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FOR THE SAFETY OF AIR NAVIGATION

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SRC DOCUMENT 33

ASSESSMENT OF THE 'LVNL SAFETY CRITERIA' AS A MEANS OF COMPLIANCE WITH ESARR 4

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Abstract :

This document has been prepared by the Safety Regulation Commission. It has been developed, validated and completed by the SRC Expert Panel in charge of assessing to which extent the document entitled 'LVNL Safety Criteria', (Version 1.0, dated 25th April 2003, reference D/R&D 03/018) complies with ESARR 4 "Risk Assessment and Mitigation in ATM", Edition 1.0.

This document compiles the outcome of this assessment to form a view on the acceptability of the 'LVNL Safety Criteria'. It is intended to be used as a decision making tool for the SRC to develop its own judgement on the acceptability of the 'LVNL Safety Criteria' as one Means of Compliance with ESARR 4.

Keywords :		
ESARR 4	Hazard	Acceptable
Risk	LVNL	Means of Compliance
Safety Assessment		

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F.3 DOCUMENT APPROVAL

The following table identifies all management authorities who have approved this document.

AUTHORITY	NAME AND SIGNATURE*	DATE
Quality Control (SRU)	***signed by Daniel Hartin*** (Daniel HARTIN)	21-Sep-04
Head Safety Regulation Unit (SRU)	***signed by Peter Stastny*** (Peter STASTNY)	21-Sep-04
Chairman of SRC Assessment Panel	***signed by Harry Daly*** (Harry DALY)	21-Sep-04
Chairman Safety Regulation Commission (SRC)	***signed by Martin Radusch*** (Martin RADUSCH)	21-Sep-04

* In order to reduce the size of files, all documents placed on the SRC Website do not contain signatures. However, please note that all management authorities have signed the master copy held by the SRU. Requests for copies of master documents should be emailed to: sru@eurocontrol.int.

F.4 DOCUMENT CHANGE RECORD

The following table records the complete history of this document.

EDITION NUMBER	EDITION DATE	REASON FOR CHANGE	PAGES AFFECTED
0.01	16-Jun-03	Creation – First working draft to SRU including initial contents for sections 2, 3 and 4.	All
0.02	31-Jul-03	Revision after AMC Panel meeting of 23-Jul-03.	As marked by revision marks
0.03	02-Feb-04	Revised after RTF 23 dicussions and meeting with LVNL.	As marked by revision marks
0.04	24-Mar-04	Revised after Second AMC Panel meeting.	As marked by revision marks
0.1	21-Apr-04	SRU quality check. Document status amended to 'draft issue'.	All
0.2	21-Jun-04	Document sent to SRC for formal approval by correspondence.	All
1.0	10-Aug-04	Document formally issued following SRC approval by correspondence (RFC 0406).	All

F.5 CONTENTS

F.6 EXECUTIVE SUMMARY

This document has been developed by the Safety Regulation Commission (SRC).

Its content has been validated and completed by the SRC Expert Panel in charge of assessing to what extent the document entitled 'LVNL Safety Criteria', (Version 1.0, dated 25th April 2003, reference D/R&D 03/018), complies with ESARR 4 "Risk Assessment and Mitigation in ATM", Edition 1.0.

This document compiles the outcome of this assessment and establishes the rationale for the SRC's judgement on the acceptability of the 'LVNL Safety Criteria' as a Means of Compliance with ESARR 4.

It considers all sections of ESARR 4 and includes a complete mapping between each safety requirement included in ESARR 4, Section 5, and the elements of the Proposed Means of Compliance (PMC), which are considered as meeting the intent of the requirement.

It also provides a set of conclusions and recommendations to support the final SRC judgement. The conclusions not only refer to the compliance with the totality of ESARR 4, but also, where necessary, to the compliance with part(s) of ESARR 4. The sets of conclusions and recommendations provide justifications supporting the final statement on the PMC, as well as proposed ways forward for the LVNL standard to be fully compliant with ESARR 4.

Generally speaking, the LVNL standard is limited to two aspects, the determination of the National TLS, and a methodology for apportioning this risk to individual functional elements. However, in some instances, the LVNL standard deviates from ESARR 4 or compliance is not clear.

More specifically;

- The TLS derived by the LVNL – $4.6 * 10^{-7}$ per flight – deviates from the ESARR 4 TLS of $2.31 * 10^{-8}$ per flight. As the scope differences between ESARR 4 TLS and the LVNL TLS are not fully understood, further study is recommended to draw conclusions about the consistency of the scope.
- The determination of ATM contribution in accident risk is designed to indicate the ATM risk that relates to specified accident types (i.e. collisions). The apportionment of ATM related risk to LVNL operations, Flight Operations or Aircraft System design has not been detailed quantitatively in the safety criteria document. This means that acceptance of this document requires assumptions to be made on other areas of the ATM design which are not formally managed by LVNL.
- The method of apportioning risks to flight phases, then to ATM process and critical ATM sub products appears logical and useful.
- The safety criteria incorporate an ALARP type risk tolerability scheme, which is compatible with the intentions of ESARR 4. The specific assumptions made on the relationship between tolerable and acceptable risk are compatible with ESARR 4.

1. INTRODUCTION

Under international treaties, such as the Chicago Convention, safety regulation of civil aviation is a national responsibility. Indeed, every State has complete and exclusive sovereignty over the airspace above its territory.

Each State which has signed the Chicago Convention undertakes to keep its own regulations, its air navigation equipment and operations compliant, as far as possible, with those established by the International Civil Aviation Organisation (ICAO) under the Chicago Convention.

Recent modifications[1] to ICAO Annex 11 requires States to assess the potential safety impacts of proposed changes[2] to the ATM system to show that an acceptable level of safety will be met, before implementing the proposed changes.

EUROCONTROL Safety Regulatory Requirement "Risk Assessment and Mitigation in ATM" (ESARR 4), approved by the EUROCONTROL Permanent Commission in April 2001 (Decision No. 87), strengthens those ICAO requirements and recommended practices. Its implementation and enforcement within their national legal framework becomes binding on States as from April 2004.

In that context, the EUROCONTROL Safety Regulation Commission (SRC) has the task of ensuring the uniform implementation of ESARR 4 across Europe, hence the need for SRC to recognise a number of Acceptable Means of Compliance (AMCs) to help this uniform implementation of ESARR 4.

2. PURPOSE AND SCOPE

The SRC Commissioner for The Netherlands wrote to the SRC Chairman requesting that the 'LVNL Safety Criteria' be assessed and recognised as a Means of Compliance with ESARR 4.

The purpose of this document is to contribute to the application of SRC Document 9 'Process for Establishing Acceptable Means of Compliance with ESARRs', Edition 4.0. It provides the results of the SRC's assessment of the 'LVNL Safety Criteria against ESARR 4 in order to form a view on its acceptability as a Means of Compliance to ESARR 4.

The documents compared are:

- ESARR 4, Edition 1.0 (Released Issue), dated 5th April 2001;
- 'LVNL Safety Criteria, Version 1.0, dated 25th April 2003, reference D/R&D 03/018.

This document includes the factual findings of the assessment of 'LVNL Safety Criteria' against ESARR 4 in the form of text and matrices.

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[1] *Amendment 40.*

[2] *Such as airspace re-organisation, provision of ATS procedures, introduction of new equipment, systems or facilities.*

In addition, it provides for a set of conclusions and recommendations with rationale. The sets of conclusions and recommendations provide some justifications supporting the final draft statement on the PMC 'LVNL Safety Criteria'.

Indeed, the document proposes in section 5 a draft statement of compliance to support the final SRC decision making process. This statement refers to the compliance with the totality of ESARR 4, but also, where necessary, to the compliance with part(s) of ESARR 4. It is intended that the SRC relies on this document to recognise/accept, or not as the case may be, the 'LVNL Safety Criteria' as a Means to show compliance with ESARR 4 or with specific requirements/parts of ESARR 4.

3. ANALYSIS

3.1 General

Section 3.2 addresses those provisions of ESARR 4 which are considered mandatory;

- The mandatory provisions are currently captured in sections 3 and 5 of the current ESARRs template[3];

  Due to the limited scope of the PMC, the provisions of ESARR 4 which are of advisory nature are not addressed.

- Related advisory material is currently captured in sections 1, 2, 4 and 8 of the current ESARRs template.

ESARR 4 was developed by the EUROCONTROL Safety Regulation Commission, as one harmonised safety regulatory requirement, to be enforced by all EUROCONTROL Member States[4]. Its main objective is to require that changes to the ATM system are implemented only after been shown to meet tolerable safety levels.

'LVNL Safety Criteria' was developed with the objective '*… to provide a reference for the derivation of quantitative safety criteria, with the intent to apply these for quantitative safety assessments of the ATM operations of LVNL …*'.[5]

The analysis, final conclusions and recommendations on the acceptability of the 'LVNL Safety Criteria' as a means of compliance to ESARR 4 will therefore reflect this statement.

[3] *ESARR 4 Appendix A is being referred to in section 5 and is therefore considered as including mandatory provisions.*

[4] *ECC member states are also encouraged to enforce ESARRs at national level.*

[5] *See Paragraph 1.2 of 'LVNL Safety Criteria'*

3.2 ESARR 4 Mandatory Provisions: Sections 3 and 5

3.2.1 Summary Analysis

Table 1 provides a coverage analysis of the contents of the following documents, for those mandatory provisions included in ESARR 4:

- ESARR 4, Edition 1.0 (Released Issue), dated 5th April 2001, and;
- 'LVNL Safety Criteria, Version 1.0, dated 25th April 2003, reference D/R&D 03/018.

Table 1 only assesses and references those sections of ESARR 4 where related sections or text exist in the 'LVNL Safety Criteria'.

Table 1 reflects the summary of the detailed findings in tables 2A and 2B and is used to derive the Statement of Compliance in section 5.

TABLE 1- COVERAGE ANALYSIS

ESARR 4	COVERED BY 'LVNL SAFETY CRITERIA'	RELATED COMMENTS
SECTION 5 – SAFETY REQUIREMENTS		
5.1 a	**NOT APPLICABLE**	The PMC addresses all changes in the ATM system which affect ATM related risk However, The quantified method proposed is used when the Quality Standards are not expected to be achieved.
5.1 b	**NOT APPLICABLE**	The 'LVNL Safety criteria' is aimed at determining the safety criteria for the risks that LVNL is responsible for (i.e. collisions between aircraft).
5.1 c	**PARTIALLY**	The 'LVNL Safety criteria specifically notes that the ATM sub products are made up of people, procedures and equipment[6], however, there is no information given on how allocation of risk extends to these parts.
5.2 a	**YES**	The 'LVNL Safety Criteria' explicitly notes the use of the method to determine which critical ATM sub functions are affected by the change[7]

[6] *See Paragraph 6.6, Example 2, page 38 of 'LVNL Safety Criteria'.*

[7] *See Paragraph 6.6, Example 1, page 36 of 'LVNL Safety Criteria'.*

ESARR 4	COVERED BY 'LVNL SAFETY CRITERIA'	RELATED COMMENTS
SECTION 5 – SAFETY REQUIREMENTS		
5.2 b i)	**NOT APPLICABLE**	The identification of hazards is not addressed by the 'LVNL Safety Criteria'
5.2 b ii)	**NOT APPLICABLE**	The assessment of the severity of the effects of a hazard is not addressed by the 'LVNL Safety Criteria'.
5.2 b iii)	**PARTIALLY**	Refer to Table 2.c for complementary assessment.
5.2 c i)	**NOT APPLICABLE**	The 'LVNL Safety Criteria' does not address the derivation of risk mitigation strategies.
5.2 c ii)	**PARTIALLY**	The 'LVNL Safety Criteria' decomposes Safety Objectives to the Critical ATM Sub products.
5.2 c iii)	**NOT APPLICABLE**	The 'LVNL Safety Criteria' does not address the risk mitigation strategy.
5.2 d i) ii) iii) and iv)	**NOT APPLICABLE**	The 'LVNL Safety Criteria' does not address the verification of risk mitigation strategies.
5.3 a, b	**NOT APPLICABLE**	The 'LVNL Safety criteria' does not address documentation of the Risk Assessment and Mitigation process. There is no mention of tracing the safety requirements to the safety objectives.

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3.2.2 Detailed Analysis

Analysis

Tables 2A and 2B include detailed information resulting from the comparison between ESARR 4, Section 5 and the 'LVNL Safety Criteria'. In all cases, only the literal text of ESARR 4 has been presented and comments include a first conclusion about the level of correspondence.

From this analysis, the following issues have been derived;

1. The literal text for the PMC document was not always quoted and references to relevant sections added instead.

Legend

- When the provisions of the PMC document are seen as equivalent or equal to the relevant requirement of ESARR 4, the sign " = " is used.
- When the provisions of the PMC document are seen as encompassing as a minimum and exceeding the relevant requirement of ESARR 4, the sign " + " is used.
- When the provisions of the PMC document are seen as less demanding than the relevant requirement of ESARR 4, the sign " - " is used.
- When the provisions of the PMC document differ or are inconsistent with the relevant requirement of ESARR 4, the sign " # " is used.
- When an issue is identified in one section of the table, this issue is not raised again in other sections of the table, i.e. scope is only addressed in the table against ESARR 4, section 5.1 and not within all parts.

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TABLE 2A – DETAILED CORRESPONDENCE ANALYSIS FOR REQUIREMENT 5.1, 5.2 AND 5.3

ESARR 4 - SECTION 5 REQUIREMENTS	LVNL SAFETY CRITERIA	COMMENTS
Section 5.1		
An ATM service provider shall ensure that hazard identification as well as risk assessment and mitigation are systematically conducted for any changes to those parts of the ATM System and supporting services within his managerial control, in a manner which;	**-** **1.1**	(-) The PMC notes (second paragraph of 1.1) that the quantified method is only used 'if it appears that a particular part of the operations does not meet the predefined quality standard or if it is uncertain whether the quality standard will be met' (Addressed in table 2b).
a) addresses the complete life-cycle of the constituent part of the ATM System under consideration, from initial planning and definition to post-implementation operations, maintenance and de-commissioning;	**-**	(-) The PMC does not mention which system changes will be assessed. (Addressed in table 2b).
b) addresses the airborne and ground[8] components of the ATM System, through co-operation with responsible parties; and	**-** Introduction Sections 1.2, 8, figure 10 etc	(-) As the purpose of the 'LVNL Safety Criteria is apparently to determine the Safety Objective for the LVNL provided systems, then the method does not indicate the involvement necessary to share risk (or safety requirements) between ATM domains. The mention in Paragraph 8 - Recommendations, that the other domains need to define their own risk budgets, and methods of justifying design choices clearly indicates that aircraft systems, airport infrastructure etc are considered in the PMC. However, the risk apportionment over different organisations is not worked out further (Issue 1).

[8] *Including spatial components.*

ESARR 4 - SECTION 5 REQUIREMENTS		LVNL SAFETY CRITERIA	COMMENTS
Section 5.1			
c) addresses the three different types of ATM elements (human, procedures and equipment), the interactions between these elements and the interactions between the constituent part under consideration and the remainder of the ATM System.		- Section 10	(=) The definition of ATM system in section 10 glossary, covers all these parts of the system.
Section 5.2 The hazard identification, risk assessment and mitigation processes shall include;			
a) a determination of the scope, boundaries and interfaces of the constituent part being considered, as well as the identification of the functions that the constituent part is to perform and the environment of operations in which it is intended to operate;		+	The PMC explicitly notes that this method requires the change to be related to the critical ATM Sub functions.
b) a determination of the safety objectives to be placed on the constituent part, incorporating;	(i) an identification of ATM-related credible hazards and failure conditions, together with their combined effects,	-	This item is not addressed by the PMC.

ESARR 4 - SECTION 5 REQUIREMENTS		LVNL SAFETY CRITERIA	COMMENTS
Section 5.2			
b) a determination of the safety objectives to be placed on the constituent part, incorporating;	(ii) an assessment of the effects they may have on the safety of aircraft, as well as an assessment of the severity of those effects, using the severity classification scheme provided in Appendix A, and	-	This item is not addressed by the PMC.
	(iii) a determination of their tolerability, in terms of the hazard's maximum probability of occurrence, derived from the severity and the maximum probability of the hazard's effects, in a manner consistent with Appendix A;	+/-	The PMC only addresses issues associated with Appendix A of ESARR 4 and these issues are discussed in table 2B.

ESARR 4 - SECTION 5 REQUIREMENTS		LVNL SAFETY CRITERIA	COMMENTS
Section 5.2			
c) the derivation, as appropriate, of a risk mitigation strategy which;	(i) specifies the defences to be implemented to protect against the risk-bearing hazards[9],	**-**	*This item is not addressed by the PMC.*
	(ii) includes, as necessary, the development of safety requirements[10] potentially bearing on the constituent part under consideration, or other parts of the ATM System, or environment of operations, and	**=/-**	The PMC does not consider the environment of operations.

[9] *To meet the safety objectives, and potentially to reduce and/or eliminate the risks induced by identified hazards.*

[10] *These safety requirements would be identified by the user of the system within the relevant standards and would need to be assessed, accepted and implemented prior to any operational use of the constituent part of the ATM system under consideration.*

ESARR 4 - SECTION 5 REQUIREMENTS		LVNL SAFETY CRITERIA	COMMENTS
Section 5.2			
c) the derivation, as appropriate, of a risk mitigation strategy which;	(iii) presents an assurance of its feasibility and effectiveness[11];	-	This item is not addressed by the PMC.
d. verification that all identified safety objectives and safety requirements have been met	(i) prior to its Implementation of the change,	-	This item is not addressed by the PMC.
	(ii) during any transition phase into operational service,	-	This item is not addressed by the PMC.
	(iii) during its operational life, and	-	This item is not addressed by the PMC.
	(iv) during any transition phase till decommissioning.	-	This item is not addressed by the PMC.

[11] *The depth and scope of the analysis may depend on the types of functions performed, the severity of the effects of the hazards, and the complexity of the constituent part of the ATM system under consideration.*

ESARR 4 - SECTION 5 REQUIREMENTS	LVNL SAFETY CRITERIA	COMMENTS
ESARR 4 – Section 5.3		
The results, associated rationales and evidence of the risk assessment and mitigation processes, including hazard identification, shall be collated and documented in a manner which ensures;	**-**	This item is not addressed by the PMC.
a. that correct and complete arguments are established to demonstrate that the constituent part under consideration, as well as the overall ATM System are, and will remain, tolerably safe[12] including, as appropriate, specifications of any predictive, monitoring or survey techniques being used;	**-**	This item is not addressed by the PMC.
b. that all safety requirements related to the implementation of a change are traceable to the intended operations/functions.	-	This item is not addressed by the PMC.

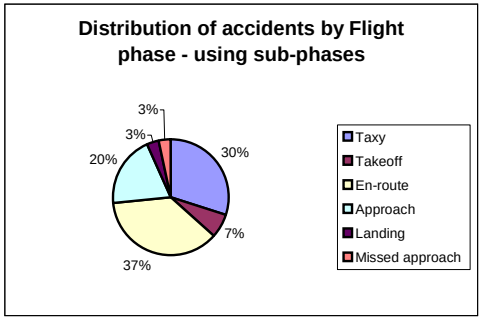
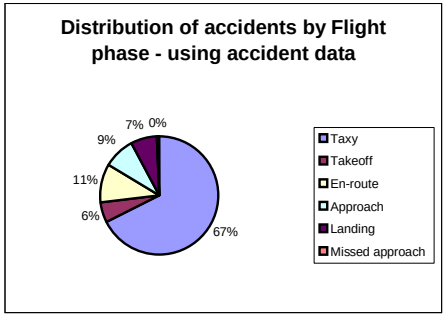
[12] *i.e. meeting allocated safety objectives and requirements.*

TABLE 2B – DETAILED CORRESPONDENCE ANALYSIS FOR ANNEX A

ESARR 4 - SECTION 5 REQUIREMENTS	LVNL SAFETY CRITERIA	COMMENTS
Appendix A		
A-1 Hazard Identification and Severity Assessment in ATM		
Before the risks associated with introduction of a change to the ATM System in a given environment of operations can be assessed, a systematic identification of the hazards shall be conducted.	- Sections 1.1 sub paragraph 1 and 2,	(-) The PMC says nothing about the Hazard identification and Classification scheme to be used. The PMC seems to suggest that a quantitative analysis is only carried out where the particular part of the system does not meet the pre-defined quality standard, or where expert judgement indicates the change is not likely to meet the qualitative safety targets. Generally, there is no detail in the PMC as to which changes are assessed, i.e. transition to service or removal from service. More complete guidelines ought however to be developed to address hazards related to all lifecycle phases of operations. LVNL have confirmed that the PMC submitted was not intended to address the assessment of all changes. The 'LVNL Safety Criteria' document is only one part of the LVNL process, other documents define the actions to be taken prior to using the 'LVNL Safety Criteria' process. LVNL accept the limitations that will result in complying with the complete scope of ESARR 4.

ESARR 4 - SECTION 5 REQUIREMENTS	LVNL SAFETY CRITERIA	COMMENTS
Appendix A		
A.2 Risk Classification Scheme in ATM		
Safety objectives based on risk shall be established *(1)* in terms of the hazards maximum probability of occurrence, derived both from the severity of its effect, according to **Figure A-1** and from the maximum probability of the hazard's effect, according to **Figure A-2.**		See below.

ESARR 4 - SECTION 5 REQUIREMENTS	LVNL SAFETY CRITERIA	COMMENTS
Appendix A		
A.2 Risk Classification Scheme in ATM		
*(Note: **Figure A-2** should be considered as a Risk Classification scheme (i.e. a Severity Classification/Probability Classification relationship matrix). It associates a Severity Class, as determined using Figure A-1, with a tolerable probability (i.e. a maximum tolerable probability of ATM directly contributing to safety occurrences) to show that the more severe the effect of the hazard the less desirable it is that the hazard occurs.)*	**-** 3.2.2, 4, 5.2	(-) The PMC, in section 4, undertakes an alternative derivation of the TLS based on world accident records. This replicates the work conducted by the SRC. This alternative derivation appears to be based on the fact that the PMC states, in the conclusion to paragraph 3.2.1 that ESARR 4 definition of ATM does not include risks deriving from aircraft system or aircraft operational ATM errors. (Issue 2). (-) The PMC determines the TLS (1 10E-8) in terms of per flight without reference to the ESARR 4 terms of flight hour. (1.55 10E-8) (Issue 2). (-) The PMC dismisses the idea of incorporating traffic growth into the TLS as unnecessary (2.3 and 6.7.2) based on the premise that even a large change in traffic growth by a factor of 2 requires only a small change in the TLS that is not significant in terms of the risk uncertainty. It is possible that the improvement factor used could be considered to include an element for traffic growth. Moreover, the method explains that during each system change, the lifetime of the system, or the system argument, is used and the corresponding effect of traffic growth incorporated.

ESARR 4 - SECTION 5 REQUIREMENTS	LVNL SAFETY CRITERIA	COMMENTS
Appendix A		
A.2 Risk Classification Scheme in ATM		
*(Note: **Figure A-2** only refers to an overall safety performance of ATM at ECAC and national level and is not directly applicable to the classification of individual hazards. To achieve this a method of apportionment of the overall probability to the constituent parts of the ATM system may need to be developed- This apportionment may be done per phase of flight and/or, per accident types.)*	**+** Section 4,	(+) The PMC proposes, at paragraph 5.2, a number of critical ATM sub products to which the overall TLS can be allocated. This relates to ICAO material derived from Annex 13. However, even if some critical ATM sub products are missed, the PMC states that this is a conservative figure (last paragraph of 5.3). This allocation of 40 will then be continuously verified by future data collection. It seems that each sub-product is judged to contribute equally and independently to the overall risk. However, the equivalence of each sub-product is not verified in the report. The charts below cast some doubt on the validity of this assumption. These are derived from the LVNL data provided. These show the differences in allocating risk equally compared to the actual distribution of risks. However, this also shows that the existing risks are all within the absolute allocated budget.  

ESARR 4 - SECTION 5 REQUIREMENTS	LVNL SAFETY CRITERIA	COMMENTS
Appendix A		
A.2 Risk Classification Scheme in ATM		
As a necessary complement to the demonstration that these quantitative objectives are met, additional safety management considerations shall be applied so that more safety is added to the ATM system whenever reasonable.	**-** **6.4.1, 3.2.3**	(-) The PMC provides a method (6.4.1) for introducing the terms, maximum allowable accident risk, target accident risk, and negligible accident risk. These terms are respectively derived from, the historical accident data, the improvement factor, and the negligibility factor. The improvement factor relates to how much safer the LVNL want to make their system than historical trends, and the negligibility factor relates to the idea if a certain risk is a certain factor lower than the historical trend, then it is always acceptable. (Issue 3)
(Note: A similar approach is also recommended for designing the ATM System in areas where exclusive General Aviation operations are carried out.)	**-**	(-) Only addresses airspace for which LVNL provides service.

ESARR 4 - SECTION 5 REQUIREMENTS	LVNL SAFETY CRITERIA	COMMENTS
Appendix A		
A.2 Risk Classification Scheme in ATM		
(Note: In order to deal with specific constituent parts of the ATM system (sub-systems), the table (Fig A-2) will have to be refined so that it adequately reflects the operational environment of the sub-system under consideration (e.g. interfaces with other systems, phases of flight, classes of airspace).This will necessitate:- *a) the redefinition of the severity categories such that they are meaningful in the context of the sub-system under consideration, and* *b) the accommodation of mitigation in other sub-systems for events in the sub-system under consideration which may lead to a hazard.* *No guidance is given here as to how the refinement should be achieved.)*	-	(-) The PMC does not provide for proposed refinements of Fig A-2.
(Note: Units used to describe risk may need to be changed depending on: the sub-system under consideration, phases of flight and classes of airspace.)	-	(-) The PMC does not proposed guidance on which units to use for categories of sub-system. LVNL accept that this is addressed elsewhere and is not part of this PMC.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 Recapitulation of Issues

This section aims at summarising those issues which could jeopardise the acceptability of the 'LVNL Safety Criteria' as a means to show compliance with all or part of ESARR 4.

Note 1: However, the following sections include a number of suggestions to 'LVNL' derived from this assessment, in order to facilitate the potential development of a future release of 'LVNL Safety Criteria' which is more fully compliant with ESARR 4.

In the light of the analysis undertaken, the assessment against the safety requirements of these sections raises the following issues;

ISSUE 1 – The PMC does not address risk assessment and mitigation of all changes to the ATM System because;

- The PMC does not define the risk allocation or TLS to Aircraft Systems and Aircraft Operations.
- The PMC does not address risk assessment and mitigation of changes and related hazards within the ATM domains of Aircraft Systems and Aircraft Operations.
- The PMC notes that methods of justifying design choices in the aircraft domain are outside the scope of the PMC.
- The PMC gives no guidance on how to allocate risks between domains through Safety Requirements.

ISSUE 2 – The PMC repeats the work conducted in SRC Policy Document 1 on the basis that the ESARR figure has a different scope to that used by LVNL; and consistency between the ESARR 4 TLS and LVNL TLS is not shown.

ISSUE 3 – The PMC suggests a method for including the ALARP principle that is intended to meets national requirements.

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4.2 Issue 1

Conclusion

In order to accept the use of The PMC to show compliance with ESARR 4;

- ❑ The PMC would need to indicate the method of risk allocation to Aircraft Systems and Aircraft Operations, or show that these risk allocations are published elsewhere and are consistent with the PMC.

4.3 Issue 2

Conclusion

The consistency between the LVNL TLS and the ESARR 4 TLS cannot be shown at present.

Note: It is possible that this inconsistency is due to

- *Difference in Scope of TLS*
- *Differences in dataset used to derive the TLS*

Recommendation

SRC should discuss the possible reasons for the differences and propose a set of actions to resolve the differences.

4.4 Issue 3

Conclusion

The intentions of ESARR 4 with respect to the application of ALARP were clarified at RTF 23. The minutes of this state 'RTF confirmed that the intention of ESARR 4 was to ensure that service providers conducting safety assessment ensured that extra safety was added whenever appropriate. ESARR 4 did not intend to mandate a method for achieving this. The LVNL Safety Criteria meets the first requirement and there was no reason in the PMC assessment to consider whether the improvement factor or ALARP region was adequate'

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5. STATEMENT OF COMPLIANCE

5.1 Statement

For changes related to ATM under the managerial control of LVNL, the implementation of the Proposed Means of Compliance 'LVNL Safety Criteria' meets the following mandatory provisions of ESARR 4, Edition 1.0;

ESARR 4 Section 5.2 a);

ESARR 4 Section 5.2 b) (iii) only if:

- supported by a data collection system that validates the apportionment,
- the LVNL TLS and the ESARR 4 TLS can be shown to be consistent.

The implementation of the Proposed Means of Compliance 'LVNL Safety Criteria' does not fully meet the following mandatory provisions of ESARR 4, Edition 1.0;

ESARR 4 Section 5.1 c) (more guidance required)

ESARR 4 Section 5.2 c) (ii) (more guidance required)

The implementation of the Proposed Means of Compliance 'LVNL Safety Criteria' is not intended to meet the following mandatory provisions of ESARR 4, Edition 1.0;

ESARR 4 Section 5.1 a)

ESARR 4 Section 5.1 b)

ESARR 4 Section 5.2 b) (I)

ESARR 4 Section 5.2 b) (ii)

ESARR 4 Section 5.2 c) (i)

ESARR 4 Section 5.2 c) (iii)

ESARR 4 Section 5.2 d) (i)

ESARR 4 Section 5.2 d) (ii)

ESARR 4 Section 5.2 d) (iii)

ESARR 4 Section 5.2 d) (iv)

ESARR 4 Section 5.3 a)

ESARR 4 Section 5.3 b)