Pages 9</b> <b>Paragraph 12.c.</b> <b>Sentence 4</b></p> <p>The proposed text states the following: “... <i>Proposed MRB tasks and/or intervals rejected by the ISC will result in CMR tasks only.</i> ...”</p>	<p>We request that the text be revised to read as follows: “... <del>CMCC proposed Proposed</del> <i>MRB tasks and/or intervals rejected by the ISC will result in CMR tasks only.</i> ...”</p> <p>The proposed text implies that the MRB task would not exist if it wasn’t considered to satisfy the candidate CMR. Proposed MRB tasks are based on MSG-3 analysis, and the MSG-3 analysis is still used to justify an MRB task and interval, whether or not a CMR is established. Also, an ISC can accept an MRB task, but reject a proposed interval from the CMCC meeting; this does not eliminate the MRB task.</p>	<p>We agree with the comment. We revised the sentence by deleting the word “only” at the end. To be clearer, the “<del>CMCC proposed Proposed</del>” requested change will be incorporated in the sentence just before the sentence being commented on.</p>
<p><b>Commenter: Boeing 15</b> <b>Pages 9-10</b> <b>Paragraph 13.b.</b></p> <p>The proposed text states the following: “<i>b. The CMR designation may not be necessary if there is an appropriate MSG-3 task to replace the CMR, provided the CCMR is identified from the following conditions:</i> <i>(1) The SSA allows the failure to be latent for the life of the airplane. Even though the failure conditions containing the latent-for-life item(s) meets the quantitative probability objective, a qualitative assessment to determine the required maintenance before end of airplane life is still necessary, or</i> <i>(2) Latent failures leaving the airplane one failure away from hazardous failure conditions, or</i> <i>(3) A wear out failure condition that is classified as</i>”</p>	<p>We request that the text be revised read as follows: “<i>b. The CMR designation may not be necessary if there is an appropriate MSG-3 task to replace the CMR, provided the <u>MSG-3 task meets all of the following criteria:</u> CCMR is identified from the following conditions:</i> <i>(1) The SSA allows the failure to be latent for the life of the airplane. Even though the failure conditions containing the latent for life item(s) meets the quantitative probability objective, a qualitative assessment to determine the required maintenance before end of airplane life is still necessary, or</i> <i>(2) Latent failures leaving the airplane one failure away from hazardous failure conditions, or</i> <i>(3) A wear out failure condition that is classified as hazardous.</i> <i>(4) In all the above cases, the CCMR is satisfied by:</i>”</p>	<p>We appreciate the intent of the comment, in that it would substantially simplify the CMR selection process. We had evaluated that option prior to releasing the draft AC for public comments, because it is a known method currently practiced at some manufacturers. However, our decision was to add the guidance that Boeing is proposing to delete because the fundamental concern is not resolved without it. The MSG-3 tasks (that replace the CMRs) can be escalated beyond the intervals allowed in the SSA. There is no guidance for limiting escalation in the MRB process. Therefore, we will not delete the proposed guidance as requested.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>hazardous.                      (4) In all the above cases, the CCMR is satisfied by:                      (a) A MSG-3 task provided it meets <u>all</u> of the following criteria:                      1 It is a Failure Effect Category 8 task (FEC8).                      Note that because the MSG-3 logic does not consider a failure condition ....”</p>	<p><del>(a) A MSG-3 task provided it meets <u>all</u> of the following criteria:                      1 It is a Failure Effect Category 8 task (FEC8).                      Note that because the MSG-3 logic does not consider a failure condition ...”</del></p> <p>We recommend deletion of above text since the remaining criteria in this section are a sufficient improvement to safety, compared to the existing guidance.</p>	
<p><b>Commenter: Boeing 16</b>  <b>Page 11</b>  <b>Paragraph 13.b.(4)(a)3</b></p> <p>The proposed text states the following:                      “3. It can be ascertained that the FEC8 task would not be overlooked in service, or be susceptible to escalation beyond the interval that would otherwise be required by a CMR. For example, due to difficulty in accessing the item, engineering judgment indicates that a FEC8 task may be overlooked and that a CMR is appropriate.”</p>	<p>We request that the text be revised read as follows:                      “3. It can be ascertained that the FEC8 task would not be <del>overlooked in service, or be susceptible to escalation beyond the interval that would otherwise be required by a CMR. For example, due to difficulty in accessing the item, engineering judgment indicates that a FEC8 task may be overlooked and that a CMR is appropriate.</del>”</p> <p>An FEC 8 (hidden safety) task is very unlikely to be overlooked, just as a CMR is very unlikely to be overlooked. In the example, access should have no bearing on whether an FEC8 task or CMR is performed or not. The concern here is to maintain an MRB interval that does not go beyond the interval that would otherwise be required by a CMR.</p>	<p>Boeing’s comment that the FEC8 task would not be overlooked is true only when it remains FEC8. There have been cases where FEC8 tasks were re-classified as a non-FEC8 tasks due to lack of traceability between the FEC8 task and the CCMR. To respond to a comment from the TCCA, we added guidance on the traceability. With that addition, we agree to remove “overlooked in service” from the paragraph (2 places) as Boeing requested. However we will retain the “access” example to allow the CMCC to determine the best maintenance action in case a component cannot be checked in the “on-wing” condition.</p>
<p><b>Commenter: Boeing 17</b>  <b>Page 11</b>  <b>Paragraph 15.e.</b></p> <p>“e. The only basis for the FAA requiring a new CMR is in association with certification of design changes that necessitates a new CMR, or with continued airworthiness corrective actions.”</p>	<p>We request that the text be revised read as follows:                      “e. The only basis for the FAA requiring a new CMR is in association with certification of design changes that necessitates a new CMR, <del>or with continued airworthiness corrective actions.</del> <u>or when certifying a new airplane there is awareness of additional hazardous or catastrophic failure conditions that have resulted in an AD for similar systems/materials on previously certified</u></p>	<p>We agree with the comment. We incorporated Boeing’s request in conjunction with a similar request from Airbus. The result is a new paragraph 15.e and deletion of paragraph 15.f.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
	<p><u>airplanes.</u>”</p> <p>We recommend revision because ADs are the only way to implement a continued airworthiness corrective action required for safety. A new CMR is a major change to the type design, or, when certifying a new airplane, there is awareness of additional hazardous or catastrophic failure conditions that have resulted in an AD for similar systems/materials on previously certified airplanes.</p>	
<p><b>Commenter: Boeing 18</b> <b>Page 11</b> <b>Paragraph 15.f.</b></p> <p>The proposed text states the following: “f. A new CMR created for any justified reason, for example, regulation changes, awareness of additional hazardous or catastrophic failure conditions, revised failure rates, etc., including new CMRs recommended by the manufacturer, should be a part of the FAA-approved change and added to the CMR document.”</p> <p>END OF BOEING COMMENTS</p>	<p>We request that the text be revised as follows: “f. <u>A new CMR created due to design changes, or created when certifying a new airplane due to awareness of additional hazardous or catastrophic failure conditions that have resulted in an AD for similar systems/materials on previously certified airplanes.</u> <del>A new CMR created for any justified reason, for example, regulation changes, awareness of additional hazardous or catastrophic failure conditions, revised failure rates, etc., including new CMRs recommended by the manufacturer, should be a part of the FAA-approved change and added to the CMR document.</del>”</p> <p>We recommend revision due to that fact that the text “for any justified reason... etc.,” is open-ended and could be subject to differing interpretations.</p>	<p>We agree. This was incorporated as discussed in the above row.</p>
<p><b>Commenter: Bombardier</b> (1) Section 5, (bottom of page 2)</p>	<p>Reference to paragraph 6b should be changed to 6c.</p>	<p><i>We thank Bombardier for the comments. Each comment is addressed below.</i></p> <p>We agree with the paragraph numbering. The paragraph reference has been corrected.</p>
<p><b>Commenter: Bombardier</b> (2) Section 5, paragraph (a) (page 3)</p>	<p>Request re-writing 2<sup>nd</sup> sentence as follows: “A CMR can also be used to establish a required task</p>	<p>The SSA process identifies both latent and evident failures due to wear out and proposes CCMRs as</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
	to detect an impending wear-out of an item whose eventual failure would be latent and which is associated with a hazardous or catastrophic condition”. Bombardier Aerospace (BA) considers that CMRs are failure-finding tasks associated with latent failures (including tasks created to identify impending wear-out). BA also considers that impending wear-out of items resulting in an active failure are properly covered through the preventative maintenance procedures defined by MSG-3.	necessary. A wear out may or may not be latent, depending on the amount of allowable wear specified by the designer. We note that this comment appears to contradict BA comment #13 below, where it requests adding FEC5 tasks. FEC5 tasks typically cover evident failures.  The sentence has been revised as follows: “A CMR can also be used to establish a required task to detect an impending wear-out of an item whose failure is associated with a Hazardous or Catastrophic failure condition.”
<b>Commenter: Bombardier</b> (3) Section 5, paragraph (c) (page 3)	Request re-writing 1 <sup>st</sup> sentence as follows: “CMRs are failure-finding tasks and impending failure-finding tasks, associated with latent failures. As such, CMRs verify that a ... (e.g. heavy wear out or leakage)”. See comment 2, above.	We disagree with the requested change because a wear out may or may not be latent.
<b>Commenter: Bombardier</b> (4) Section 5, paragraph (d) (page 3)	Request re-writing 2 <sup>nd</sup> sentence as follows: “This process is not intended to establish normal maintenance tasks (e.g. greasing, fluid-level checks, etc.) that should be defined through the MSG-3 analysis process.” This will help distinguish between failure-finding tasks and preventative maintenance tasks performed through MSG-3, associated with hazardous or catastrophic conditions.	We agree to this change.
<b>Commenter: Bombardier</b> (5) Section 11, Title (page 9)	“Candidate CCMRs” should be “Candidate CMRs”	We agree.
<b>Commenter: Bombardier</b> (6) Section 11, paragraph (a), third sentence (page 9)	Request re-writing, 3rd sentence as follows: “Tasks may also be selected from those intended to inspect for impending failures due to wear-out, <u>which upon failure would be latent.</u> ” See comment 2, above.	CMR tasks need not be limited to wear outs that result in latent failures.
<b>Commenter: Bombardier</b> (7) Section 11, paragraph (a) (page 9)	4 <sup>th</sup> sentence related to qualitative assessment is redundant and should be deleted since this aspect is covered in paragraph c.	We agree to delete this sentence.
<b>Commenter: Bombardier</b> (8) Section 11, paragraph (b) (page 9)	To clarify, the justification (System Safety Analysis) for a Candidate CMR would be sent to	We agree with the clarification, but it needs not be added to the AC because we need not tell the

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
	<p>the ACO and not the Certification Maintenance Coordination Committee (CMCC) for review. The certification documentation should not be presented to the CMCC.</p> <p>The CCMR would identify the failure mode to be detected, the dormant failure events to be checked and the check interval and proposed maintenance.</p>	<p>applicant to protect the propriety of their SSA data.</p> <p>We will add the clarification for the content of the CCMR. The sentence is moved to paragraph 11.a.</p>
<p><b>Commenter: Bombardier</b> (9) Section 11, paragraph (c) (page 9)</p>	<p>This is the only place in the AC where reference is made to <u>Major</u> failure conditions. This is considered insufficient. Suggest a longer treatment of how to deal with tasks associated with Major failure conditions. BA processes such tasks through the CMCC in the same manner as CCMRs except that they are referred to as “Major Tasks”. BA feels that Major Tasks need the same formal attention as CCMRs since they are related to safety requirements associated with § 25.1309. They are typically treated in a quantitative manner in the safety analysis and are dispositioned via an MSG-3 task. They would become CMRs if the MSG-3 process could not identify a task, although this is not expected to occur.</p>	<p>We appreciate BA’s being receptive of including Major failure conditions to the CMR process, and we agree with the rationale you provided. However, by the same rationale (MSG-3 rarely misses such tasks) we believe extensive guidance beyond what we’ve already proposed is not necessary.</p>
<p><b>Commenter: Bombardier</b> (10) Section 11, paragraphs (b) and (c), page 9</p>	<p>For a more logical flow in the discussion, suggest swapping paragraphs b. and c (i.e., para c becomes b and para b becomes c)</p>	<p>We made some modifications to these paragraphs that improve the flow, although we did not swap the paragraphs.</p>
<p><b>Commenter: Bombardier</b> (11) Section 13, paragraph (a), page 10</p>	<p>References to “wear out” are unclear since the “no single failure rule” would preclude “wear out” from leading to a catastrophic event.</p>	<p>We agree. The paragraph now addresses dual-failure situations that include wear out.</p>
<p><b>Commenter: Bombardier</b> (12) Section 13, paragraph (b), page 10</p>	<p>Since this paragraph includes a reference to AFM procedures (sub-paragraph (4) (b)), request re-writing the introduction to paragraph b, as follows: “The CMR designation may not be necessary if there is an appropriate MSG-3 task or AFM procedure to replace the CMR. The following criteria are used in making this determination:”</p>	<p>We agree. The introduction paragraph b has been revised as requested.</p>
<p><b>Commenter: Bombardier</b> (13) Section 13, paragraph (b)(4)(a)</p>	<p>MSG-3 tasks should not be limited to Failure Effect Category 8 (FEC8). FEC5 should also be included</p>	<p>We agree. We added that FEC5 tasks associated with wear out can also be considered instead of a</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
	as it is a safety-driven task.	CMR for Hazardous failure conditions. We note that FEC5 tasks typically cover evident failures.
<p><b>Commenter: Bombardier</b> (14) Section 13, subparagraphs b (4)(a)(2) and (3) (page 11)</p>	<p>Some of the language used in referring to the MSG-3 process comes across as prejudicial and gives the impression that the MSG-3 process doesn't take Safety as seriously as the Certification process. This is inappropriate and does not do justice to the successful application of the MSG-3 process, and in particular the handling of FEC8 tasks, over the past 2 decades. Suggest rewriting these two sub-paragraphs to eliminate the use of some prejudicial wording, such as, "<u>inappropriate</u> escalation of FEC8 task intervals" (sub-para 2,), "indicates that a FEC8 task may be <u>overlooked</u>" (sub-para 3), and, "one should not replace a CMR task with a MSG-3 task <u>without having a process in place</u> (isn't MSG-3 such a process?) to ensure that the certificated level of safety will be protected for the life of the airplane" (sub-para 3). If there is a concern about the rigour with which FEC8 tasks are managed at the PMI level, then suggest that additional training be provided to local authorities.</p>	<p>We agree with commenter's sentiment. Our proposal was meant to convey experience over the last 15 years where there have been cases where FEC8 tasks were re-classified after the initial MRB activity thereby eliminating the capability to rely on FEC8 tasks to satisfy CCMRs. However, we agree the guidance is repetitive of paragraph 5.b. Therefore we will remove it from paragraph 13.</p>
<p><b>Commenter: Bombardier</b> (15) Section 13, paragraph b, sub-paragraph (4)(b) (page 11)</p>	<p>It is not clear how the governing ACO can determine "whether the task <u>might be altered</u> during the operational life of the airplane". Such language is too loose and may lead to an undue number of CMRs. Suggest re-writing.</p>	<p>We agree. We will simply state the criteria that the CCMR is satisfied by a procedure in the <u>approved</u> section of the AFM.</p>
<p><b>Commenter: Bombardier</b> (16) Section 13, paragraph b (page 11)</p>	<p>The perception is that only CCMRs associated with hazardous failure conditions can be covered by an appropriate MSG-3 task. It should be made clear that based on various criteria, CCMRs associated with catastrophic failure conditions can also be covered by an appropriate MSG-3 task. Based on BA experience, the criteria outlined in paragraph 11, sub-paragraph (a)(2) of the <u>existing</u> AC 25.19, were deemed pertinent and appropriate in helping to determine whether or not CMR status was</p>	<p>It is not our intent to rule out the use of MSG-3 tasks to satisfy CCMRs associated with Catastrophic failure conditions. We added wording to this effect to paragraph 13.</p> <p>Regarding BA's suggested additional criteria, we agree that having a large margin indicated in items ii through iv lessen the risk for inadvertent escalation. However we have the following concerns with the suggested additional criteria:</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
	<p>necessary, even though the criteria were initially intended to help in categorizing a CMR as either a One Star or Two Star. As such, BA requests that the following criteria be added to paragraph 13, paragraph b.:</p> <p>“The following criteria can also be helpful in determining whether or not CMR status needs to be applied:</p> <ol style="list-style-type: none"> <li>i. The degree of conservatism taken in the classification of the failure condition consequences,</li> <li>ii. The margin available in the failure condition probability relative to the failure condition criticality (e.g., <math>1 \times 10^{-12}</math> probability for a catastrophic failure condition),</li> <li>iii. The sensitivity of the failure condition probability to interval escalation (this involves the theoretical doubling of the initially prescribed latent failure task interval and re-assessing the failure condition probability),</li> <li>iv. The margin between the safety analysis calculated maximum interval and the interval selected through the MRB process, and</li> <li>v. The proximity of the calculated maximum interval to airplane life.”</li> </ol>	<p>-The classification of the failure condition (and the conservatism therein) is part of the certificated level of safety and needs to be maintained as such. It should not be the basis for not having a CMR.</p> <p>-The proximity of the interval to airplane life is not a rationale for selecting either MSG-3 or CMR because the concern for escalation is still paramount.</p>
<p><b>Commenter: Bombardier</b> (17) Section 14, paragraph b., 3<sup>rd</sup> sentence, page 11</p>	<p>“Principle Maintenance Inspector” should be “Principal Maintenance Inspector”.</p>	<p>The error has been corrected.</p>
<p><b>Commenter: Bombardier</b> (18) Section 15, introductory sentence</p> <p>Additional comment. Received 3/30/2011 by email: Mr. Thor,</p>	<p>A full CMCC review for every new item would be inefficient and burdensome for the participants. We suggest a more flexible process be used, similar to that used prior to certification, where there is participation from all required CMCC participants, but no requirement for all participants to be present</p>	<p>We agree with the comment, and it has been addressed by other commenters. We will revise the sentence to state that post-certification changes to CMRs should be assessed by the same entities who participated on the CMCC process. We will not add the detailed steps as suggested in the additional</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>Since sending in our comments on the propose AC 25-19X, I have received a clarification for our point 18, suggesting detailed changes to the review process for new candidate CMRs. Unfortunately, the subject-matter expert had other priorities last week and could not provide his feedback in time:</p> <p>"My only suggestion is with respect to the last comment about the CMCC review. As you know, having a full blown CMCC to disposition a single CCMR is an onerous task. We do not want to suggest a process "<i>similar to that used prior to certification</i>" as you have mentioned. I would take this phrase out as it is may cause confusion. I would suggest we define a process to be used post certification.</p> <p>As mentioned in our phone conversation last Friday, I would suggest the following process for post certification aircraft , where there are very few CCMRs to disposition, instead of a having a full blown CMCC meeting:</p> <ol style="list-style-type: none"> <li>1. Send an electronic copy of the CCMR listing the failure modes, the failure effect and proposed the inspection interval, and if applicable the proposed disposition as either a CMR, AFM check or possible MSG-3 task if one exists, to the Industry Steering Committee (ISC) Chairman and the Multi Functional Working Group (MFWG) chairman for their input on how to process the CCMR. These two gentlemen are part of the CMCC. They may decide to obtain input from other operators of the aircraft for their input, but that is left to their discretion.</li> <li>2. Their input from the ISC and MFWG</li> </ol>	<p>at any given meeting.</p>	<p>comment. How the applicants wish to coordinate with the various entities is their prerogative.</p> <p>In any case, disposition of new CCMRs and modification to existing CMRs will be approved by the ACO.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>chairmen would be used to disposition the CCMR as either a CMR task or MSG-3 task or AFM check.</p> <ol style="list-style-type: none"> <li>3. If dispositioned as an MSG-3 task, this would require approval from the Regulatory Authority Maintenance branch.</li> <li>4. If dispositioned as a CMR or AFM check, these would require approval from the Regulatory Authority Certification branch.</li> <li>5. At the next formal ISC and MFWG meetings with the operators and the representatives from the Regulatory Authorities Maintenance branch, the disposition of the CCMR would be presented to the group for information purposes.</li> <li>6. The disposition of the CCMR would be documented in the System Safety Analysis report and sent to the Aircraft Certification Office (or in BA's case to TCCA) for final approval.</li> </ol> <p>This process involves input from all the members of the CMCC, just not all at the same time in one meeting. The manufacturer prepares the CCMR based on the System Safety Analysis ensuring that the disposition of the CCMR meets the criteria set by the Regulatory Authorities and advisory material , the operators (represented by the ISC and MFWG chairman) have input into the CCMR, the Regulatory Authority Maintenance branch would approve the new MSG-3 task (if applicable) and the Regulatory Authority Certification branch would approve the System Safety Analysis which dispositions the CCMR and approve the CMR (if applicable) or the AFM change (if applicable)."</p>		

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
END OF BOMBARDIER'S COMMENTS		
<p><b>Commenter: Cessna</b> Cessna Aircraft Company has no comment on this issue at this time.</p>		<i>We thank Cessna for the notification.</i>
<p><b>Commenter: Embraer</b> <b>Paragraph 4.b:</b></p> <p>Embraer recommends that in paragraph 4.b. the mention of 25-KSI-X Key safety Information for Airplane Systems should be removed, since this subject is under discussion and the document draft version is not open for public comments.</p>		We agree. References to KSI (2 places) have been removed.
<p><b>Commenter: Embraer</b> <b>Paragraph 5.a</b></p> <p>Embraer recommends, in paragraph 5.a., the AC shall specify a clear criterion (<i>i.e.</i>, logic flow chart or examples) for when or how a CMR could be required to detect impending wear-out failures on items related to Hazardous or Catastrophic failure condition in order to minimize possible improper CMR definition due to over-conservatism.</p>		We agree. Paragraph 5.a defines CMR and its functions. The selection criteria are described in Section 13.
<p><b>Commenter: Embraer</b> <b>Paragraph 6.d:</b></p> <p>The title of item 6.d, in page 5 of proposal AC, is "Governing Aircraft Certification Office (AC)". Embraer believes the sentence should be revised to say "Governing Aircraft Certification Office (ACO)".</p>		We agree. The title has been corrected.
<p><b>Commenter: Embraer</b> <b>Paragraph 6.e.2.a and b:</b></p> <p>The paragraph 6.e.2.a states that "For quantitative analysis purposes, remote failure conditions are</p>		The expression "on the order of" in the numerical objectives is identical with the expression in AC 25.1309-1 as well as EASA AMC 25.1309. The comment refers to the § 25.1309 regulation itself. However, the regulation contains only the

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>those having a probability on the order of <math>1 \times 10^{-5}</math> or less, but greater than <math>1 \times 10^{-7}</math>." The paragraph 6.e.2.b states that "extremely remote failure conditions are those having a probability on the order of <math>1 \times 10^{-7}</math> or less, but greater than on the order of <math>1 \times 10^{-9}</math>."</p> <p>These definitions are not clear, once the use of the expression "on the order" is not well defined and depends of interpretation. Embraer believes the use of definition presented by 14 CFR 25.1309 is more adequate to the intention of the AC. Thus, we suggest revise both paragraph to use the same text of the requirement.</p>		<p>qualitative terms (remote, extremely remote, extremely improbable). The expression is not used in the rule. As explained in AC 25.1309-1, the expression is appropriate because of the inexact nature of probabilistic estimates.</p>
<p><b>Commenter: Embraer</b> <b>Paragraph 10:</b></p> <p>In this paragraph Embraer recommends that FAA should clarify the following points.</p> <p>1. The intention of the box added to figure which contains the following statement: "Inputs to KSI Process (placeholder);"</p> <p>2. After the box that outlines "Safety Analysis ..." was added "ACO acceptance" in red, which has no meaning for it.</p>		<p>The KSI box was a placeholder. It has been removed.</p> <p>The "ACO acceptance" is added as guidance that the CMCC should use the SSA data that has been accepted by the ACO, rather than draft SSA data.</p>
<p><b>Commenter: Embraer</b> <b>Paragraph 11 :</b></p> <p>The title of paragraph 11 states "Identification of <b>Candidate CCMRs (CCMRs).</b>" Embraer believes the sentence should be revised to say "Identification of <b>Candidate CMRs (CCMRs).</b>"</p>		<p>We agree. The title has been corrected.</p>
<p><b>Commenter: Embraer</b> <b>Paraqraph 11.a:</b></p> <p>The meaning of the statement "..., and other requirements requiring this type of Analysis," contained in parenthesis, is not clear.</p>		<p>We agree. We added a list of such rules, as they are known at this time. It is possible new rules will be developed in the future that will also require SSA.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
Embraer recommends that FAA should clarify it, in order to avoid undue time spending with discussions to define "what are" these other requirements, during a CMCC process development.		
<p><b>Committer: Embraer</b> <b>Paragraph 13a:</b></p> <p>1. Embraer believes that, in this paragraph, it is not clear in which event combination (<i>i.e.</i>, cut-set combination) wear-out should be considered a CMR.</p> <p>2. This AC does not explain how a latent failure in a combination of three or more events shall be monitored. The absence of the latent failure maintenance action may compromise the required probability compliance for catastrophic or hazardous top events in accordance with §2 5.1309.</p>		<p>1: We added guidance for wear out similar to that of Significant Latent Failure, <i>i.e.</i>, dual-failure combinations.</p> <p>2: Failure combinations consisting of 3 or more events need detailed examination of the SSA data to identify CCMR. This is normally done during engineering review of the SSA prior to presenting the CCMRs at CMCC meetings. Based on Embraer's comment, we added the following guidance to ensure the more complex conditions are not missed:                      "In complex failure conditions (e.g., a combination of three or more failures) the SSA may identify more than one CCMR. Equivalent and compatible MSG-3 tasks (if they exist) may be used to satisfy some of those CCMRs. The rationale for the disposition of each CCMR should be presented to the governing ACO for approval."</p>
<p><b>Committer: Embraer</b> Paragraph 15: The title of paragraph 15 is "Post-Certificaiton Changes to CMRs." Embraer recommends that it should be revised to say "Post-Certification Changes to CMRs".</p> <p>END OF EMBRAER'S COMMENTS</p>		We agree. The title will be corrected.
<p><b>Committer: GAMA</b></p> <p><b>General</b> GAMA appreciates the opportunity to review and</p>		<i>We thank GAMA for their comments. Each comment is addressed below.</i>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
provide comments to Draft AC 25-19X, <i>Certification Maintenance Requirements</i> for which GAMA respectfully offers the following comments for consideration.		
<p><b>Commenter: GAMA</b></p> <p>According to paragraph 5.a, a CMR is intended to detect safety-significant latent failures that would result in a <u>hazardous</u> or <u>catastrophic</u> failure condition. The newly added verbiage contained in paragraph 11.c indicates that latent failures that lead to a <u>major</u> condition should be considered as CMRs and creates an inconsistency in intent. GAMA recommends the FAA replace the word “major” with “hazardous or catastrophic” in the last sentence of paragraphs 11.c.</p>		As we responded to similar comments from AIA, Airbus, and others, the addition of Major harmonizes with EASA and TCCA current practices, and we expect CMRs due to Major failure conditions that are not covered by MSG-3 are rare.
<p><b>Commenter: GAMA</b></p> <p>Paragraph 13(b) - CCMR latent for the life of the airplane may not need to be CMR or require maintenance before the end of the airplane life. Whether a component is latent for the life of the airplane is dependent on the system redundancy and whether credit is taken in meeting the probabilistic safety objective. That is, if the backup component is assumed failed in the fault tree model and the probability requirement is still met. Such a failure may still appear in a failure combination that could leave the airplane one failure away from a catastrophic or hazardous condition.</p> <p>GAMA recommends deleting the second sentence of paragraph 13b(1): “Even though...life is still necessary” as this is addressed in paragraph 13a last sentence.</p> <p>GAMA also recommends revise 13.b.(1) first</p>		<p>As we responded to a similar comment from another commenter, we agree to remove the “Even though ...” sentence from paragraph 13.b(1).</p> <p>We do not agree to revise the first sentence as recommended because it is sufficient to simply state the criterion that the failure is latent for life, whether credit is taken or not.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>sentence to “(1) The SSA allows the failure to be latent for the life of the airplane and credit is taken for this latent failure in meeting the quantitative probability objective (when no credit is taken, CMR designation is also not necessary), or”</p>		
<p><b>Commenter: GAMA</b></p> <p>Paragraph 13.b(4)(a)(1) - Failure effect category 8 task is not defined within the AC or by reference to other document. GAMA recommends the FAA add a definition or reference applicable document containing definition.</p>		<p>We agree. We added a reference to the ATA document.</p>
<p><b>Commenter: GAMA</b></p> <p>Paragraph 13.b(4)(a)(1) - It is stated that MSG-3 logic does not consider failure conditions containing three or more failures and therefore if no MSG-3 tasks exists it should be CMR. This ignores the level of redundancy in the system as a mitigating factor. GAMA recommends the FAA change the last phrase in paragraph 13.b.(4)(a)1 to “in which case the CCMR may possibly be designated a CMR. The significance of the contribution to the failure condition needs to be assessed.”</p> <p>GAMA is concerned that this change is laying groundwork for expanded application of current § 25.1309 requirements, without following proper rulemaking and cost benefit analysis procedures, by applying excessively conservative latent failure scenarios as identified through examples above.</p> <p>END OF GAMA’S COMMENTS</p>		<p>Our intent is not to ignore the level of redundancy as a mitigating factor. In conjunction with reviewing a similar comments from other commenters, we will remove the phrase “in which case the CCMR should be designated a CMR.” However, we do not agree to add the statement “significant of the contribution to the failure condition needs to be assessed.”</p> <p>Regarding GAMA’s concern that this change “is laying groundwork for expanded application of current § 25.1309 requirements without following proper rulemaking...” we note that the current AC already allows the practice that if a compatible MRB task does not exist, then the CMR designation is applied. Our proposal lays out more precise criteria so that there is a clearer rationale for why a CMR designation is chosen, besides the mere fact that a MRB task does not exist.</p>
<p><b>Commenter: Garmin</b></p>	<p>Replace the word “major” with “hazardous or catastrophic” in the last sentence of paragraph 11.c.</p>	<p><i>We thank Garmin for their comments. Each comment is addressed below.</i></p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>Paragraph 11.c</p> <p>Per paragraph 5.a, the objective of CMR is to detect significant latent failures that in combination with one or more specific failures or events results in hazardous or catastrophic failure condition. However the last sentence of paragraph 11.c indicates that latent failures that lead to a major condition should be considered as CMRs. This is inconsistent with paragraph 5.a.</p>		<p>This comment is identical to GAMA’s comment above. See above disposition.</p>
<p><b>Committer: Garmin</b> Paragraph 13b (1)</p> <p>CCMR latent for the life of the airplane may not need to be CMR or require maintenance before the end of the airplane life. Whether a component is latent for the life of the airplane is dependent on the system redundancy and whether credit is taken in meeting the probabilistic safety objective. That is, if the backup component is assumed failed in the fault tree model and the probability requirement is still met. Such a failure may still appear in a failure combination that could leave the airplane one failure away from a catastrophic or hazardous condition.</p>	<p>Recommend deleting the second sentence of paragraph 13.b.(1): “Even though...life is still necessary” as this is addressed in paragraph 13.a last sentence.</p> <p>Revise 13.b.(1) first sentence as follows:</p> <p>(1) The SSA allows the failure to be latent for the life of the airplane and credit is taken for this latent failure in meeting the quantitative probability objective (when no credit is taken, CMR designation is also not necessary), or</p>	<p>This comment is identical to GAMA’s comment above. See above disposition.</p>
<p><b>Committer: Garmin</b> Paragraph 13.b.(4)(a)<u>1</u></p> <p>Failure effect category 8 task is not defined within the AC or by reference to other document.</p>	<p>Add definition or reference applicable document containing definition.</p>	<p>This comment is identical to GAMA’s comment above. See above disposition.</p>
<p><b>Committer: Garmin</b> Paragraph 13.b.(4)(a)<u>1</u></p> <p>It is stated that MSG-3 logic does not consider failure conditions containing three or more failures and therefore if no MSG-3 tasks exists it should be CMR. This ignores the level of redundancy in the</p>	<p>Change the last phrase in paragraph 13.b.(4)(a)<u>1</u> to:</p> <p>“in which case the CCMR may possibly be designated a CMR. The significance of the contribution to the failure condition needs to be assessed.”</p>	<p>This comment is identical to GAMA’s comment above. See above disposition.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>system as a mitigating factor.</p> <p>END OF GARMIN'S COMMENTS</p>		
<p><b>Commenter: GE Aviation, S Knife</b></p> <p>GE Aviation is grateful to the FAA for the opportunity to review and comment on the proposed CMR policy. We recognize that undesired events have occurred resulting from wear out and from escalation of component maintenance intervals; it is our understanding that the role of wear out was not addressed in the initial failure analysis. The revised CMR policy would likely avoid this kind of event from recurring.</p> <p>However we are concerned that the draft AC goes beyond requiring consideration of wear out. It expands the scope of CCMRs to failure combinations with Major effects, and directs resources to combinations of three or more failures. This expansion exponentially increases the number of CCMRs to be reviewed; it is not clear that there will be a commensurate safety benefit.</p> <p>In particular, the proposed policy would appear likely to impose CMRs upon systems with traditional architectures, traditional well-understood technologies, and excellent track records, where multiple unprecedented failure propagations would be required for a hazardous or catastrophic outcome. Requiring CMRs for purely hypothetical, extremely unlikely cases may not be a good use of safety resources.</p> <p>Specific suggestions are attached in a comment form.</p>		<p><i>We thank GE Aviation for the comments. Each comment is addressed below.</i></p> <p>We thank GE Aviation for your support on the inclusion of wear out in the proposed CMR policy.</p> <p>Regarding the inclusion of Major effects, as we responded to similar comments from other commenters, the inclusion is realized only when the MSG-3 process does not provide coverage. This has been the practice at EASA and TCCA. Again, we expect this will be rare and the CMR process will be focused mostly to Hazardous and Catastrophic effects.</p> <p>The consideration of three or more failures is already a current practice in the certification process, if not in the MSG-3 process, so there is no expansion in this regard.</p> <p>Catastrophic and Hazardous failure conditions are required by the regulation to be “extremely improbable” and “extremely remote” while Major failure conditions are allowed to occur relatively more frequently (remote). Even “traditional architectures” have had CMRs. GE’s comments appear self-contradictory because if Catastrophic and Hazardous aren’t included because they are “extremely unlikely,” and inclusion of Major effects is considered “expansion,” then GE is recommending complete deletion of maintenance requirements. This would not be acceptable for compliance to the system safety rule, and would</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
Once more, many thanks for the opportunity to contribute.		create a gap in today’s safety-related maintenance practice.
<b>Commenter: GE Aviation, S Knife</b>	The proposed definition of failure is ambiguous when the failure is latent. Does a reduction in performance, degradation, or a condition which will result in loss of function at some later time constitute “failures?” Suggest the definition be modified to “(this includes <b>complete</b> loss of function or...)”	The suggestion is not accepted. The definition presented in the draft AC 25-19X is consistent with the definitions used in various advisory materials for § 25.1309. The inclusion of “ <b>complete</b> ” would unnecessarily complicate the definition of “failure” because “partial” loss of function is also a failure.
<b>Commenter: GE Aviation, S Knife</b>	The draft says: “ <i>The type certification process assumes the airplane will be maintained in a condition of airworthiness at least equal to its certified or properly altered condition.</i> ” This appears incorrect; “at least equal to” suggests the airplane can be maintained to be <u>more</u> airworthy than at certification. It is not clear how this could be done. Suggest the words “ <i>at least</i> ” be removed.	We agree to delete “at least” from the sentence.
<b>Commenter: GE Aviation, S Knife</b>	The draft says: “ <i>All significant latent failures (including latent-for-life items) should be CCMRs.</i> ” This appears a significant expansion of other guidance which typically says that CCMRs may be selected from significant latent failures. Many failures termed “significant latent” have extensive applicable service experience to show that the failure would not in practice propagate to a hazardous or Catastrophic effect; the difficulty of proving that it could not do so may drive additional CMRs with no safety benefit. Suggest the draft be reworded to say that CCMRs may be selected from safety significant failures.	The draft AC, and the current CMR process, already accomplish what the commenter suggests. The term “Significant Latent Failure” is defined in paragraph 6i as a latent failure “that would, in combination with one or more other specific failures or events, result in a hazardous or catastrophic failure condition.” The term has been in use since 1988 in the current AC 25.1309-1A.
<b>Commenter: GE Aviation, S Knife</b>	The draft says: “ <i>These may include latent failures that would, in combination with one or more specified failures or events, lead to a <b>major</b> failure condition that is not identified and assigned a task via the MSG-3 process.</i> ” Significant latent failures, and CMRs, are focused around failures with	See our response to GE’s comment on Major above, as well as our responses to similar comments from other commenters.

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
	<p>catastrophic or Hazardous effects. The intent of expansion of the scope to Major effects is not understood. This would bring no safety benefit and exponentially increase the number of CCMRs.</p>	
<p><b>Commenter: GE Aviation, S Knife</b></p>	<p>Section 13 of the draft greatly reduces the potential for the intent of the CCMR to be met by normal maintenance tasks such as letter checks and walk-rounds. It appears to require that maintenance tasks used in this way appear in the approved section of the AFM. This will greatly expand the approved section of the AFM, and in combination with the other proposed changes in policy, risks reducing the visibility of the most safety-significant maintenance tasks.</p> <p>We recommend a pilot project, where the proposed CMR policy is applied to an existing product, to understand the scope of the proposed changes and avoid unintended effects.</p>	<p>Paragraph 5.d clearly states that the CMR process is not intended to establish normal maintenance tasks. Since 1994 in the original AC, if there is an approved AFM procedure that would satisfy the CCMR, then a CMR is not needed. The comment on “greatly expand the approved section of the AFM” is not correct. It is not that new approved AFM procedures are required. It is that credit can be taken for existing approved AFM procedures. There is no need for a pilot project because this has been the existing practice for the last 16 years.</p>
<p><b>Commenter: GE Aviation, S Knife</b></p>	<p>The phrasing of section 13 is difficult to interpret. Suggest the sentence “<i>Particularly, the CMR designation should be applied in the case of dual failures where one failure is latent, or in the case of a wear out, that could result in a catastrophic failure condition.</i>” be removed since it is completely redundant with the preceding sentence.</p> <p>END OF GE AVIATION’S COMMENTS</p>	<p>The sentence is deleted (the paragraph is revised due to others comments.)</p>
<p><b>Commenter: Mr. James Stevenson</b></p> <p>Mr. Stevenson’s full comment (attached) contains figures and footnotes so are not suitable to cut-and-paste in this column. As a summary, Mr. Stevenson referenced the regulations and advisory materials related to fire/smoke in the cockpit and cabin, pointing out that protection against continuous smoke in the cockpit is not required by</p>		<p>We infer that the commenter believes that the current regulations regarding smoke in the cockpit are insufficient. This comment is not within the scope of AC 25-19X as we are proposing no change to current regulations.</p> <p>The emphasis of FAA’s fire protection strategy on commercial transport airplanes is to detect small fires and extinguish the fires or evacuate passengers</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>the regulation (ref AC 25-9A). Mr. Stevenson then asked (bolded words added for clarify and as a way to summarize his comment) the following question:</p> <p>“...how should we respond to Advisory Circular 25-19X when it does not address how to deal with <b>(the continuous smoke in the cockpit)</b> events that are not required <b>(to be considered)</b> for certification that are foreseeable and occur more frequently than Extremely Improbable?”</p> <div style="text-align: center;">  <p>Ken Dickenson AC25_19 comments.p</p> </div> <p>END OF MR. STEVENSON’S COMMENTS.</p>		<p>before small fires grow into large fires that can lead to catastrophic conditions (e.g., producing dense, continuous smoke). Per the regulations, airplanes are protected from fire and smoke by detection, control of ventilation, fire resistant liner material, self-extinguishing cabin interior materials, active fire suppression systems and evacuation procedures. The FAA is also minimizing fire ignition sources by regulating protection of wiring systems, carriage of hazardous cargo, etc.</p>
<p><b>Commenter: Mr. Ken Dickenson</b></p> <p>First of all, thanks to the FAA for the opportunity to comment on this proposed draft AC. I include comments in the form of a letter which contains the consensus of comments from myself and several ex-colleagues from my working life. I am a former Aerospace engineer having recently retired from a lifetime spent in Design, Customer Support and Airworthiness departments of aircraft manufacturers (TC holders). My experience also includes several years in the Reliability, Maintenance Planning and Airworthiness departments of some large Operators and MRO. My colleagues are drawn also from these areas. Our comments are derived from our experiences in both sides of the industry and hopefully highlight some difficulties encountered in remaining fully compliant with regulations and requirements and suggest some means to eliminate such possibilities</p>	<p>To try to avoid such misunderstandings, it is suggested to continue from the work carried out with the Ageing Aircraft Program, Fuel Systems assessments, EWIS, etc. This could be done by the application of CDCCL status within the TC Holders' and Operators' maintenance programs to tasks derived quantitatively from systems' § 25.1309 type certification assessments. This could help Operators and CAMO to more easily manage their programs by being able to list all Mandatory requirements and safety related tasks in one area. This would then give full visibility to maintenance planners and to their local NAA during the exercise of maintenance program escalation. At the same time, it leaves the flexibility to base the program on the TC Holders MRBR and to claim credit for similar non-mandatory task accomplishment, under the criteria of current CMCC agreements. In addition, should the 'mandatory' required interval be greater than the MRBR/MSG3 interval, it would</p>	<p><i>We thank Mr. Dickenson for his comments, insights, and suggestions.</i></p> <p>We agree with your observation that “...some tasks seen as necessary by the Design/SSA specialists, are now not mandated and their necessity may be 'lost' or 'hidden' from future assessments. This can 'mislead' future Maintenance Program Escalation meeting members, both Operators and NAA representatives, into believing some task escalations probably have no great effect on safety or probability of encountering an unsafe condition.” We also agree that operators need full visibility of mandatory maintenance.</p> <p>However, we do not agree with applying “CDCCL status” to CMR. Although some CDCCLs and CMRs are functionally equivalent from the ICA perspective, by regulation they are two separate types of maintenance requirements. CDCCLs</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>of non-compliance and inadvertent increase of safety risk.</p> <p>To summarise our comments: Systems,(installations, functions, &amp; components) are assessed, by a Quantitative process, during the period of type design and Type Certification, iaw FAR/JAR/IR 25.1309 requirements. Limitations to these systems may be proffered where a Haz/Catastrophic failure condition may be foreseen as possible. These limitations may be denoted as Candidate CMR (where a latent failure in isolation can be tolerated until the next [operational] check). In parallel, but by a separate, Qualitative process, the basic maintenance plan (MRB Report) is derived, most often by way of MSG3 process. The CMCC compares the list of Candidate CMR to similar MSG3-derived tasks and a final list of mandatory tasks is agreed, ie the CMR. That is to say, some tasks seen as necessary by the Design/SSA specialists, are now not mandated and their necessity may be 'lost' or 'hidden' from future assessments. This can 'mislead' future Maintenance Programme Escalation meeting members, both Operators and NAA representatives, into believing some task escalations probably have no great effect on safety or probability of encountering an unsafe condition.</p>	<p>give the Operator the flexibility to delay a task accomplishment, for reasons of logistics, manpower availability etc.</p> <p>Finally, I would ask that due consideration be given to the comments detailed in the attached letter.</p>	<p>specifically apply to fuel tank ignition source prevention as required by § 25.981. Labeling CMR as CDCCL could create confusion that § 25.981 applies to all systems aside from the fuel tank.</p>
<p><b>Commenter: Mr. Ken Dickenson</b></p> <p><b>The AC 25-19 in the general context:</b> Obviously this AC is revised following different activities on ageing and wear of aircraft systems. Ageing or wear have probably been the root cause of many aircraft accidents, e.g., the Alaska Airlines Flight 261 (MD-83) on January 31, 2000. It was</p>	<p>We would like to suggest then, that consideration be given to the adaptation and application of the CDCCL concept to the CMR and Airworthiness Limitations processes.</p>	<p>We agree with the problem identified in the comment; i.e., substituting CMR with MSG-3 task could lead to “hidden CMR” and “unintentionally violate the integrity of the original aircraft type design (including systems).” This is one of the main reasons we are revising this AC to correct this problem. However, as stated above, we could not directly apply the CDCCL label to all CMRs for</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>established for this accident that the original DC-9 Certification Documents specified a lubrication interval for the trimmable horizontal stabilizer (THS) jackscrew assembly of 300 to 350 flight hours. When the Maintenance Steering Group (MSG-3) methodology was later applied, the Maintenance Review Board (MRB) called for lubrication of the jackscrew assembly every 3600 flight hours or 15 months, whichever comes first. The TC Holder design engineers were neither consulted about nor aware of the extended lubrication interval specified in the MSG-3 documents. There was no cross reference to the certification exercise, conducted by different methodology, which specified the lower interval.</p> <p>The Annex 8 to the Convention on International Civil Aviation states that “Mandatory maintenance requirements that have been specified by the State of Design as part of the approval of the type design shall be identified as such and included in the maintenance information [...]”.</p> <p>The International Civil Aviation Organization (ICAO) Airworthiness Manual (Doc. 9760) indicates that “Based on service experience, it is normal practice for operators to develop maintenance programmes in terms of variation of task content and escalation of inspection and check intervals. Airworthiness limitations are to be excluded from this escalation process. [...]”.</p> <p>Should the lubrication requirement, together with its maximum interval as justified by TC Holder design engineers, have been specified as mandatory in the maintenance information (in the Airworthiness Limitations Section, the ALS), Alaska Airlines would have not been authorized by</p>		<p>other systems aside from the fuel tank.</p> <p>We agree there would be benefit in including CMR in the Airworthiness Limitations section, similar to CDCCL being included in the ALS as required by Appendix H § H25.4. We will consider rulemaking to revise H25.4, but that is beyond the scope of this AC 25-19 revision.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>the local FAA Flight Standards District Office (FSDO), without consulting the FAA Aircraft Certification Office (ACO), to excessively escalate the lubrication interval, i.e. beyond the maximum justified by probability means.</p> <p>It is important to note that the AC 25-19 instituted, as an acceptable practice, the non-designation of Candidate CMR (CCMR) as CMR when there is an <i>appropriate</i> MSG-3 task to substitute the CMR. The organizations not participating in the Certification Maintenance Coordination Committee (CMCC) have no visibility on these CCMR becoming “hidden” CMR. It is a fact that some organizations other than the TC/Supplemental Type Certificate (STC) holders, the Primary Certification Authority (PCA), or members of the CMCC, have activities (development, approval or performance of maintenance, repairs or alterations), which may unintentionally violate the integrity of the original aircraft type design (including systems).</p> <p>The protection of the design features and/or the maintenance requirements with their maximum interval (even beyond the current aircraft operational life) that have been defined in the original type design as needed to preclude development of hazardous or catastrophic failure conditions would be ensured if included in the operating limitations of the TC or STC. A consequence of the investigation on the TWA 800 flight (Trans World Airlines B747-131) midair explosion over the Atlantic on July 17, 1996 is the protection of such design features. This protection is ensured by the inclusion of Critical Design Configuration Control Limitations (CDCCL) in the ALS.</p>		

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p><b>Commenter: Mr. Ken Dickenson</b></p> <p><b>Purpose of the AC 25-19:</b>  <u>1) Duplication of information is a source for inconsistencies:</u>                      It is stated that this AC aims at providing guidance on the selection, the documentation, and the control of CMR. This process starts once the list of CCMR has been established, not before. The removal from this AC of all details about or necessary to the identification of CCMR would:                      - Clarify the interface between the CMR process and the formal, numerical analysis, and therefore would prevent (current) misunderstandings between Design and Maintenance engineers, and                      - Avoid inconsistencies in regulatory materials. (This AC has not been revised for about 17 years). The FAA implies it implicitly by including in this draft AC the statement “Editorial: match latest § 25.1309 terminology”.</p> <p><u>2) Protection of assumptions made in the system safety analyses:</u>                      It is stated that this AC also aims at providing a rational basis for coordinating the MRB, if the MRB process is used, and CMR selection processes to ensure premises made in the system safety analyses supporting the compliance with the requirements of FAR 25.1309, and other system safety rules are protected in service.</p> <p>However, it has been demonstrated here above that the design features generating CCMR that have not been designated as CMR are not protected from maintenance, repairs, or alterations developed, approved and/or performed by organizations other than the TC/STC holders, the PCA, and the CMCC</p>	<p>1) Nothing prevents the FAA from introducing these details into another AC (if not done yet, e.g. in the AC 25.1309) and referencing it into the AC 25-19 to direct the reader to the correct source document. For example, the paragraph 11 would be deleted and the paragraph 6 would be limited to:                       “6. Other Definitions. Some terms used in the guidance material of this AC originate from the system design and analysis requirements of § 25.1309(b), and (c). For the definition of these terms, refer to the applicable regulations and guidance material (e.g. ,AC 25.1309-1A).”</p> <p>2) The adaptation and application of the CDCCL concept within the CMR process would ensure that the essential information (covered by the CDCCL) will be evident to any organization that develop, approve or perform repairs or alterations. The examples given in the paragraph 13.b. are typical CDCCL.</p> <p>3) A simple and economical solution to reach concurrently the objectives of safety and flexibility is the CMR designation for each CCMR when the System Safety Assessment (SSA) does not allow the failure to be latent for the operational life of the aircraft. This information will be used:                      - To escalate safely the interval of FEC 8 tasks without the need for involving the TC/STC holder(s) and the PCA, each time,                      - To ensure before approval that the assessment of Changes to Type Design and/or of Repair Designs details the impact on CMR interval/CDCCL.</p>	<p>The comment has 3 suggestions:</p> <p>1) <u>Eliminate duplication of materials between AC 25.1309-1 and AC 25-19.</u> We will reconsider having only one source of information for the definitions currently in paragraphs 6 and 11 of AC 25-19X when we revise AC 25.1309-1A. At this time, we will ensure the information in both ACs is consistent.</p> <p>2) <u>Adapt and apply the CDCCL concept within the CMR process.</u> As stated previously, although some (but not all) CDCCLs are functionally equivalent to CMRs, CDCCLs are specific to the fuel tank and § 25.981. CDCCLs also cover design features not intended for CMRs. Broadly applying the CDCCL label to all systems could generate confusion.</p> <p>3) <u>Apply the CMR designation to each CCMR whenever the System Safety Assessment does not allow the failure to be latent for the operational life of the aircraft.</u> This was the practice prior to the original publication of AC 25-19 and it allowed no credit for maintenance tasks derived from the MSG-3 process. While reinstating this method simplifies the CMR determination, it results in CMRs for tasks that can be managed by MSG-3 FEC8 tasks. We have determined that the use of MRB/MSG-3 task is effective to ensure airplane safety, provided the criteria in paragraph 13.b of AC 25-19X are met. Allowing credit for MSG-3 tasks reduces ACO Engineering involvement in operators’ escalation practices, and focuses ACO resources to overseeing the critical</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>members. These activities may unintentionally violate the integrity of the original aircraft systems type design. This is detailed in the final rule of the SFAR 88.</p> <p>It may be noted that the evolutions of approval activities delegation (FAA order 8100.15A) will further affect this aspect.</p> <p>3) <u>Flexibility to the operator’s maintenance planning.</u>            This AC indicates that it aims at providing flexibility to the operator’s maintenance planning in substituting CMR by an <i>appropriate</i> MSG-3 task. Although it is a fair objective, it is usually not reached outside the jurisdiction of the PCA. The paragraph 13.b.(4) gives the impression to the reader that flexibility exists, but the burden resulting from a FEC 8 task (hidden safety effects) may be equivalent or exceed the CMR’s:            - FEC 8 tasks are safety related like CMR. Both require an independent check and record of accomplishment. For example, refer to FAR 121.369 “Manual requirements”, in particular paragraph (b)(2), and FAR 121.380 “Maintenance recording requirements” (Refer also to the European Aviation Safety Agency (EASA) Part M, paragraph M.A.402 “Performance of maintenance” and paragraph M.A.305 “Aircraft continuing airworthiness record system”).</p> <p>- The FEC 8 task interval is shorter than the interval that would be required for the CMR. So, the task has to be performed more frequently. The example given in this AC indicates that some applicants have applied, and the National Aviation Authorities</p>		<p>maintenance requirements.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>(NAA) have accepted, a factor of one half of the CMR interval as a margin to guard against potential inappropriate escalation of FEC 8 task intervals. But some other NAA rejected and do not accept FEC 8 task interval escalation because they have no visibility on the limit to the escalation process of FEC 8 tasks “hiding” CCMR. Then, the only alternative for operators is to ask for support from the TC/STC holder(s) in order to obtain an approval from the PCA. This is time consuming and, implies superfluous costs. The objective of flexibility may turn into rigidity.</p>		
<p><b>Commenter: Mr. Ken Dickenson</b></p> <p><b>CMR definition:</b>            1)The initial version of the AC 25-19 indicates that CMR are designed to verify that a certain failure has or has not occurred, and do not provide any preventative maintenance function.            In the 2011 draft version, CMR verify that a certain failure has or has not occurred, indicate that repairs must be initiated if the item has failed, or identify the need to inspect for impending failures (e.g., heavy wear out or leakage).</p> <p>The idea that CMR do not provide any preventative maintenance function is deeply rooted in people's minds. It has been established and taught in all maintenance engineering schools worldwide for almost two decades. The addition of preventative maintenance to the CMR process is a significant change of concept that will, with no doubt, create confusion.</p> <p>2) The AC 25-19 states that CMR should not be confused with required structural inspection programs that are developed by the TC applicant to</p>	<p>1) Could it be more appropriate to keep the CMR concept as it is, i.e., for failure-finding tasks, and to develop a new concept for preventative maintenance of systems. For preventative maintenance, it may be advisable to refer to Airworthiness Limitation Items (ALI) for sake of consistency with the approach taken within the frame of the SFAR 88.            Therefore, the following definitions would apply (AC 25-19, paragraph 5):            “a. A CMR is intended to detect safety-significant latent failures that would, in combination with one or more other specific failures or events, result in a hazardous or catastrophic failure condition.            b. An Airworthiness Limitation Item (ALI) is a required preventative maintenance task, which is intended to prevent impending wear-out failures of an item associated with a hazardous or catastrophic failure condition.            c. It is important to note that CMR and ALI are derived from a fundamentally different analysis process than the maintenance tasks and intervals derived from the MSG-3 analysis associated with MRB activities (if the MRB process is used). MSG-3 analysis activity produces different types of</p>	<p>1) We agree that CMRs are failure finding tasks and are not meant to be requirements for preventative maintenance. The word “must” in the first sentence of paragraph 5.c of AC 25-19X has been removed.</p> <p>There is no need to define ALI and CDCCL in this AC.</p> <p>2) We agree there would be benefit in documenting CMR in the ALS. This has also been recommended by others, e.g., the CAST SE172R1 taskforce. To provide the regulatory basis for CMR in the ALS, rulemaking is needed to revise § H25.4, similar to Amendment 25-102 when CDCCL was defined for the fuel tank. This rulemaking will be considered separately from this AC 25-19X revision.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>meet the inspection requirements for damage tolerance, as required by FAR 25.571, FAR 25.1529, and FAR 25 Appendix H, paragraph H25.4 (ALS). They should be developed and managed separately from any structural inspections programs and be listed in a separate CMR document, which is referenced in the type certificate data sheet (TCDS).</p> <p>This AC is revised following some activities on aging and wear of aircraft systems. The Alaska Airlines Flight 261 accident involved excessive wear of the THS jackscrew assembly nut. The THS jackscrew assembly is part of both aircraft structure (transfers loads) and systems (ensures functions). Servo-controls and landing gears are other examples.</p> <p>Some structural inspections and systems checks (including CMR), or life limits, are defined for this kind of aircraft components. That is to say, some items listed as systems parts, may include a structural element. Therefore, it seems out of date to separate structure and systems in the domain of mandatory maintenance. The FAA has already implied it implicitly by including the mandatory maintenance program that is developed by the TC applicant to meet the requirements for fuel tank system ignition prevention, as required by FAR 25.981, FAR 25.1529, and FAR 25 Appendix H, paragraph H25.4.</p> <p>Experience has shown that some airworthiness limitations had been overlooked and therefore exceeded as a result of their dissemination in different documents/locations (ALS, CMR</p>	<p>maintenance tasks, some which are performed for safety reasons, but also some for operational and/or economic reasons. Therefore, the intervals resulting from such an analysis may take into account economical considerations. On the other hand, CMR and ALI exist solely for safety and their intervals are limits not to exceed. Although CMR tasks are failure-finding tasks, use of potential failure-finding tasks, such as ALI, may sometimes be appropriate. Although both types of analysis may produce similar maintenance tasks at the same intervals, it could therefore be inappropriate to substitute a CMR with an MSG-3 task.</p> <p>d. A Critical Design Configuration Control Limitation (CDCCL) is intended to preserve systems' design features needed to prevent development of a hazardous or catastrophic failure condition. This information is essential to ensure that maintenance, repairs or alterations do not unintentionally violate the integrity of the aircraft original type design. The TC/STC holder must ensure that this essential information will be evident to those that may develop, approve or perform such repairs and alterations. A typical CDCCL is a CCMR for which the SSA allows the failure to be latent for the operational life of the aircraft or the latent failure leaves the aircraft one failure away from hazardous failure conditions.”</p> <p>The remainder of the AC 25-19 material would need to be aligned on these definitions.</p> <p>2)All actors would benefit from a unique location for all mandatory Instructions for Continued Airworthiness (ICA). As a consequence, it is our opinion that CMR, ALI and CDCCL should be documented in the ALS for sake of consistency</p>	

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>document or even Airworthiness Directives). Airbus has already started the transfer into the ALS of some systems' mandatory requirements and their airworthiness limitations currently in AD. That is to say, the ALS document, although mandatory by definition, is covered by a new AD which supersedes the AD(s) whose content and intent is transferred into the new/revised ALS document. Operators have expressed their satisfaction with this practice.</p> <p>Note: In order to address widespread fatigue damage, FAR 26 already requires the creation of an ALS (for those aircraft certificated before FAR 25 amendment 54).</p>	<p>with the approach previously taken for the evaluation of structures and of the Electrical Wiring Interconnection System (EWIS), and within the frame of SFAR 88. This practice is already used by Boeing and Airbus.</p> <p>In addition, the ALS is referenced in the TCDS... like the CMR document is.</p>	
<p><b>Commenter: Mr. Ken Dickenson</b></p> <p><b>In-service history records:</b> CMR verify that a failure of a certain system function has or has not occurred. They are usually addressed by operational checks controlled most of the time at aircraft level.</p> <p>Based on the experience gained over the past six years, maintenance tasks will be frequently controlled at component level with the introduction of the impending wear-out failures prevention. In addition, life limits may be necessary.</p> <p>Current regulations require that history of maintenance accomplishment must be recorded and kept at least until the repetitive maintenance has been superseded by other repetitive maintenance of equivalent work scope and detail. Some components (with limitations) maybe removed from one aircraft and reinstalled on another.</p> <p>Experience has also shown the need for emphasizing the requirements for in-service history record at component level in order to ensure that</p>	<p>None.</p>	<p><i>The commenter did not suggest new wording for the AC. We recognize the need to keep track of maintenance records at the component level. However, it is a subject beyond the scope of this AC 25-19X.</i></p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>maintenance tasks are complied with in a timely manner. For life limit, history of life accumulation and of aircraft application details back to birth is necessary.</p>		
<p><b>Commenter: Mr. Ken Dickenson</b>  <b>CMCC:</b>            This AC indicates that the TC applicant should convene a CMCC in order to grant aircraft operators an opportunity to participate in the selection of CMR, and to assess the CCMR and the proposed MRB tasks and intervals in an integrated process. The international economical context makes this objective more and more difficult to achieve: It is unfortunately difficult to involve operators and Airworthiness Authorities (time spent, travel costs, etc...) for the CMCC before TC. Needless to say anything about CMCC to review Changes to Type Design resulting in CCMR.... The issue is how to recognize an organization as a representative body when less and less, and now only a few, airlines contribute?</p>	<p>We would like to propose the following ideas to the FAA. We believe that it would help the industry to include in this AC some guidance on:</p> <ul style="list-style-type: none"> <li>- The minimum criteria for the establishment of a representative CMCC, e.g.:               <ul style="list-style-type: none"> <li>- Minimum number of members,</li> <li>- Distribution amongst airlines/authorities/industry representatives,</li> <li>- Participation of relevant experts in each technical domain, (with co-ordination with the original type certification team)</li> <li>- etc...</li> </ul> </li> <li>- The decision process followed by the CMCC (including a detailed flowchart).                It would reinforce the credit given to the CMCC outcomes.</li> </ul> <p>Note: If the concept of CDCCL is applied, no CMCC may be needed (but optional). This would allow savings for operators and TC/STC holders, while a safe compensation is provided by giving visibility to all interested parties.</p>	<p>The concern for full participation on the CMCC is recognized. However, it is not a requirement to convene the CMCC and participation has always been optional. In fact, some applicants choose not to have CMCCs and directly propose or apply CMR designations to CCMRs.</p> <p>As stated in paragraph 12.c of the AC 25-19X, the CMCC is an <u>advisory committee for the applicant</u>, and the governing ACO ultimately approves the CMRs. We do not wish to specify “minimum criteria for the establishment of CMCC” as proposed in the comment, because we do encourage participation on the committee if the applicant convenes it.</p>
<p><b>Commenter: Mr. Ken Dickenson</b>  <b>Selection of CMR/ALI/CDCCL:</b>            In accordance with the demonstration here above:</p> <ul style="list-style-type: none"> <li>- The CMR designation is systematically needed for CCMR when the SSA does not allow the failure to be latent for the operational life of the aircraft.</li> <li>- The ALI designation is systematically needed for CCMR when the SSA does not allow the</li> </ul>		<p>The comments on designation of CMR, ALI, and CDCCL have been discussed above.</p> <p>Regarding cross-referencing the tasks in the MRBR to the ALS, we determine that it would not be necessary because the requirements in the ALS must be met regardless of the MRBR.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>preventative maintenance task for an impending wear-out failure of an item to be performed beyond the operational life of the aircraft.</p> <ul style="list-style-type: none"> <li>- The CDCCL designation is needed for CCMR when:</li> <li>- The SSA allows the failure to be latent for the operational life of the aircraft (a qualitative assessment to determine the required maintenance before end of aircraft life may still be necessary within the MSG-3 process) or the latent failure leaves the aircraft one failure away from hazardous failure conditions.</li> <li>- The SSA allows the preventative maintenance task for an impending wear-out failure of an item to be performed beyond the operational life of the aircraft.</li> </ul> <p>When credit can be taken for the accomplishment of MSG-3 tasks to claim compliance with the CMR, ALI or CDCCL (i.e. the MSG-3 task objective covers the scope of the CMR, ALI or CDCCL and the MSG-3 task interval is shorter than the CMR or ALI interval or the operational life of the aircraft) the cross references to the ALS should be included in the MRB Report (in compliance with FAR 25.1529, and FAR 25 Appendix H, paragraph H25.3(b)(1)).</p>		

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p><b>Commenter: Mr. Ken Dickenson</b></p> <p><b>Documentation and handling of CMR:</b>                      For sake of consistency with the approach taken within the frame of SFAR 88 (or Electrical Wiring Interconnection System – EWIS, for mandatory component replacements), it would be appropriate to document CMR, ALI and CDCCL in the ALS of the ICA, which is referenced in the TCDS.                      Note: Could it be relevant to indicate in the AC 25.1309 that SSA must include justifications for exceptional short-term extensions (when they are allowed by TC/STC applicant) of CCMR interval shorter than the operational life of the aircraft?</p>		<p>As discussed above, inclusion of CMR in the ALS would require rulemaking to revise H25.4. We are considering such action separately from the revision of AC 25-19X.</p> <p>Regarding the question on adding guidance in AC 25.1309-1 to address the justification for exceptional short-term extensions, the ARAC recommended AC 25.1309-Arsenal already addresses the uncertainties inherent in probability analysis, and relates it to CCMR. As exceptional short-term extensions are meant for the occasional unplanned circumstances and the extensions should be relatively short, we do not see the need to provide further guidance beyond what is already available in AC 25-19.</p>
<p><b>Commenter: Mr. Ken Dickenson</b></p> <p><b>Initial issue of AC 25-19:</b>                      The first issue was released in 1994. As stated in this AC, the concept of CMR has been in use since the early 1970's. This concept has been applied (when applied) differently from one aircraft type to another. Before the release of the revised AC 25-19, the CMR designation has sometimes not been allocated to CCMR. For example some CCMR were not designated CMR when:                      - A FEC 9 (hidden non safety effects) task was available, or</p> <p>- The margin between the MRB Report task interval and the interval required by the CCMR was... zero flight hours (or slightly greater), leaving very little for escalation purposes.</p>	<p>For obvious safety reasons, it may be appropriate that the FAA requires (by the means of FAR 26) a review in accordance with the new CMR process for the CCMR analyzed in accordance with the initial issue of the AC 25-19.</p> <p>Note: Under the EASA jurisdiction, the operators and the Continuing Airworthiness Management Organizations (CAMO) can gradually escalate FEC 9 task intervals up to the operational life of the aircraft without the involvement of the NAA. (Refer to EASA Part M.A.302).</p>	<p>Regarding the suggestion to review all CCMRs established since 1994, this suggestion goes beyond this AC 25-19X.</p> <p>Although we understand the reasoning behind the suggestion, we believe it is impractical to implement without findings of specific unsafe conditions and consequently applying airworthiness directives.</p>
<p><b>Commenter: Mr. Ken Dickenson</b></p>	<p>It would be suitable that the FAA requires a review of systems design and maintenance requirements</p>	<p>The review of all “systems design and maintenance requirements for in-service aircraft, like required in</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p><b>Retrospective review for aging/wear:</b> Structures are being re-evaluated for aging (widespread fatigue damage), and resulting instructions and airworthiness limitations will be included in the ALS in compliance with FAR 26. It would not be consistent to consider the aircraft structure, without considering systems: passengers do not want to know whether the airframe or systems will fail first, they want to fly safe aircraft. So, who would fly a safe old airframe if it cannot be confirmed that systems will ensure their functions safely? The Guidance Material to EASA Part 21A.3B(b) “Determination of an unsafe condition” states that “In service experience, additional testing, further analysis, etc., may show that certain initially accepted assumptions are not correct. Thus, certain conditions initially demonstrated as safe, are revealed by experience as unsafe. In this case, it is necessary to mandate corrective actions in order to restore a level of safety consistent with the applicable certification requirements.”</p>	<p>for in-service aircraft, like required in the past for the compliance with SFAR 88. In addition, such a review would contribute to tackle (only for aging and wear of systems) some findings emphasized by the Commercial Airplane Certification Process Study (CPS). Specifically:</p> <ul style="list-style-type: none"> <li>- There is no reliable process to ensure that assumptions made in the safety assessments are valid with respect to operations and maintenance activities, and that operators are aware of these assumptions when developing their operations and maintenance procedures. In addition, certification standards may not reflect the actual operating environment.</li> <li>- Processes for identification of safety critical features of the airplane do not ensure that future alterations, maintenance, repairs, or changes to operational procedures can be made with cognizance of those safety features.</li> </ul> <p>Our experience shows that the review should document at least the following items:</p> <ul style="list-style-type: none"> <li>- List of applicable failure conditions (hazardous and catastrophic),</li> <li>- Systems and components participating in these failure conditions,</li> <li>- Potential damage sources for the identified systems components,</li> <li>- Effective maintenance requirements to address identified damage sources for the selected systems components,</li> <li>- Method(s) used to justify intervals,</li> <li>- Justified intervals,</li> <li>- Applicability.</li> </ul> <p>The aim would be to establish the ALI and CDCCL necessary to prevent impending wear-out failures of</p>	<p>the past for the compliance with SFAR 88” is beyond the scope of this AC 25-19X revision. Like the previous suggestion, it would be impractical to implement without specific findings of unsafe conditions.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
	<p>items associated with a hazardous or catastrophic failure condition.</p> <p>There should be no need for challenging the existing list of hazardous and catastrophic failure conditions (already established for type certification). If this assumption is accepted, it will significantly reduce the investment imposed on TC/STC holders for this review.</p> <p>It appears reasonable to require the completion of this study before reaching the initial operational life of the aircraft or within say two or three years following issuance of the requirement in the FAR 26, whichever occurs later.</p>	
<p><b>Commenter: Mr. Ken Dickenson</b></p> <p><b>Side note:</b> By referring to “wear-out” without further definition (probably until issuance of the revised AC 25.1309), some readers may understand that only wear needs to be considered. It is recommended to refer to “any damage sources that may lead to wear-out have to be considered during the assessment of the system. The damage sources that apply must be recorded and controlled with effective maintenance instructions.” Some consider that aging is limited to fatigue, wear and corrosion, and does not affect electric or electronic components. However, could the cyclic application of electrical power lead a degradation of an electrical component?</p> <p>We trust that our comments will help the FAA in their considerations of the CMR process for future type certifications and for retrospective application.</p>		<p>The term “wear out” has been used for many years in the ARAC recommended AC 25.1309-Arsenal and in the published AMC 25.1309. We believe it is well understood and needs no further definition. The “damage sources” are considered during the SSA process leading to the CCMR.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p><i>(Mr. Dickenson then attached a two-page extract of the Aircraft Accident Report NTSB/AAR-02/01. It won't be repeated here for brevity.)</i></p> <p>END OF MR. KEN DICKENSON'S COMMENTS</p>		
<p><b>Commenter: TCCA</b> Page 2, Section 5 -Certification Maintenance Requirements (CMR) Definition, First paragraph</p> <p>Comment #1:</p>	<p>Transport Canada suggests the last sentence in the paragraph be reworded as follows:</p> <p>" A CMR usually results from a formal, numerical analysis conducted to show compliance with the catastrophic and hazardous failure conditions, as defined in paragraph 6c, below, but may also result from a qualitative, engineering judgment based analysis."</p> <p>The additional words highlight to the reader the importance of other sources of analysis used as referenced in section 8 and llc of the draft AC. Paragraph reference to "6b" has also been changed to "6c" which is believed to be the correct reference.</p>	<p><i>We thank the TCCA for their comments, and also for their participation in the development of this draft AC.</i></p> <p>We agree with the suggested changes. The sentence has been revised accordingly.</p>
<p><b>Commenter: TCCA</b> Page 3, Section 5 -Certification Maintenance Requirements (CMR) Definition, First paragraph, Part b.</p> <p>Comment #2:</p>	<p>Transport Canada suggests the last sentence be revised to read: "Although both types of analysis may produce equivalent maintenance task and intervals, it is not..."</p> <p>The change is requested to recognize that the MRB process may arrive at tasks and intervals that are different (but still acceptable) than those derived from the safety analyses, as noted in section 13 of the draft AC.</p>	<p>We agree with the suggested change.</p>
<p><b>Commenter: TCCA</b> Page 3, Section 5 -Certification Maintenance Requirements (CMR) Definition, First</p>	<p>Transport Canada suggests to revise the second sentence to read "Because the exposure time of the latent failure is a key element in the calculations used in the safety analysis performed to show</p>	<p>We agree with the suggested change, but will simply the sentence by removing the reference to § 25.1309. The other regulations are already mentioned at the beginning of the AC.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p>paragraph, Part c.</p> <p>Comment #3:</p>	<p>compliance with 25.1309 or other requirements requiring this type of analysis (e.g. 25.671), limiting the..." The change is requested to recognize other regulations that are equally affected and also to be consistent with similar wording in 5e and 11a.</p>	
<p><b>Commenter: TCCA</b> Page 3, Section 5 -Certification Maintenance Requirements (CMR) Definition, First paragraph, Part d.</p> <p>Comment #4:</p>	<p>Transport Canada suggests to revise the second sentence to read "The process described in this AC is not intended ..."</p> <p>This comment is editorial.</p>	<p>We agree with the suggested change.</p>
<p><b>Commenter: TCCA</b> Page 6, Section 8 -System Safety Assessments (SSA), Part a.</p> <p>Comment #5:</p>	<p>Transport Canada suggests to revise the last sentence to read "... previously approved systems, and thorough qualitative and quantitative analyses."</p> <p>Even though the draft AC is unchanged in this section from the previous version, it is believed to be relevant to note that quantitative analyses are not only required explicitly for only those conditions noted in section 8b.</p>	<p>We agree with the suggested change.</p>
<p><b>Commenter: TCCA</b> Page 8, Figure I: Scheduled Maintenance Task Development</p> <p>Comment #6:</p>	<p>Transport Canada suggests to revise that participants in the CMCC should include delegated personnel.</p> <p>This comment is to highlight that the OEM's delegated engineering personnel should be part of the CMCC process.</p>	<p>We agree with the suggested change. It is also our experience that design and safety engineering personnel participation on CMCC provides much clarity to the discussion and decision.</p>
<p><b>Commenter: TCCA</b> Page 8, Figure I: Scheduled Maintenance Task Development</p> <p>Comment #7:</p>	<p>Transport Canada suggests adding words in the body of the AC to indicate what the KSI Process is intended to achieve. See also related comment # 16 below.</p> <p>"Inputs to the KSI Process" is highlighted on Figure 1 but not mentioned in the body of the AC. Further details on the intent of the process yet to be formalized may prove helpful.</p>	<p>The KSI box was a placeholder. We've determined that it is not needed in the Figure and it has been removed.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
<p><b>Commenter: TCCA</b> Page 9, Section 11 -Identification of Candidate CCMRs (CCMRs) -Section a.  Comment # 8:</p>	<p>Transport Canada suggests the second sentence should be revised to read "The TC applicant should identify all tasks intended to detect latent failures that would..." The change is requested to highlight that all such cases where latent failures are associated with hazardous or catastrophic failure conditions should be identified as CCMR's.</p>	<p>We agree with the intent of the suggestion. However, instead of the suggested wording, we clarified that CCMRs should be identified in the SSA, consistent with AC 25.1309 material.</p>
<p><b>Commenter: TCCA</b> A proposed addition to Page 9, Section 11 - Identification of Candidate CCMRs (CCMRs) - Section a.  Comment # 9:</p>	<p>Transport Canada suggests to add to 11a or a new subparagraph as follows:  "Significant latent failures associated with meeting required reliability targets (e.g. <math>10^{-4}</math> for stick pusher systems) could also generate additional CCMR's." Change requested to highlight potential, additional source of CCMR's.</p>	<p>A CMR can limit exposure to a significant latent failure, but it is not a suitable means to meet reliability targets, because reliability is a property of the design. If there is a required reliability for a design, it has to be built into the design itself. We do not agree that "reliability targets" are sources of CCMRs.</p> <p>However, in case there is a <u>required</u> probability of occurrence for a failure (e.g., the 1/1000 criterion for flight control system failures) then CMR can be used to limit exposure based on that probability requirement. This is already covered in the draft AC.</p>
<p><b>Commenter: TCCA</b> A proposed addition to Page 9, Section II - Identification of Candidate CCMRs (CCMRs) - Section a.  Comment # 10:</p>	<p>Transport Canada suggests to add to 11 a or a new subparagraph as follows:"The authority shall review and accept the proposed listing of CCMR's from the applicant before they are submitted to the CMCC."  This sentence provides the basis for the entry in Figure 1 which indicates the same (i.e. "ACO Acceptance" note following the safety analysis block).</p>	<p>We agree that there should be agreement between the certification authority and the applicant on the list of CCMRs prior to entering the CMCC discussion. However, we believe the suggested change is not necessary, because the review and acceptance of CCMRs is meaningful only as part of the SSA review. The "ACO acceptance" note in Figure 1 is applicable to the entire SSA, not just the CCMR listing.</p>
<p><b>Commenter: TCCA</b> Page 9, Section 12, subsection a - Certification Maintenance Coordination Committee (CMCC).</p>	<p>Transport Canada suggests to revise the 1st sentence to read "The CMCC should discuss and disposition all CCMR's". Also, add that committee membership should include the OEM's delegated personnel (e.g. Engineering) -see comment #6</p>	<p>We agree with the suggested change to the 1<sup>st</sup> sentence.</p> <p>We also agree with adding OEM's engineering personnel to the list of CMCC participants.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
Comment # 11:	<p>above.</p> <p>The word "analyze" revised to "discuss" to ensure that analyses are not reworked by the CMCC membership.</p>	
<p><b>Commenter: TCCA</b> Page 10, Section 12 -Certification Maintenance Coordination Committee (CMCC), Subsection c.</p> <p>Comment # 12:</p>	<p>Transport Canada suggests to revise the second last sentence to read, "Proposed MRB tasks and/or intervals rejected by the ISC, where no equivalent and compatible task to replace the CCMR can be proposed, will result in CMR tasks only."</p> <p>The revised sentence acknowledges that the MRB can be given the opportunity to generate an equivalent and compatible task if one does not readily exist at the time of review.</p>	<p>Due to others' comments on the same sentence, we will delete the word "only" at the end of the sentence. Because the MRB process is independent from the CMR process it can generate tasks that <u>happen to be</u> equivalent to a CMR. AC 121-22B (or latest version thereof) provides guidance for the MRB process.</p>
<p><b>Commenter: TCCA</b> Page 10, Section 13 -Selection of CMRs</p> <p>Comment # 13:</p>	<p>Transport Canada suggests to revise the last sentence to include a statement "The applicant should provide the failure conditions and related supporting analysis/data involving the CMR's to the authority in advance of the CMCC meeting." This revision will be consistent with earlier comment #8 above.</p>	<p>Due to others' comments, the paragraph has been revised to reflect the need to provide sufficient data to enable understanding of the CMR. However, we believe it is not necessary to specify that data be provided in advance of the CMCC meeting. We also note that some applicants might not have CMCCs.</p>
<p><b>Commenter: TCCA</b> Page 10, Section 13 -Selection of CMRs, Subsection b.</p> <p>Comment # 14:</p>	<p>Transport Canada suggests to revise the sentence to read, "The CMR designation may not be necessary if there is an equivalent and compatible MSG-3 task to accommodate the CCMR, provided..."</p> <p>The "equivalent and compatible" wording is consistent with earlier comments made. "Replace the CMR" wording is changed to "accommodate the CCMR" since the CMR does not yet exist at this point.</p>	<p>We agree with the suggested change. The sentence has been revised accordingly, but without the word "compatible."</p>
<p><b>Commenter: TCCA</b> Page 10, Section 13 -Selection of CMRs, Subsection b.4.a.1.</p>	<p>Transport Canada suggests to add to this subsection or a new subparagraph the following, "The authority shall review and accept the proposed</p>	<p>Please see disposition for comment #10.</p>

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
Comment # 15:	listing of CCMR' s from the applicant before they are submitted to the CMCC." The MRB may still be able to generate an equivalent and compatible task.	
<p><b>Commenter: TCCA</b> Page 11, Section 13 -Selection of CMRs, Subsection <i>b4.a.3</i>.</p> <p>Comment # 16:</p>	<p>Transport Canada suggests to revise the first sentence to read "The applicant has procedures in place (e.g. tagging of FEC8 tasks to identify those derived from the safety analysis) to ensure that the FEC8 task..."</p> <p>The revised wording highlights that procedures should be put into place to avoid FEC8 tasks being overlooked in service and that these tasks were derived from processes fundamentally different than the MRB process.</p>	We agree with the suggested change.
<p><b>Commenter: TCCA</b> Appendix 1, Supplemental Guidance for CMR Use -Section 1</p> <p>Comment # 17:</p>	<p>Transport Canada suggests to remove the second sentence and insert the following wording: "A practical and reliable monitoring and/or warning system should be considered as the first means to expose the latent failure." Also suggest adding the following to the 2<sup>nd</sup> last sentence: "... for both the type certificate applicant and the operator, if the rationale is acceptable to the authority."</p> <p>Sentence removed as discussing costs associated with the determination of CMR's is more appropriately placed after the suggested revision<sup>nd</sup> proposed. Added portion to the 2<sup>nd</sup> last sentence highlights the need for the authority to understand the justification for not providing monitoring systems.</p>	We agree with the intent of the suggested changes. The first suggestion has been adopted. The second suggestion has been alternatively adopted as "... for both the type certificate applicant and the operator, provided all applicable regulations are met."
<p><b>Commenter: TCCA</b> Appendix 1, Supplemental Guidance for CMR Use -Section 2</p> <p>Comment # 18:</p>	Transport Canada suggests to revise the first sentence to read" A decision to create a CMR may include a <del>rigorous</del> trade-off of the cost, weight. or ..."	Suggestions are accepted.

## DISPOSITION OF PUBLIC COMMENTS

### AC NO. 25-19X, CERTIFICATION MAINTENANCE REQUIREMENTS

Comment	Requested Change	Disposition
	Suggested revision is meant to highlight that cost or weight should not be the overriding consideration in determining whether a CMR is appropriate over a practical and reliable monitoring means as a first choice (use of "may" versus "should").	
<p><b>Commenter: TCCA</b> Appendix 1, Supplemental Guidance for CMR Use -Section 2</p> <p>Comment # 19:</p> <p>END OF TCCA'S COMMENTS</p>	<p>Transport Canada suggests that the sentence "The following points should be considered in any decision to create a CMR:" be removed from this paragraph and identified as a new section 3.</p> <p>The points listed in b) through j) are not necessarily related to cost but are basic attributes to be assessed in determining the identification of CMR' s.</p>	The suggestion is accepted.
END OF ALL <u>PUBLIC</u> COMMENTS RECEIVED		
<b>Recommendation from the CAST's SE172R1 Task Force.</b>		
<p>Editorial: This task force submitted their final report to the Commercial Aviation Safety Team (CAST) who approved the report in June 2011. The task force was asked to identify "gaps" in the current maintenance processes and develop recommended actions. A number of recommendations relevant to the CMR process are mentioned elsewhere in this table. This row addresses a particular recommendation, known as gap #009 of their final report.</p>	<p>"CMRs are critical to safety and should have similar treatments as Airworthiness Limitations (AL).Task Force recommendation to address gap: Revise 14 CFR part 25, Appendix H25.4 to include CMR in the ALS."</p>	<p>We agree with the recommendation. Although paragraph H25.4 currently does not require inclusion of CMR in the ALS, many applicants have done so voluntarily. FAA Order 8110.54A (ICA) recognizes that CMR is functionally equal to airworthiness limitations, so applicants practice is consistent with the Order. While the FAA assesses rulemaking as recommended by the task force, we can recognize in AC 25-19 industry's best practice and an acceptable means of documenting and handling CMRs. The AC paragraph 14 has been revised accordingly.</p>
END OF DISPOSITION		