Comment				Comment summary	Suggested resolution	Comment is an observation (suggestion)	Comment is substantive (objection)	EASA comment disposition	EASA response
NR	Author	Section, table, figure	Page						
1	*GE Aviation*	3.1	4	On whole, the document is trying to be consistent with the FAA's version of the Life Shortfall Policy. Although, EASA's attempt is also applicable to all critical parts not just critical rotating parts. The CM implies that there should be a much more concerted effort to ensure that the parts that have exceeded the reduced life are removed from service "without undue delay." This appears to leave it up to EASA to define what an "undue delay" means and is counter to the earlier wording in the paragraph that states the draw down plan should be defined by the guidelines establish in Part 21.A.3B.	Suggest document be changed to more clearly define what an "undue delay" is	X		Partially accepted	See comments 5 and 6. The affected text has been revised. Paragraph 3 of section 2 Background has also been revised to avoid confusion.
2	*GE Aviation*	3.1	4	The purpose of the probabilistic discussion in the fourth paragraph of Section 3.1 is unclear. It appears, for a life shortfall field program development, to prohibit the use of probabilistic based risk assessments on parts that have included any form of probabilistic methods in their lifing process. It implies that the use of such parts above the newly reduced life limit, should be removed from service at a time of "minimum duration" as agreed to by the Agency. If probabilistic methods are not to be used for the field plan development, the term "minimum duration" could use a more concise definition of how this time frame is to be determined.	The term "minimum duration" could use a more concise definition of how this time frame is to be determined.	X		Partially accepted	The affected paragraph has been amended to highlight concerns related to the use of a simplistic risk assessment and how the campaign should be established such that it does not represent a departure from lifing principles. Please refer to comment 6 for further information.
3	*Rolls-Royce Plc*	1.1		A lifing shortfall is defined as the inability of a critical part to achieve the agency approved life as established within CS-E 515. However it is not uncommon for lifing shortfalls, should they occur, to be associated with operation outside the defined operating profiles. In this case the part is able to achieve the agency approved life and so this would not be considered a 'lifing shortfall' under the definition in this CM. However there may be a need to take parts out of service because of how they have been, and many continue to be, operated. From a safety perspective the same approach should be applicable to parts used in this way as to parts which can not achieve the agency approved life. It is suggested that the CM, if required, should cover this case as well.				Partially accepted	A lifing shortfall may be due to a physical characteristic, or as the commenter has suggested, due to in-service operation of a outside of the certified assumptions, such that the existing approved life cannot be maintained for specific serialised components. The commenter is correct that for such a sub-fleet population a new lower life would need to be introduced. Additional clarity has been added to the final CM.

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4	*Rolls-Royce Plc*	2 last sentence		This states 'These guidelines provide a theoretical maximum reaction time and are not intended to allow avoidance of quicker reaction times where these can be achieved.' It is not clear what is meant by 'where these can be achieved.' Clearly it is always possible to achieve quicker reaction times by grounding the fleet. So if this is not mandatory there has to be a basis on which to allow something else. It is suggest that this should be '….where these are reasonably practical.' The principle should be that safety risk should be as low as reasonably practical.				Noted	The CM is in line with GM 21.A.3B (a) (4) 4.4 Defect correction – Sufficiency of proposed corrective action "It is not intended that the method should be used to avoid quicker reaction times where these can be accommodated without high expense or disruption of services." A reference to GM 21.A.3B (a) (4) 4.4 has been added to the CM.
5	*Rolls-Royce Plc*	3.1 3rd paragraph last sentence		'the earliest opportunity' and 'without undue delay' are not the same thing – see comments on Section 2. It is suggested that this is replace by 'as soon as is reasonably practical, without undue delay.'				Partially accepted	The CM has been revised.
6	*Rolls-Royce Plc*	3.1 4th paragraph		The rationale for this is not understood. It is not obvious why the use of some level of probabilistic assessment in meeting CS-E 515 implies that probabilistic risk assessment for managing lifing shortfalls is inappropriate. Without some form of risk assessment there is no clear basis for deciding what duration above lives calculated in accordance with CS-E 515 can be considered a minimum. Thus there is no basis for EASA, or the TC holder, to use to decide what action to take. This comment is consistent with the point made in GM 21.A.3B(d)(4) 4.4 'the method proposed will at least provide a rational 'departure point' for any exercise of such judgement.' It is believed that part of the reason for the proposal not to use a risk assessment in line with the GM to Part 21.A.3B in the event of a lifing shortfall is that the methods used to life critical parts may lead to lives which mean the part has a lower probability of failure than required to meet the certification requirement. This gives the potential, following a lifing shortfall, for a risk assessment in line with the GM to Part 21.A.3B to give a very long reaction time, even potentially no need to react. Clearly it would not be appropriate to effectively increase the life, using continued airworthiness risk criteria, and accept a continuing, permanent, failure risk that is higher than accepted at certification. This point is understood and it is accepted that frequently reaction times considerably shorter than those from the GM to 21.A.3B process are both achievable and appropriate. However as part of the assessment of what will maintain the risk as low as reasonably practical the GM to 21.A.3B risk assessment provides a valuable input. The preliminary risk assessment is also important in identifying what immediate containment action is required whilst work is ongoing to understand the shortfall and define a reduced life. Additionally it may be appropriate, or even necessary, to provide the risk assessment to the airframer to support their continued airworthiness process. It is important that				Partially accepted	CS-E 510 identifies "It is recognised that the probability of Primary Failures of certain single elements cannot be sensibly estimated in numerical terms. If the Failure of such elements is likely to result in Hazardous Engine Effects, reliance must be placed on meeting the prescribed integrity specifications of CS-E 515 in order to support the objective of an Extremely Remote probability of Failure. Furthermore the AMC to E 510 elaborates that: "When considering primary Failures of certain single elements such as Engine Critical Parts, the numerical Failure rate cannot be sensibly estimated. If the Failure of such elements is likely to result in Hazardous Engine Effects, reliance should be placed on their meeting the prescribed integrity specifications, such as CS-E 515, among others. These specifications are considered to support a design goal that, among other goals, primary LCF (Low Cycle Fatigue) Failure of the component should be Extremely Remote throughout its operational life. There is no specification to include the estimated primary Failure rates of such single elements in the summation of Failures for each Hazardous Engine Effect due to the difficulty in producing and substantiating such an estimate. The prescribed integrity specifications established in CS-E 515." The Life analysis of CS-E 515 establishes a minimum LCF capability (1/1000 or alternatively -3 sigma) to initiation of an engineering flaw size of 0.75mm, or alternatively an agreed safety margin to burst of a minimum strength part, typically 2/3. As the commenter describes, the methods used to life critical parts are bench marked to exceed an Extremely Remote probability of Failure and may lead to lives which mean the part has a lower probability of failure than required to meet the certification requirements of CS-E 510. We believe the commenter is also correct that this gives the potential for a simplistic risk assessment in line with the GM to Part 21.A.3B to give a very long reaction time. We agree with the commenter that it is not appropriate to effectively increase the life using continued airworthiness risk criteria, and accept a continuing, permanent, failure risk that is higher than accepted at certification. Such an approach would represent a

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				the engine level and airframe level guidance is compatible, which a need to provide a risk assessment to the airframer while having a prohibition from using it at engine level would not be. The Rolls-Royce position is that a risk assessment to in line with the GM to Part 21.A.3B is relevant and should be produced. It is also recognised, as stated in Section 2, that the guidelines provide a theoretical maximum reaction time and for lifing shortfalls, given the low probability of failure expected from a certified critical part, that theoretical maximum reaction time would not typically be appropriate. It might be appropriate to make the point in the CM that whilst the reaction time is always a theoretical maximum, and TC holders are expected to take action as quickly as reasonably practical, consideration for what is reasonably practical in the case of a lifing shortfall is greater – that is reaction times are expected to be shorter – than for some other unsafe conditions, because of the design standards applied to critical parts. There are some other considerations that might be considered relevant for defining plans for removing affected parts from service as follows: - The plan should aim to remove parts starting from those at highest risk, and in order of risk. - The plan should minimise risk accrual rate - The ability to monitor execution of the plan should be considered Incorporation of this point in the CM should be considered.					departure from the principles upon which the Approved Life of CS-E 515 is established. It should be recognised that a lifing shortfall may be associated with inappropriate certification assumptions and not specific defect occurrences or component failures upon which a simplistic risk assessment would be established. As the commenter identifies in 3, lifing shortfalls often occur where there is no defect or deficiency with the component, and indeed the component would normally be expected to achieve its Approved Life, if operated within the certification assumptions. However as the commentator alludes, the more frequent use of operating conditions (which may indeed be within the approved envelope of the product), with a greater rate of cyclic fatigue consumption than had been assumed at initial certification, may indeed also result in a lifing shortfall. This is not however a traditional defect or component failure, and hence a simplistic defect orientated risk assessment may be lead to inappropriate conclusions.. In contrast, the EASA considers that when defining the drawdown schedule, the campaign should be constructed using the integrity principles established in CS-E 515, and tools commensurate with the declaration of an Approved Life. The drawdown plan that is established should prioritise the removal from service of the parts, starting with those with the highest exceedance and risk. As described in GM 21.A.3B (a) (4) 4.4, “It is not intended that the method should be used to avoid quicker reaction times where these can be accommodated without high expense or disruption of services.”, and as recognised by the commentator, frequently reaction times considerably shorter than those from the GM to 21.A.3B process are both achievable and appropriate.