

ORGANISATION EUROPÉENNE POUR LA SÉCURITÉ DE LA NAVIGATION AÉRIENNE

« EUROCONTROL »

- Décisions de la Commission permanente -

DÉCISION N°97

portant approbation du Plan d'action européen pour la prévention des incursions sur piste

LA COMMISSION PERMANENTE POUR LA SÉCURITÉ DE LA NAVIGATION AÉRIENNE :

Vu la Convention internationale de coopération pour la sécurité de la navigation aérienne "EUROCONTROL", amendée par le Protocole signé à Bruxelles le 12 février 1981, et notamment ses articles 2.1, 6.1(a) et 7.1 ;

Vu la nécessité de renforcer encore la sécurité sur les pistes en Europe ;

Sur proposition du Directeur général et du Conseil provisoire,

PREND LA DÉCISION SUIVANTE :

Article unique

Le Plan d'action européen pour la prévention des incursions sur piste, tel qu'il figure en pièce jointe 2 au document PC/03/16/12 du 20 mars 2003, est approuvé.

Fait à Bruxelles, le 10 avril 2003.

Le Président de la Commission,



Josef TURECKÝ



EUROPEAN
COCKPIT
ASSOCIATION



AEA



European Action Plan for the Prevention of Runway Incursions



GASR

Group of Aerodrome Safety Regulators



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1. Statement of Commitment

Runway safety is a vital component of aviation safety as a whole. With the predicted growth of air traffic, the actual numbers of incidents are likely to rise, unless held in check by preventative actions such as those recommended in this action plan.

Although runway safety includes issues such as foreign objects, debris and wildlife straying onto the runway and other technical deficiencies, this action plan specifically addresses the subject of **runway incursion prevention**.

This action plan is the result of the combined efforts of organisations representing all areas of aerodrome operations. Those organisations that contributed to this action plan, listed overleaf, are totally committed to enhancing the safety of runway operations by advocating the implementation of the recommendations that it contains. The ICAO secretariat has lent its strong support to the work of this group and urges all states to fully implement the ICAO provisions relevant to runway safety.

Over recent years there have been a number of runway incursions across the European region, which resulted in two actual collisions, with a significant loss of life. Analysis of the available data indicates that **there may be one runway incursion every three to four days within the region**. The analysis findings have been used to determine specific runway safety issues and identify the preventative actions recommended here.

The recommendations, when implemented, will enhance runway safety by the consistent and harmonised application of existing ICAO provisions, improving controller - pilot - vehicle driver communications and working procedures at the aerodrome, and by the subsequent increase in situational awareness. Application of these recommendations will also contribute to member states' preparation for the ICAO Safety Oversight Audit programme foreseen to commence in 2004.

A EUROCONTROL European Convergence and Implementation Plan objective relates to this Action Plan.

Member	Organisation	Signature
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Pierluigi D'Aloia, Director International Relations	ENAV S.p.A.	
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Jean-Claude Coulardot, Chef du Bureau Réglementation	Direction de la Navigation Aérienne	
Klaus Zeh, President - Europe	International Council of Aircraft Owner and Pilot Associations	
Peter Wilde Director Airport Services	National Air Traffic Services Ltd.	
Hans-Jürgen Morscheck Head Corporate Safety and Quality Management	DFS Deutsche Flugsicherung GmbH	
Daniel Goffin Air Traffic Services Manager	Belgocontrol	

2. Introduction and background

In July 2001 a joint runway safety initiative was launched by GASR, JAA, ICAO and EUROCONTROL to investigate specific runway safety issues and to identify preventative actions. The Task Force that was subsequently formed to carry out this work comprised of representatives from the JAA, EUROCONTROL, ICAO, GASR, ACI, AEA, ECA, ERA, IATA, IAOPA, IFALPA, IFATCA and many other professional organisations, including Air Navigation Service Providers (ANSPs) and other Aircraft Operators.

As a first action, the Task Force carried out a survey of incidents at airports to determine causal and contributory factors that led to actual or potential runway incursions. Statistics from the survey show that Pilots and Air Traffic Controllers consider that runway incursions are one of the most serious safety issues in airport operations.

It was necessary to carry out a survey initially because little data existed about runway safety occurrences. The diverse reporting systems operating across the region are typically not capturing the detailed information necessary to determine trends, which could then be used to devise, and implement mitigating measures.

The following understanding has been used for the purposes of this work, although a globally accepted definition of 'runway incursion' has still to be formally agreed by ICAO:

"A runway incursion is the unintended presence of an aircraft, vehicle, or person on the runway or runway strip."

The dedication of the joint Task Force for Runway Safety demonstrated the extent of concern on this issue by all stakeholders across the aviation community. All participants have contributed considerable time and energy to identifying the critical measures necessary for reducing runway incursions. The Task Force delivered a set of draft recommendations that were debated and endorsed at the International Workshop on Runway Safety hosted by EUROCONTROL at its Brussels Headquarters on 9-10 September 2002.

The workshop was jointly organised with the Group of Aerodrome Safety Regulators (GASR), the Joint Aviation Authorities (JAA), and the International Civil Aviation Organization (ICAO). Inputs were made by European Regulatory bodies, ANSPs, the FAA, Transport Canada, Accident Investigators, Aircraft Operators, Airports, and other professional and industry representatives. The event offered a unique opportunity for participants to debate many different issues associated with runway safety, including communications, human factors, procedures and situational awareness.

All members of the Steering Committee agree that **rapid and co-ordinated implementation of the recommendations is necessary to reduce runway accidents and incidents and improve safety**. The need to share safety-related information and introduce a harmonised and consistent approach to the collection and analysis of data is key to reducing the risks of runway incursions. On-going work on this issue is being undertaken by a small working group of experts (Working Group for the Prevention of Runway Incursion) who report to the European Steering Committee for the Prevention of Runway Incursion and represent the aviation community. The joint task is to raise awareness of the need for immediate action in implementing the recommendations contained in this action plan.

Global co-operation in the prevention of runway incursions is crucial. Contact will be maintained with ICAO, FAA, Transport Canada etc. to continue to work together to enhance safety. ICAO will be kept fully involved with a view to using the material in, and experience with, this action plan, so as to make an input to global requirements, standards and other documentation.

Recognition is given to those organisations that have already completed a lot of this work.

3. Explanatory Note - Recommendations

The recommendations are contained in Section 4. For clarity the recommendations have been divided into specific areas for action. **It is essential that each organisation take an overview of all recommendations to optimise their own contribution.** Guidance material, which may be of assistance, is contained in the appendices to the action plan.

Whereas the National Aviation Safety Authorities have overall responsibility for safety regulation and oversight, the importance of this issue requires that implementation commences at the earliest opportunity by all parties involved. All parties include, but are not limited to, Aerodrome Operators, ANSPs, Aircraft Operators, and National Aviation Safety Authorities. The very nature of aerodromes means that the interfaces between Annex 11, i.e. tower air traffic control, and Annex 14, i.e. the aerodrome, may be governed by different regulations, according to the local organisation's arrangements.

Core to these recommendations is the uniform and consistent application of ICAO provisions at those aerodromes that come under the auspices of ICAO - these will apply in all cases **except where a State has provided notification by the appropriate procedure.** The National Aviation Safety Authority will decide upon the strategy for implementation at applicable aerodromes within its own state. The recommendations are mainly generic and it will be for the responsible organisations to decide specific details, after taking local conditions into account e.g. aerodromes where joint civilian and military operations take place. Local arrangements may vary as decisions on the applicability of the Action Plan should be taken at national level.

The establishment of the Local Runway Safety Teams, which should comprise of representatives from Aircraft Operators, ANSPs and the Aerodrome Operator, is intended to facilitate effective local implementation of the recommendations. For many of the recommendations contained in this action plan it is suggested that a single representative body take the lead, with other organisations providing support to fully co-ordinate actions. Some recommendations suggest a joint lead to ensure effective implementation. All suggest a completion date.

The urgency of the need to prevent further runway incursions dictates the high priority of much of the work. Implementation of the recommendations should commence upon receipt of this action plan. A report on progress will be produced by the European Steering Committee at the end of 2003.

4. Recommendations

4.1 - General principles

#	Recommendation	Action	Completion date	Guidance
4.1.1	At individual aerodromes, as designated by the National Aviation Safety Authorities, a Runway Safety Team should be established to lead action on local runway safety issues.	Aerodrome Operators ANSP Aircraft operators	Dec. 2003	Appendix C
4.1.2	A local runway safety awareness campaign should be initiated at each aerodrome for Air Traffic Controllers, Pilots and Drivers and other personnel who operate on or near the runway.	Local Runway Safety Team	Dec. 2003	Appendix C
4.1.3	Confirm that all infrastructure, practices and procedures relating to runway operations are in compliance with ICAO provisions.	Aerodrome Operators (lead) ANSPs (lead)	Jun. 2004	Appendix A
4.1.4	Where practicable, ensure that specific joint training and familiarisation in the prevention of runway incursion is provided, to the pilots, air traffic controllers and vehicle drivers, to increase understanding of the roles and difficulties of personnel working in other areas.	Local Runway Safety Team	Jun. 2006	

4.2 - Aerodrome Operator Issues

#	Recommendation	Action	Completion date	Guidance
4.2.1	Verify the implementation of Annex 14 provisions and implement maintenance programmes relating to Runway operations e.g. markings, lighting, signage. Ensure that signs and markings are clearly visible, adequate and unambiguous in all relevant conditions.	Aerodrome operator	Jun. 2004	Appendix A
4.2.2	Works in progress - Ensure that information about temporary work areas is adequately disseminated and that temporary signs and markings are clearly visible, adequate and unambiguous in all relevant conditions.	Aerodrome operator	On-going	Appendix A
4.2.3	Assess the need for additional ICAO standards for aerodrome signage markings and lighting. Make recommendations to ICAO where appropriate.	Working Group (ACI lead)	On-going	
4.2.4	Implement safety management systems in accordance with ICAO provisions.	Aerodrome operators	Nov. 2005	Appendix H
4.2.5	Ensure a continued focus on runway safety in internal audit activities.	Aerodrome operators	On-going	Appendix G
4.2.6	Introduce a formal Driver training and assessment programme, or where already in place review against the Driver training guidelines.	Aerodrome operators	Jun. 2004	Appendix D
4.2.7	Introduce formal communications training and assessment for Drivers and other personnel who operate on or near the runway.	Aerodrome operators	Jun. 2004	Appendix B Appendix D

#	Recommendation	Action	Completion date	Guidance
4.2.8	Implement the standard ICAO naming conventions for taxiways.	Aerodrome operators (lead) ANSP (support)	Jun. 2006	Appendix A

4.3 - Communications (Language, Radiotelephony, Phraseologies and Procedures)

#	Recommendation	Action	Completion date	Guidance
4.3.1	Use full aircraft or vehicle call signs for all communications associated with runway operations.	ANSPs (lead) Aircraft operators (lead) Aerodrome operators (lead)	Dec. 2003	Appendix B
4.3.2	Verify the use of standard ICAO RTF phraseologies.	ANSPs (lead) Aircraft operators (lead) Aerodrome operators (lead)	Jun. 2004	Appendix A Appendix B
4.3.3	Use the ICAO read-back procedure (including Drivers and other personnel who operate on the manoeuvring area).	ANSPs (lead) Aircraft operators (lead) Aerodrome operators (lead)	Jun. 2004	Appendix A Appendix B Appendix E
4.3.4	Improve situational awareness, when practicable, by conducting all communications associated with runway operations using aviation English.	ANSPs (lead) Aircraft operators (lead) Aerodrome operators (lead)	On-going Following ICAO guidance	Appendix B
4.3.5	Improve situational awareness, when practicable, by conducting all communications associated with runway operations on a common frequency.	ANSPs (lead) Aircraft operators (lead) Aerodrome operators (lead)	Jun. 2005	Appendix B

4.4 - Aircraft Operator Issues

#	Recommendation	Action	Completion date	Guidance
4.4.1	Provide training and assessment for Pilots regarding Aerodrome signage, markings and lighting.	Aircraft operators (lead IAOPA (support)	Jun. 2004	Appendix E
4.4.2	Pilots shall not cross stop bars when lining up or crossing a runway, unless contingency procedures are in force, for example to cover cases where the stop bars or controls are unserviceable.	Aircraft operators	Jun. 2004	Appendix A Appendix E Appendix F
4.4.3	Ensure that flight deck procedures contain a requirement for explicit clearances to cross any runway. <i>Includes non-active runways.</i>	Aircraft operators	Jun. 2004	
4.4.4	When in receipt of line-up clearance, Flight crew must advise ATC if they will need to hold on the runway for more than 90 seconds beyond the time it would normally be expected to depart.	Aircraft operators (lead) IAOPA (support)	June 2004	
4.4.5	Promote best practices on flight deck procedures while taxiing - to include the "Sterile flight deck" concept.	IATA, (lead) ECA/IFALPA (support)	Jun. 2005	Appendix E
4.4.6	Promote best practices for pilots planning of ground operations.	IATA, (lead) ECA/IFALPA (support)	Jun. 2005	Appendix E

4.5 - ANSP Issues

#	Recommendation	Action	Completion date	Guidance
4.5.1	Implement safety management systems in accordance with ESARR3 provisions.	ANSPs	Jul. 2003	Appendix H
4.5.2	Survey the different methods and techniques in use to indicate to controllers that a runway is temporarily obstructed and recommend Best Practice.	Working Group	Dec. 2003	
4.5.3	Whenever practical give ATC en-route clearance prior to taxi.	ANSPs	Jun. 2004	Appendix F
4.5.4	Develop an ICAO compliant procedure applicable if an aircraft or vehicle becomes lost on the aerodrome manoeuvring area.	EUROCONTROL	Jun. 2004	
4.5.5	Aircraft shall not be instructed to cross red stop bars when entering or crossing a runway unless contingency measures are in force, e.g. to cover cases where the stop bars or controls are unserviceable.	ANSPs	Jun. 2004	Appendix A Appendix F
4.5.6	Ensure that ATC communication messages are not over long or complex.	ANSPs	Jun. 2004	Appendix B
4.5.7	Ensure that ATC procedures contain a requirement for explicit clearances to cross any runway. <i>Includes non-active runways.</i>	ANSPs	Jun. 2004	Appendix A Appendix F
4.5.8	Identify any potential safety benefits of carrying out runway inspections in the opposite direction to runway movements and if appropriate adopt the procedure.	Aerodrome Operators / ANSPs (joint activity)	Jun. 2005	

#	Recommendation	Action	Completion date	Guidance
4.5.9	Use standard taxi routes when practical to minimise the potential for pilot confusion, on or near the runway.	ANSPs	Jun. 2005	Appendix A
4.5.10	Where applicable use progressive taxi instructions to reduce pilot workload and the potential for confusion.	ANSPs	Jun. 2005	Appendix F
4.5.11	Avoid infringing sight lines from the tower and assess visibility restrictions from the tower, which have a potential impact on the ability to see the runway, and disseminate this information as appropriate. Recommend improvement when possible and develop appropriate procedures.	ANSPs	Jun. 2005	Appendix A
4.5.12	Ensure that runway safety issues are included in training and briefing for ATC staff.	ANSPs	Jun. 2005	Appendix F
4.5.13	Identify any potential hazards of runway capacity enhancing procedures when used individually or in combination and if necessary develop appropriate mitigation strategies. (Intersection departures, multiple line up, conditional clearances etc.)	ANSPs	Jun. 2006	Appendix H
4.5.14	Do not issue line up clearance to an aircraft if this aircraft will be required to hold on the runway for more than 90 seconds beyond the time it would normally be expected to depart.	ANSP	June 2004	
4.5.15	When using multiple line-ups, do not use oblique or angled taxiways that limit the ability of the Flight crew to see the runway threshold.	ANSP	June 2004	

4.6 - Data collection and Lesson sharing

#	Recommendation	Action	Completion date	Guidance
4.6.1	Promote the implementation of occurrence reporting compatible with an international harmonised reporting system i.e. ADREP 2000.	National Aviation Safety Authority	Jun. 2004	
4.6.2	Improve the quality of runway occurrence data by starting work to extend the AGA taxonomy in ADREP 2000, used in occurrence reporting.	Steering Committee	Jun. 2004	
4.6.3	On a Europe-wide basis, disseminate de-identified information on actual runway occurrences to increase understanding of causal and contributory factors to enhance lesson learning.	Steering Committee	Jun. 2005	

4.7 - Regulatory Issues

#	Recommendation	Action	Completion date	Guidance
4.7.1	Confirm that all infrastructure, practices and procedures relating to runway operations are in compliance with ICAO provisions.	National Aviation Safety Authorities	Jun. 2004	Appendix A
4.7.2	Make the appropriate regulations available to ensure implementation of safety management systems in accordance with the applicable standards.	National Aviation Safety Authorities	Nov. 2005	Appendix H
4.7.3	Ensure that safety assurance documentation for operational systems (new and modified) demonstrates compliance with regulatory and safety management system requirements.	National Aviation Safety Authorities	Jun. 2005	Appendix I
4.7.4	National Aviation Safety Authorities should focus on runway safety in their inspection activities.	National Aviation Safety Authorities	On-going	Appendix G
4.7.5	Certify aerodromes according to ICAO provisions, Annex 14.	National Aviation Safety Authorities	Nov. 2006	Appendix A

4.8 - Aeronautical Information Management

#	Recommendation	Action	Completion date	Guidance
4.8.1	Significant aerodrome information which may affect operations on or near the runway should be provided to pilots 'real-time' using radio communication.	ANSPs (lead)	Jun. 2004	
4.8.2	Verify that the collection, provision and dissemination of the content of aeronautical information are in accordance with ICAO provisions.	ANSPs/AIS (lead) Aerodrome operators (support) Aircraft operators (support)	Jun. 2004	Appendix I
4.8.3	Providers of databases and charts of aeronautical information (including Aircraft Operators) must establish a process with AIS with the objective of ensuring the data accuracy, timeliness, availability and integrity.	National Aviation Safety Authorities EUROCONTROL Agency	Jun. 2004	Appendix I
4.8.4	Ensure that an accuracy feedback process exists for the users of aeronautical information.	EUROCONTROL (AIM)	Jun. 2004	Appendix I
4.8.5	The ergonomics of Maps and Charts and relevant documentation should be improved to enhance their readability and usability.	EUROCONTROL (AIM)	Jun. 2004	EUROCONTROL draft report with recommendations expected Dec. 2003
4.8.6	Aerodrome operators to provide aeronautical information in standard electronic format (AIM) with ANSPs/AIS for upload into EAD.	Aerodrome operators (lead), ANSPs/AIS (support)	Jun. 2004	Appendix I

5. Future Work

New technology & Human Factors

#	Recommendation	Action	Completion date	Guidance
5.1.1	Data on the implementation guidelines for surface movement radar and information about the development of new technologies that can be applied to runway safety shall be disseminated as part of the general runway safety awareness campaign.	Steering Committee	On-going	
5.1.2	Identify any ICAO guidance material that should be upgraded to ICAO standards and recommended practices and review other relevant materials.	Working Group	On-going	
5.1.3	Initiate a programme to better understand human factors contribution to runway incursions.	Steering Committee	Jun. 2008	See note below.
5.1.4	Review "Heads up, Heads down" time requirement of procedures and working methods and assess their potential impact on runway safety and recommend improvement when appropriate	Steering Committee	Jun. 2008	See note below.

Work has been commissioned with the Human Factors Unit of EUROCONTROL in co-operation with the JAA, to provide detailed guidance on recommendations 5.1.3 and 5.1.4 to include an assessment of the use of TRM/CRM for all areas i.e. AGA, Ops and ATM. The estimate for completion of this work is June 2005.

Future work on runway safety issues will include a review of aerodrome design to minimise the number of runway crossings and amendments to Annex 14.

6. Follow Up Actions

It is intended that a mutual exchange of information and data between organisations will take place to facilitate lesson learning and assist in enhancing runway safety. This process could follow the successful aircraft operator information sharing system, where participants have access to de-identified and de-personalised data.

To assist your organisation to plan this activity a generic approach is suggested.

- Confirm your organisation's usage of the relevant ICAO provisions - note any discrepancies.
- Identify any changes required in your operations.
- Identify any changes required from your operating partners.
- Document the change requirements.
- Invite your internal and where appropriate external partners to a joint meeting, using the local runway safety team or another forum to discuss the problem, and identify solutions.
- Implement and monitor the effectiveness of the change.

The Action Plan for the Prevention of Runway Incursions will be updated to reflect any changes that become necessary. It is intended that the second edition of this document will start to look at some of the longer term issues, such as airport design.

For further information on the content of this action plan please contact:



Appendix A. Bibliography

ICAO MATERIAL

References to Runway Safety found in ICAO Documents and ICAO Guidance materials

ICAO Documents

Convention on International Civil Aviation

(Doc 7300), Notification of differences
Article 38

Annex 2 **Rules of the air**

Chap 3.2.2.7 Surface movement of aircraft
Chap 3.6.1.4 Air Traffic Control Clearance

Annex 3 **Meteorological Service for International Air Navigation**

Chap 2. General provisions.
Chap 4. Meteorological observations and reports.
Chap 5. Aircraft observations and reports.
Chap 7. SIGMET and AIRMET information, aerodrome warnings and wind shear warnings.
Chap 9. Service for operators and flight crew members.
Chap 10. Information for air traffic services, search and rescue services and aeronautical information services.
Chap 11. Requirements for and use of communications.

Annex 4 **Aeronautical Charts,**

Chap 2.1 Operational requirements for charts
Chap 2.17 Aeronautical Data
Chap 13 Aerodrome/Heliport Chart
Chap 14 Aerodrome Ground Movement Chart
Chap 20 Electronic Charts
Chap 21 Electronic Terrain Data

Annex 10 **Volume II Aeronautical Telecommunications**

Chap 5 Phraseology
Chap 7.2.1 Broadcast techniques

Volume III

Chap 5 & 6 Air-Ground data link

Annex 11 Air Traffic Services

- Chap 2.14 Establishment and identification of standard routes for taxiing aircraft
- Chap 2.26 ATS Safety Management
- Chap 3.3 Operation of ATS
- Chap 3.7 Air Traffic Control Clearances (Read back)
- Chap 3.8 Control of persons and vehicles at aerodromes
- Chap 7.3 Information of operational status of navigation aids

Annex 13 Aircraft Accident and Incident Investigation

- Chap 8 Accident Prevention Measures

Annex 14 Volume I, Aerodrome Design and Operation

- Chap 2 Aerodrome data
- Chap 2.13 Co-ordination between AIS and aerodrome authorities
- Chap 5.2-5.4 Markings, Lights and Signs
- Chap 8.2-8.4 Electrical systems, Monitoring and Fencing
- Chap 8.9 Surface movement guidance and control systems
- Chap. 8 Aerodrome vehicle operations
- Chap. 8 Operators of vehicles
- Chap 9.4 Maintenance programmes
- attachment A,
para. 17
- Appendix 5 Aeronautical Data Quality requirements

Annex 15 Aeronautical Information Services

- Chap 3. General.
- Chap 4. Aeronautical Information Publications (AIP).
para. 4.1.2 c) Notification of differences
- Chap 5. NOTAM.
- Chap 6. Aeronautical Information Regulation and Control (AIRAC).
- Chap 7. Aeronautical Information Circulars (AIC).
- Chap 8. Pre-flight and Post-flight Information/data
- Appendix 1, Part 3 Aerodromes

Doc 4444 **PANS-ATM - Air Traffic Management**

Chap 2	ATS Safety Management
Chap 6.2	Essential Local Traffic
Chap 7	Procedures for Aerodrome Control Service
Chap 8.10	Use of Radar in Aerodrome Control Service
Chap 12	Phraseologies
Chap 16.3	Air Traffic Report

Doc 8168 Aircraft Operations

ICAO Guidance Materials

Doc 8126	AI S manual
Doc 8168	Procedures for Air Navigation Services - Aircraft operations
Doc 9137	Airport Service Manual Part 9, Airport Maintenance Practices
Doc 9157	Aerodrome Design Manual, Part 4, Visual Aids
Doc 9157	Aerodrome Design Manual, Part 5, Electrical Systems
Doc 9184	Airport Planning Manual
Doc 9365	Manual on All-Weather Operations
Doc 9426	ATS Planning Manual
Doc 9432	Manual of Radiotelephony
Doc 9476	Manual Of Surface Movement Guidance And Control Systems (Smgcs)
Doc 9674	World Geodetic System - 1984 (WGS-84) MANUAL
Doc 9683	Human Factors Manual
Doc 9694	Manual on ATS Data Link Applications
Doc 9774	Manual on certification of aerodromes

Roadmap for AWO in the European Region ver 2.1

ICAO Posters- Good Radiotelephony Checklist

Taxiing Guidance Signs - Information Signs

Taxiing Guidance Signs - Mandatory Instruction Signs

ICAO State Letter SP 20/1-98/47 of 12 June 1998:

Operational Requirements for A-SMGCS

ICAO NACC Regional office, OPS guidelines for the prevention of runway incursion, Jan Jurek, 2002

Non ICAO MATERIAL

There is a lot of material produced outside ICAO on the subject of "Runway Safety". Below you will find a list of different material that can be used in "Local Runway Safety Teams", Training etc. When studying this material be aware of that:

- Although a globally accepted definition of 'runway incursion' has still to be formally agreed by ICAO, the following understanding has been used for the purposes of this work -

"A runway incursion is the unintended presence of an aircraft, vehicle, or person on the runway or runway strip."

- There are differences between North America and ICAO phraseologies.

ACI MATERIAL

- Airports Council International ACI (World) Apron Safety Handbook
- ACI (World) Apron Signs and Markings Handbook

EUROCAE MATERIAL

- EUROCAE MASPS ED-87
- EUROCAE ED 76/RTCA DO 200A,
Standards for processing Aeronautical data
- EUROCAE ED 77/RTCA DO 201A,
Standards for Aeronautical information
- EUROCAE ED 99/RTCA DO 272,
User requirements for airport mapping

EUROCONTROL MATERIAL

- EUROCONTROL WEBSITE: www.eurocontrol.int
- EUROCONTROL Safety Management Implementation Plan
http://www.eurocontrol.int/safety/GuidanceMaterials_SafetyPolicyImplementationGuide.htm
- EUROCONTROL Safety Regulatory Requirements
<http://www.mis.eurocontrol.be/sru-src/dgs/src/en/>
ESARR 2 - Safety Regulatory Requirement: Reporting and Assessment of Safety Occurrences in ATM, **ESARR 3** - Use of Safety Management Systems by ATM Service Providers, **ESARR4** - Risk Assessment and Mitigation in ATM, **ESARR 5** - Safety Regulatory Requirement for ATM Services' Personnel

-
- Advanced Surface Movement Guidance and Control System (A-SMGCS) Surveying of Navigation Facilities – EUROCONTROL Standard Document Ed 1, 007-97
 - AIS AHEAD - <http://www.eurocontrol.int/ais>
 - AIS AGORA Voicing Problems - Sharing Solutions: Improving communication among all aeronautical information stakeholders
<http://www.eurocontrol.int/aisagora>

FAA MATERIAL

- FAA Runway Safety Web site <http://www.faarsp.org/>
- RUNWAY SAFETY BLUEPRINT 2002-2004
- FAA Aviation News (February 2000)
- RUNWAY INCURSION PREVENTION PROGRAM (May 2002), IATA and FAA
- RUNWAY INCURSION JOINT SAFETY ANALYSIS TEAM (JSAT) Result and Analysis (August 11, 2000)
- Federal Aviation Regulations / Airman's Information Manual, 2002
- Runway Safety: It's everybody's business. Kim Cardosi, Ph.D., 2001

GASR MATERIAL

- GASR WEBSITE: www.jaa.nl
- WP 013, Aerodrome Licensing,
- WP 020, Surface Movement Management Problems associated with Traffic Growth
- WP 039, Key indicators for monitoring safety levels
- WP 046, Safety Management Systems,
- WP 048, Common Inspection Manual for GASR states
- WP 091, Runway Safety with focus on prevention of runway incursion,
- WP 092, Safety Management System, a practical initial approach,
- WP 093, GASR Guidelines to Safety Assessment
- WP 094, GASR Model Aerodrome Audit Report Template

IATA MATERIAL

- IATA Airport Handling Manual (AHM) current edition

JAA MATERIAL

- JAA WEBSITE: www.jaa.nl
- ATC Data Link (ARINC 623-1) (Awaiting approval)

-
- JAR 66 (certifying staff)
 - JAA TGL 9 Recognition of ED76 (RTCA DO-200A) Standards for Processing Aeronautical Data
 - JAR FCL
 - JAR OPS

TRANSPORT CANADA

- TRANSPORT CANADA WEBSITE: www.tc.ca
- TRANSPORT CANADA FINAL REPORT from Sub-Committee on
- Runway Incursions (September 14, 2000)
- Runway Incursion Study at NAV CANADA ATS facilities (February 2001)

MISCELLANEOUS

- UK Civil Aviation Authority CAP 642 - Airside Safety Management
- UK Airport Operators Association - Airside Driver Training Scheme
- University of Leiden, Human Factors in runway incursion incidents, Patrick Hudson

USEFUL WEB SITES

www.airports.org
www.aci-europe.org
www.caa.co.uk
www.eurocontrol.int
www.faarsp.org/
www.iata.org
www.jaa.nl
www.tc.ca

Appendix B. Communications Guidance

Best Practices

In many investigation reports, and from surveys regarding runway safety occurrences it is apparent that communications issues are frequently a causal or contributory factor.

The demanding environment associated with aerodrome operations on a runway require that **all participants** accurately receive, understand, and correctly **read back all the clearances and instructions** being transmitted. Whilst this readback requirement is not an ICAO mandatory requirement for drivers, it is however considered Best Practice to apply it.

At times, the **volume, speed of delivery, and complexity** of these RTF instructions can impose difficulty on the controllers, vehicle drivers and/or flight crew, especially when the language in use is not the native language of the participants.

Use of **Aviation English** is proven to be a significant factor in the establishment and maintenance of situation awareness for all participants associated with runway operations. To be effective, a limited set of phraseologies (15 – 20) could be identified for vehicle drivers. Although a minimum skill level requirement for language proficiency had been proposed by ICAO in State Letter AN 13/48.1-02/1 on 31st May 2002, it is important that a more hazardous situation is not created by implementing this recommendation prior to the minimum skill level being achieved. For this recommendation no implementation date will be attached, as due to the many factors associated with this issue it is considered that only ICAO can propose implementation of this action. Although important, this recommendation will not apply until a start date is mandated by ICAO.

To maintain high levels of situational awareness it is also recommended that communications for all operations on a runway (landing, departing, crossing aircraft, vehicles crossing and runway inspections etc.) take place on the frequency assigned for that runway. To accommodate vehicles that are equipped with UHF radios only, frequency 'coupling' should be employed to ensure that all UHF communications associated with runway operations are simultaneously transmitted on the appropriate VHF frequency (and vice versa).

Aerodrome Control Phraseologies

Use of established **standard ICAO phraseologies** for radio telephony communication between aircraft and ground stations is essential to avoid misunderstanding the intent of the messages, and to reduce the time required

for communication. ICAO phraseology shall be used in all situations for which it has been specified. When standardised phraseology for a particular situation has not been specified, plain language shall be used. An extract from the ICAO Standard that states this requirement is as follows:

Annex 10

Volume 11 para 5.1.1.1 “In all situations for which standard radio telephony phraseology is specified, it shall be used.”

All personnel involved in operations associated with runways must use clear, concise and unambiguous phraseologies. Such usage will ensure that safety levels are maintained or improved upon. In PANS-ATM chapter 12 the standard phraseologies are stated, and in Annex 11 chapter 3.7.3 one can find the regulations regarding read-backs.

The use of **full call-signs of all traffic** operating on or in close proximity to a runway has been identified as a critical element in enhancing safety for runway operations. Whilst the ICAO provisions allow for use of abbreviated call-signs in certain circumstances, it is deemed Best Practice not to apply any shortening of call-sign in this situation.

Example Phraseologies

Listed below are some of the relevant key ICAO phraseologies contained within those documents, applicable for operations on runways. It should be noticed that these phraseologies apply to air traffic controllers, pilots, and when applicable, to vehicle drivers.

Note 1: Words in parentheses () indicate that specific information, such as a level, a place or a time, etc., must be inserted to complete the phrase, or alternatively that optional phrases may be used. Words in square parentheses [] indicate optional additional words or information that may be necessary in specific instances.

Note 2: The detailed phrases listed below do not form the complete phrases to be used, nor do they represent the total number listed in ICAO PANS/ATM (Doc 4444) where a complete listing is available in Chapter 12. They refer to those elements considered crucial to runway safety aspects.

a) TAXI PROCEDURES

For departure

ATC (call sign) TAXI TO HOLDING POSITION [number] [RUNWAY (number)]

Or where detailed taxi instructions are required

ATC (call sign) TAXI TO HOLDING POSITION [(number)] [RUNWAY (number)] VIA (specific route to be followed) [TIME (time)] [HOLD SHORT OF RUNWAY (number)];

ATC (call sign) TAXI VIA RUNWAY (number);

PILOT (call sign) REQUEST BACKTRACK

ATC (call sign) BACKTRACK APPROVED

ATC (call sign) BACKTRACK RUNWAY (number);

Other general instructions

ATC (call sign) FOLLOW (description of other aircraft or vehicle)

ATC (call sign) VACATE RUNWAY

PILOT/DRIVER (call sign) RUNWAY VACATED

b) HOLDING INSTRUCTIONS FROM ATC

(call sign) HOLD (direction) OF (position, runway number, etc.);

(call sign) HOLD POSITION;

(call sign) HOLD (distance) FROM (position)

... to hold not closer to a runway than specified in Doc. 4444; Chapter 7, 7.5.3.1.3.1

(call sign) HOLD SHORT OF (position);

READBACK FROM PILOTS/DRIVERS

(call sign) HOLDING;

(call sign) HOLDING SHORT.

It should be noted that aircraft should not hold closer to a runway than specified in Doc. 4444; Chapter 7, 7.5.3.1.3.1.

The procedure words ROGER and WILCO are insufficient acknowledgement of the instructions HOLD, HOLD POSITION and HOLD SHORT OF (position). In each case the acknowledgement shall be by the phraseology HOLDING or HOLDING SHORT, as appropriate.

c) TO CROSS A RUNWAY

PILOT/DRIVER (call sign) REQUEST CROSS RUNWAY (number..)

Note — If the control tower is unable to see the crossing aircraft or vehicle (night, low visibility, etc.), the instruction should always be accompanied by a request to report when the aircraft or vehicle has vacated the runway.

ATC (*call sign*) CROSS RUNWAY (*number*) [REPORT VACATED]

ATC (*call sign*) TAXI TO HOLDING POSITION [*number*] [RUNWAY (*number*)] VIA (*specific route to be followed*), [HOLD SHORT OF RUNWAY (*number*)] or [CROSS RUNWAY(*number*)]

Note — The pilot will, when requested, report "RUNWAY VACATED" when the aircraft is well clear of the runway.

d) PREPARATION FOR TAKE-OFF -clearance to enter runway and await take-off clearance.

ATC (*call sign*) LINE UP [AND WAIT];

ATC (*call sign*) LINE UP RUNWAY (*number - in multiple runway / intersection departures*);

ATC (*call sign*) LINE UP. BE READY FOR IMMEDIATE DEPARTURE;

e) CONDITIONAL CLEARANCES

Conditional clearances must consist of the condition before the line up instruction, and an acknowledgement of the correct (or otherwise) readback is required as part of the correct procedure.

NB: this is the only ICAO phraseology procedure that has a requirement for **an** ATC acknowledgement of a correct, or otherwise, readback of a clearance or instruction e.g.

Scandinavian 941, BEHIND DC9 ON SHORT FINAL, LINE UP BEHIND.

The acknowledgement of a conditional clearance must contain the condition in the readback e.g.

**BEHIND LANDING DC9 on SHORT FINAL, LINING UP BEHIND
Scandinavian 941.**

Scandinavian 941 [that is] correct

NB: Conditional phrases, such as "behind landing aircraft" or "after departing aircraft", shall not be used for movements affecting the active runway(s), except when the aircraft or vehicles concerned are seen by the appropriate controller and pilot.

NB: The procedure also makes no provision for vehicles to be included in the process of receiving a conditional clearance. They may only be the subject of a conditional clearance.

f) TAKE-OFF CLEARANCE

**ATC (call sign) CLEARED FOR TAKE-OFF
[REPORT AIRBORNE]....** Applicable for Low Visibility operations;

Or when more than one runway in use,

ATC (call sign) RUNWAY (number) CLEARED FOR TAKE-OFF

When take-off clearance has not been complied with,

**ATC (call sign) TAKE OFF IMMEDIATELY OR VACATE RUNWAY
[(instructions)];**

ATC (call sign) TAKE OFF IMMEDIATELY OR HOLD SHORT OF RUNWAY

Or to cancel a take-off clearance

**ATC (call sign) HOLD POSITION, CANCEL TAKE-OFF I SAY AGAIN
CANCEL TAKE-OFF (reasons);**

PILOT (call sign) HOLDING;

Or to stop a take-off after an aircraft has commenced take-off roll

**ATC (call sign) STOP IMMEDIATELY [(repeat aircraft call sign) STOP
IMMEDIATELY]**

PILOT (call sign) STOPPING;

Aerodrome Control Phraseology - READ BACK

Of equal importance to the usage of correct phraseologies is the need to obtain the required read back, in the order required and accurately. Listed below are the provisions provided in the relevant ICAO documents pertaining to this safety critical element of runway operations, together with the paragraph number in the ICAO document.

Annex 11

3.7.3 Read-back of clearances and safety-related information
3.7.3.1 The flight crew shall read back to the air traffic controller safety-related parts of ATC

clearances and instructions that are transmitted by voice. **The following items shall always be read back:**

- a) ATC route clearances
- b) Clearances and instructions to enter, land on, take off on, hold short of, cross and backtrack on any runway; and
- c) Runway in use, altimeter settings, SSR codes, level instructions, heading, and speed instructions and, whether issued by the controller or contained in ATIS broadcasts transition levels.

3.7.3.1.1 Other clearances or instructions, including conditional clearances, shall be read back or acknowledged in a manner to clearly indicate that they have been understood and will be complied with.

3.7.3.1.2 The controller shall listen to the read-back to ascertain that the clearance or instruction has been correctly acknowledged by the flight crew and shall take immediate action to correct any discrepancies revealed by the read-back.

3: Communication techniques - general

Detailed below are the relevant provisions laid down in Annex 10, with regard to radio transmission guidelines and techniques.

Annex 10 and PANS ATM

Transmissions shall be conducted concisely in a normal conversational tone; full use shall be made of standard phraseologies wherever these are prescribed in relevant ICAO documents or procedures. Additionally, speech-transmitting technique should be such that the highest possible intelligibility is incorporated in each transmission. Fulfilment of this aim requires that flight crew and ground personnel should:

- a) Enunciate each word clearly and distinctly;
- b) Maintain an even rate of speech not exceeding 100 words per minute. When a message is transmitted to an aircraft and its contents need to be recorded the speaking rate should be at a slower rate to allow for the writing process. A slight pause preceding and following numerals makes them easier to understand;
- c) Maintain the speaking volume at a constant level;
- d) Be familiar with the microphone operating techniques particularly in relation to the maintenance of a constant distance from the microphone if a modulator with a constant level is not used;
- e) Suspend speech temporarily if it becomes necessary to turn the head away from the microphone.

APPENDIX C. Guidelines for Local Runway Safety Teams

Introduction

Recommendation 4.1.1 states that at individual aerodromes, as designated by the National Aviation Safety Authorities, **a Runway Safety Team should be established to lead action on local runway safety issues**. The establishment of the Local Runway Safety Teams, which may comprise of representatives from Aircraft Operators, Pilot Associations, ANSPs and the Aerodrome Operator, is intended to facilitate effective local implementation of the recommendations. This appendix provides suggested guidance on the role of that team.

At a number of aerodromes within Europe, and at the majority of aerodromes in the USA where the runway safety programme is already in place, Local Runway Safety Teams have already been established. Experience has demonstrated that these teams have been very effective at helping to minimise the risk of runway incursions at individual aerodromes, where local issues such as taxiway layout, runway configuration and mixture of Aircraft Operators can be taken into account.

Composition

The team should consist of representatives from the three main groups associated with manoeuvring area operations. The Aerodrome Management (which would include a vehicle driver representative), Air Traffic Controller representation from the Air Navigation Service Provider and Pilot representation from Aircraft Operators / local pilot associations which operate at the Aerodrome. The experience to date has demonstrated that this triangular approach is very effective in dealing, in a co-ordinated fashion, with local runway safety issues.

Role

The role of the Local Runway Safety Team should be to advise the appropriate Management (in a broad sense) on potential runway safety issues and to recommend mitigating measures.

Tasks

A number of the recommendations contained in the Action Plan can be dealt with by the Local Runway Safety Team. One such task is the identification of potential Runway safety issues. It is essential to ask the question 'What' can go wrong 'Where' and 'Why'. In order to provide sensible answers it is necessary to take into account runway and taxiway layout, traffic intensity and mix, visual and non-visual aids such as markings, lights, signs, radar, taxiway designations, ATS procedures, AIP information etc. It is

also necessary to take into account lessons learned from incidents and accidents related to runway safety issues from other aerodromes, as well as one's own.

Depending on the answers to the previous questions, mitigating measures should be developed and proposed to the appropriate management. Whereas guidance can be found in the Action Plan, this should not be seen to be limiting. However, the boundaries set by National regulations and internationally accepted provisions should not be crossed.

Another important task for the Local Runway Safety Team should be to assist in keeping focus on the subject and to develop and run local awareness campaigns. A possible output could be the production and distribution of local hot spot maps or other guidance material as considered necessary. Hot Spot maps are unique or complex intersections and runway crossings where runway incursions have taken place in the past, or areas of the runway or associated taxi ways which are not visible from the Control Tower. Consideration should be given to publishing these maps via the AIP. An example of a local map, often referred to as a 'Hot Spots Map', produced by Brussels Airport, is attached to this Appendix. Other tasks could include, but are not limited to assisting in verifying that communications between Air Traffic Controllers, Pilots and Vehicle Drivers are satisfactory, or if any improvements could be suggested. For example, although standard ICAO phraseology may be utilised, some messages from ATC may be overlong or complex, which may have the potential to confuse Vehicle Drivers or Pilots.

Make observations on a regular basis in different weather and light conditions to assess whether all markings and signage are adequate and understandable by all parties, and that no possible ambiguity exists. If possible this exercise should be performed using vehicles and aircraft to ensure readability from all heights.

Duplication of Effort

At some aerodromes cross discipline Teams may already exist that could carry out the functions of this runway safety Team.

Terms of Reference

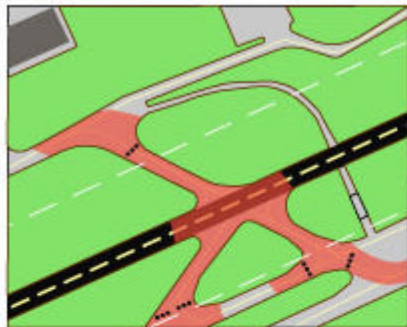
The above mentioned topics should be reflected in the Terms of Reference for the Local Runway Safety Team.

Example of Hotspot Map

Not for operational use

Brussels National Airport

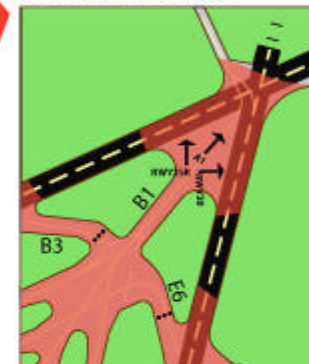
Confusing Taxiway crossing of the Runway.



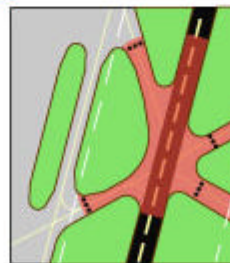
Confusing Taxiway crossing of the Runway.



B1. Confusing Runway entry. Make sure you are lining up on the correct Runway.



B3 and E6. Make sure not to cross the holding position markings without a clearance.



Confusing Taxiway crossing of the Runway.

Explicit RWY crossing clearance required.

CSA / ANM / CL-125 - 001 - 02.02.00



Appendix D. Airside Vehicle Driver Training

Introduction

It is the responsibility of the Aerodrome Operator to have in place a formal training, assessment and authorisation programme for all drivers operating airside. Information already exists that indicate vehicles and their drivers have caused runway incursions at a number of aerodromes and the trend is continuing.

As a result of local hazard analysis the operation of vehicles on the aerodrome should have been highlighted as a potentially high risk activity which demands a number of formal control measures to be put in place to manage the risk. A vehicle driver training programme is one of these control measures and should form part of the overall Safety Management System of the Aerodrome Operator.

It is suggested that the Aerodrome Operator takes the lead in developing an agreed standard for the vehicle driver training programme. There will be a requirement for co-operation and partnership with Air Traffic Control, Ground Handling Agents, Airlines and other Service Providers airside to ensure the continued operation of the programme.

Depending upon the scale and complexity of the aerodrome and the individual requirements of the driver, the programme should take into account the following main areas -

1. A generic airside vehicle driver training programme which covers operational safety and health and safety aspects of operating vehicles, plant and equipment in close proximity to aircraft on aprons, stands and airside roads.
2. Specific training on the vehicle, plant and equipment, e.g. car, tug, high loader, coach.
3. Where the specific job function requires the driver to operate on the manoeuvring area then additional training on the hazards associated with runways and taxiways should be covered.
4. An essential requirement of operating a vehicle on the manoeuvring area is the need to use VHF radio communications with Air Traffic Control that will require training in the correct use of RTF and standard phraseology.

The following material describes what should be considered as 'good practice' guidance and is applicable to the majority of aerodromes. The material describes generic frameworks for the four main areas shown above. The guidance is a compilation of material drawn from many sources including ICAO,

IATA, ACI and a large number of aerodromes that already operate vehicle driver training programmes. It is vital that both theoretical classroom training and practical experience cover all four areas. The aim of this guidance is to ensure consistency and a high degree of standardisation in the manner in which a driver obtains an 'Airside Driving Permit'.

Framework for an Airside Vehicle Driver Training Programme

The Airside Driving Permit (ADP)

- the issuing authority (normally the aerodrome operator), its validity in terms of time, conditions of use, its transferability
- ownership of the permit, control and audit of permit issue
- local enforcement and driving offence procedures
- relationship to State driver licensing system.

National Legislation and Regulation

- Government/State regulations related to general vehicle driving licences
- State/Regional/Local government requirements
- National Aviation Safety Authority requirements/guidance for driving airside

Aerodrome Regulations and Requirements

- rules of air traffic services as they relate to vehicles, particularly rights of way
- specific aerodrome regulations, requirements and local instructions
- local methods used to disseminate general information and instruction to drivers
- local methods used to disseminate information regarding works in progress

Personal Responsibilities

- fitness to drive (medical/health standards) national or airport agreed requirements
- issue and use of personal protective equipment such as high visibility clothing and hearing protection,
- general driving standards,
- no smoking requirements airside,
- responsibilities with respect to FOD and fuel/oil spillage.
- responsibility for individuals to ensure vehicle is suitable for the task and used correctly

Vehicle Standards

- condition and maintenance standards agreed at aerodrome and/or national level
- the requirements to display obstruction lights and company insignia
- requirements and content of daily vehicle inspections
- agreed standards of aerodrome and company vehicle fault reporting and rectification
- local requirements for the issue and display of Airside Vehicle Permits (AVP's).

General Aerodrome Layout

- the general geography of the local aerodrome
- aviation terminology used such as runway, taxiway, apron, roads, crossings etc.
- all standard aerodrome signs, markings and lights for both vehicles and aircraft
- specific reference to those signs, markings and lights used to guard runways,
- specific reference to any controlled/uncontrolled taxiway crossing procedures

Hazards of General Airside Driving

- speed limits, prohibited areas and no parking regulations.
- the danger zones around aircraft,
- engine suction/ingestion and blast, propellers and helicopters,
- aircraft refuelling,
- FOD and spillages,
- vehicle reversing,
- staff and passengers walking across aprons,
- air-bridges and other services such as fixed electrical ground power,
- the general aircraft turnaround process,
- aircraft emergency stop and fuel cut off procedures,
- hazardous cargo,
- local vehicle towing requirements,
- requirements for driving at night
- requirements for driving in adverse weather conditions, particularly low visibility.

Local Organisations

- the role of the Aerodrome Operator in setting and maintaining standards
- the National Aviation Safety Authority and its responsibilities
- the National and/or local Police and their involvement with airside driving
- other enforcement authorities dealing with vehicles, driving, health and safety

Emergency Procedures

- action to be taken in the event of a vehicle accident,

- specific action to be taken in the event of a vehicle striking an aircraft
- action to be taken in the event of fire
- action to be taken in the event of aircraft accident/incident,
- action to be taken in the event of personal injury.

Communications

- radio procedures to be used, if applicable
- light signals used by ATC, if applicable
- procedures to be used by vehicle drivers if lost or unsure of position,
- local emergency telephone number
- how to contact the local aerodrome safety unit

Practical Training (Visual Familiarisation)

- airside service roads, taxiway crossings and any restrictions during low visibility
- aprons and stands
- surface paint markings for vehicles and aircraft
- surface paint markings that delineate the boundary between aprons and taxiways
- signs, markings and lights used on the taxiway and help indicate runways ahead
- parking areas and restrictions
- speed limits and regulations
- hazards during aircraft turnarounds and aircraft movements

Framework for Manoeuvring Area Vehicle Driver Training Programme

It is anticipated that all drivers expected to operate on the manoeuvring area of an aerodrome will obtain an ADP which has covered the programme detailed above. It is also anticipated that any driver expected to drive on the manoeuvring area will have obtained an agreed period of experience of general airside driving before training to operate on the manoeuvring area.

The numbers of drivers permitted to drive on the manoeuvring area should be kept to the minimum necessary, and the functions they perform should normally be within the following areas of responsibility -

- Runway Inspections
- Bird Control
- Rescue and Fire Fighting
- Essential Engineering
- ATC
- Snow clearing and De-icing
- Airline/Handling agent for aircraft towing and runway crossings

All drivers should be trained initially and be provided with refresher training at agreed intervals with particular additional emphasis on the following areas.

Aerodrome Regulations and Requirements

- rules of Air Traffic Control, rights of way of aircraft
- definitions of movement area, manoeuvring area, aprons, stands
- methods used to disseminate information regarding works in progress

Air Traffic Control

- function of aerodrome control and its area of responsibility
- function of ground movement control and its area of responsibility
- normal and emergency procedures used by ATC relating to aircraft
- ATC frequencies used and normal hand over/transfer points for vehicles
- ATC call signs, vehicle call signs, phonetic alphabet, standard phraseology
- demarcation of responsibilities between ATC and Apron Control if applicable

Personal Responsibilities

- fitness to drive with particular emphasis on eyesight and colour perception
- correct use of personal protective equipment
- responsibilities with respect to FOD
- responsibilities with respect to escorting other vehicles on the manoeuvring area

Vehicle Standards

- responsibility to ensure vehicle used is fit for purpose and task
- requirements for daily inspection prior to operating on the manoeuvring area
- particular attention to the display of obstruction and general lights
- serviceability of all essential communications systems with ATC and base operations

Aerodrome Layout

- particular emphasis on standard ICAO signs, markings and lights used on the manoeuvring area
- special emphasis on those signs, markings and lights used to protect the runway
- description of equipment essential to air navigation such as ILS
- description of protected zones related to ILS antenna
- description of ILS protected areas and their relation to runway holding points
- description of runway instrument/visual strip, cleared and graded area
- description of lights used on the manoeuvring area with particular emphasis on those related to low visibility operations

Hazards of Manoeuvring Area Driving

- engine suction/ingestion and blast, vortex, propellers and helicopter operations
- requirements for driving at night
- requirements for operations in low visibility and other adverse weather conditions
- procedures for vehicle and or radio becoming unserviceable whilst on manoeuvring area
- rights of way for aircraft, towed aircraft and RFFS vehicles in emergency

Emergency Procedures

- actions to be taken in event of vehicle accident/incident
- actions to be taken in event of aircraft accident/incident
- actions to be taken if FOD or other debris is found on runways and taxiways
- procedures to be used by vehicles if lost or unsure of position
- local emergency telephone number

Aircraft Familiarisation

- knowledge of aircraft types and ability to identify all types normally operating at the aerodrome
- knowledge of Airline call signs
- knowledge of aircraft terminology relating to engines, fuselage, control surfaces, undercarriage, lights, vents etc.

Practical Training (Visual Familiarisation)

- all runways (including access and exit routes), holding areas, taxiways and aprons
- all signs, surface markings and lights associated with runways, holding positions, CAT 1/2/3 operations
- all signs, surface markings and lights associated with taxiways
- specific markings that demarcate the boundary between aprons and manoeuvring area
- navigation aids such as ILS, protected area, antenna, RVR equipment and other meteorological equipment
- hazards of operating around aircraft landing, taking off or taxiing
- any locally used naming convention for particular areas or routes

Framework for a Radiotelephony (RTF) Training Programme

The movement of vehicles on the manoeuvring area is subject to authorisation by ATC. Depending upon the complexity of the aerodrome, ATC may operate a number of frequencies. Typically the aerodrome (tower) controller will be responsible for all vehicles operating on the runway, and the ground controller will be responsible for all vehicles operating on the taxiways. It is essential to fit all vehicles that operate on the runway with the appropriate radio communication frequencies.

All drivers of vehicles operating on the manoeuvring area should be expected to display a high degree of competence with respect to use of RTF phraseology and aviation English.

Hierarchy of Message Priority

- message priorities, understanding of distress, alerting, control, information messages

Use of the Phonetic Alphabet

- correct pronunciation of both letters, words and numbers

Use of Standard Phraseology

- emphasis on drivers using standard phraseology similar to pilots
- caution should be noted with certain phrases such as 'cleared', and 'go ahead'

Use of Call Signs for Aircraft, ATC and Vehicles

- understanding of terminology and acronyms used by ATC and pilots
- knowledge of the airline call signs used at the aerodrome
- vehicle call signs should be appropriate to function e.g. 'Operations', 'Fire', 'Engineer', where there are more than one vehicle the use of numbers e.g. 'Fire 2'

Use of Read back Procedures

- vehicle drivers should use standard read back in the same manner as pilots for instructions such as 'enter/cross the runway', and if conditional clearances are used

Readability Scale

- understanding and use of the readability scale from 1 - 5

Lost or Uncertain of Position

- understanding of local procedures for vehicles lost or uncertain of position on the manoeuvring area

Vehicle Breakdown

- local procedure for vehicle breakdown on runways and taxiways
- procedure for indicating to ATC of vehicle failure

Radio Fail Procedure

- understanding of the local procedure if radio failure occurs whilst on the runway or taxiway
- understanding of the light signals that may be used by ATC to pass instructions to vehicles

Correct Transmitting Technique and RTF Use

- understand the reasons for listening out prior to transmitting
- use of standard phraseology, aviation English,
- words and sounds to be avoided
- correct positioning of microphones to avoid voice distortion
- avoidance of 'clipped' transmissions
- be aware of regional accents and variations of speech
- speed of delivery of RTF phraseology

Use of Portable Radios

- correct use of radios
- effective range and battery life
- screening/shielding effects on the aerodrome
- use of correct call signs, either related to vehicle or an individual person

Safety whilst using Radios

- local instructions regarding use of portable radios and hand held microphones whilst driving a vehicle
- local instructions on the use of mobile telephones (cell phone) whilst operating airside

The three training frameworks shown above are intended as generic guidance and each aerodrome will need to apply those areas of training that are applicable to their local geography, conditions and type of operation.

All of the three training programmes should consist of two main parts, the first being the classroom/theoretical part which should include the use of prepared presentations, maps, diagrams, video, booklets, checklists as appropriate. The second part should involve practical tuition and visual familiarisation on the aerodrome with a suitably trained person. This practical tuition will take a period of time depending upon the complexity of the aerodrome. Following initial training, a programme of refresher training should be organised after an agreed period of time.

Where responsibility for vehicle driver training (apron and manoeuvring area) and RTF is delegated to a third party provider the aerodrome should institute a programme of audits, as part of its SMS, to ensure that agreed standards are being maintained.

The above frameworks are intended only as a guide are based on current 'good practice'. It is incumbent on aerodromes to regularly review their vehicle driver training programmes against programmes and documentation available across the industry.

References

- 1) Airports Council International ACI (World) Apron Safety Handbook
- 2) ACI (World) Apron Signs and Markings Handbook
- 3) IATA Airport Handling Manual (AHM) current edition
- 4) UK Civil Aviation Authority CAP 642 - Airside Safety Management
- 5) UK Airport Operators Association - Airside Driver Training Scheme
- 6) ICAO Annex 14, ch. 8, Aerodrome Vehicle Operations, and attachment A, para. 17 - Operators of vehicles
- 7) ICAO Air Traffic Management (PANS ATM) ch. 7 Procedures for Aerodrome Control

Useful Web sites

www.eurocontrol.int

www.airports.org

www.aci-europe.org

www.iata.org

www.caa.co.uk

Appendix E. Flight Crew Best Practice

The aim of this appendix is to highlight some of the causal or contributory factors that have resulted in runway safety occurrences, and which were identified during the runway safety survey.

Aircraft Operators are invited to review the materials put forward in this document, and where necessary, amend their Standard Operating Practices with regard to ground operations.

Critical phase of flight

The number of ground movements on airports has increased significantly during the last decades. To provide the necessary capacity on the ground, it was necessary to continuously review the layout of the taxiway infrastructure. The taxiway system on major airports has become more and more complex.

With the evolutionary process of enhancement and change accelerating in recent times, it remains imperative that all flight crew remain aware of the signage and markings currently being applied. Every opportunity to familiarise one self should be taken, and where possible, information critical to safe aerodrome operations, should be shared.

The current generation of aircraft are highly automated and complex systems, that have allowed preparing and programming the total flight on the ground. This has resulted in flight deck workload peaks to be shifted from the previous critical flight phase to the ground phase of aircraft operations. These evolutions are irreversible, and appropriate measures should be undertaken to address the situation.

Consequently the taxi phase should be treated as a "critical phase of flight".

Planning for taxi operations

The key-point in the prevention of runway incursions, is to apply better preventative measures during the taxi-phase. Reduced workload will provide for increased attention to the taxi phase and allow an updated and accurate positional and situational awareness. This situation can be further enhanced by assigning one crew member to progressively monitor the progress of the flight

against the aerodrome chart.

Airport familiarisation

Departing from or coming into an airport can be prepared well in advance. A thorough planning for taxi operation is essential. This preparation should be done at the gate or prior to starting descent.

- ✓ Prepare the necessary charts for taxi and have them available for use during taxi.
- ✓ Take some time to study the airport layout. Very often some systematic can be found in the naming of taxiways.
- ✓ Use the ATIS information and your previous experience to determine the possible taxi routes.
- ✓ Remember to review the latest NOTAM for both the Departure and Arrival airport for information concerning construction or taxiway/runway closures. Visualise this information on the charts.
- ✓ Standard taxi routes are used more often at busy airports. Review the routes you can expect.
- ✓ Pay special attention to the location of HOT SPOTS. These are unique or complex intersections and runway crossings where runway incursions have taken place in the past, or areas of the runway or associated taxi ways which are not visible from the Control Tower. Know what runways you will encounter between where you are and where you are going.
- ✓ Plan timing and execution of check-lists, so that no distractions occur when approaching and/or crossing runways; i.e. all eyes outside during this phase.
- ✓ Conduct detailed briefing for all flight crew members, especially during night and low visibility operations i.e. include "extra eyes" where available.

Briefings

The before take-off briefing should be simplified as much as possible. Where possible, conduct pre-departure check-lists when the aircraft is stationary. Several taxi items can be covered during the before start briefing at the gate. The briefings during taxi can be limited to a summary of the highlights and the items which have been altered since the before start briefing. This should also

be done during the descent briefing.

The before start and descent briefing should also contain a complete review of the expected taxi routes with special attention to the HOT SPOTS. Pay special attention to temporary situations such as work in progress, other unusual activity and recent changes in airport layout. During this part of the briefing, refer to the airport charts and visualise all available information.

An added benefit can be if other crew members are familiar with the airport and have some recent taxi experience at the aerodrome. Local habits can be "good to know".

Our memory is "constructive". That means that we have the tendency to fill in the blanks. Ensure yourself that you follow the clearance or instruction that you actually received, and not the one you expected to receive.

Be aware that the expectations established during the pre-taxi or pre-landing planning can be significantly altered with a different and unexpected clearance.

The following additional check list may assist with briefing preparations:

1. Conduct a briefing for all flight crewmembers
2. Familiarise yourself with airport
3. Plan timing and execution of checklists
4. Review NOTAM's
5. Flight crew should fully understand all departure briefing items
6. Assigned taxi route should be briefed as thoroughly as an instrument approach
7. Airport diagram should be readily available to all flight crew members

Taxi procedures

1. Clearance

The receipt of any clearance and the taxi phase itself requires the complete attention of all flight crew in the flight deck. If necessary, write down taxi-instructions - especially at complex or unfamiliar airports - and cross-check the instructions against the airport chart. Clear up any uncertainties about your clearance or your position on the surface before the start of taxi.

IN CASE OF DOUBT: ASK.

All flight crew members must monitor the clearance for taxi, take-off and landing, and must be "in the loop" at all times when runway operations are in

progress.

2. Public Address announcements

Public Address welcome announcements by flight deck should be transferred from the taxi phase to a moment before engine start-up or push back. Safety reports show that Public Address announcements to passengers or commercial announcements are a direct source of error in many events. Also operational calls on the company frequency cause the other pilot to be isolated in the flight deck. These calls and announcements should, if at all possible, be avoided while taxiing and above all when approaching the active runway.

If you need to leave the ATC frequency, then notify your other flight crew members. Afterwards, be briefed by the other crew member of what you have missed.

Taxi Best Practices

1. Only one pilot can control the aircraft during taxi. However, as in flight, the pilot not in control of the aircraft has the important task of monitoring the taxi and assisting his colleague.
2. Cancel check list activity when crossing and entering runways. Maintain full concentration of all flight crew members on the runway traffic situation.
3. Never cross red stop bars when lining up or crossing a runway, unless in exceptional cases where the stop-bars, lights or controls are reported to be unserviceable, or some other plausible explanation is received, and a clear, unambiguous and positive clearance has been given to cross the red stop bars.
4. When entering any runway, check for traffic (left and right) using all available surveillance means e.g. all eyes in the flight deck, the Airborne Collision Avoidance System, radar etc.
5. When cleared to line up and/or when crossing any runway, position the aircraft in a right angle with the runway where possible, in order to better observe the other traffic, both arriving and departing.
6. Do not rush. The higher your ground speed, the less time you have to react, manoeuvre the plane and avoid an obstacle. High speed also results in greater distance and time required to bring the plane to a complete stop. Time can be your ally and your enemy; use it wisely. Taxi defensively, this is being prepared for others mistakes.

-
7. When you receive a clearance to taxi to a point beyond a runway, then this clearance does not automatically include the authorisation to cross that runway. Each taxi clearance beyond a runway shall contain an explicit clearance to cross the runway or an instruction to hold short of that runway.
 8. Adopt the sterile flight deck concept whilst taxiing. During movement of the aircraft the flight crew must be able to focus on their duties without being distracted by non-flight related matters. Ensure cabin crew are aware of this requirement if it is not a Standard Operating Procedure. The following definition of a 'Sterile Flight Deck' is offered as a reference:

Sterile flight deck definition:

Any period of time when the flight crew should not be disturbed, except for matters critical to the safe operation of the aircraft.

Explanation:

This may include, but not be limited to, calls received from non-operational areas (e.g. company), entry onto the flight deck (e.g. cabin crew) and extraneous conversations not related to the current phase of flight. It is generally accepted, that such a period of time commences;

- a) Departure: when the aircraft starts engine/s and ceases when the aircraft reaches 10,000' above the departure aerodrome elevation.
 - b) Arrival: when the aircraft reaches 10,000' above the arrival aerodrome elevation until the engine/s are shut down after landing.
 - c) Any other times decreed by the flight crew. (e.g. in flight emergency, security alert etc)
9. Use all your aircraft lights to help controllers and other pilots to see you. Fixed navigation lights and taxi light should be on whenever the aircraft is moving. Landing lights logo and strobes (where fitted) should be turned on when taking the active runway or when cleared for take-off.
 10. Check your audio box and volume adjustment whenever a frequency change is made.
 11. Ensure all flight crew are on the appropriate frequency until all runways have been vacated after landing.
 12. After the landing, vacate the runway as soon as possible, but not by turning onto another runway, unless specifically instructed to do so.
 13. When the aircraft has vacated the active runway, be prepared to stop to resolve any questions about the ATC clearance or about the aircraft position.
 14. Anytime you feel uncertain about the location of the aircraft position on the movement area, STOP the aircraft, advise ATC, and ask for clarification.

Take the question out of the flight deck.

15. If necessary request progressive taxi instructions.

16. Never stop on a runway unless specifically instructed to do so.

The following check list may assist with best practice preparations:

- ✓ If necessary write down taxi route
- ✓ Assign crew member to progressively follow aircraft position on chart
- ✓ Follow company SOP's in regard to exterior lighting when taxiing and cleared for take-off - where possible, maximum illumination.
- ✓ Sterile Flight Deck during taxi
- ✓ The visibility required for taxiing may be less than the Runway Visual Range
- ✓ Be alert for Mandatory Signs / Markings / Stop bars and Runway guard lights
- ✓ Look for visual aids (Taxiway location information and destination signs)
- ✓ Designate a crew member to look for and report signs / markings and keep track of location against the aerodrome chart
- ✓ Conduct pre-departure checklists when the aircraft is stationary
- ✓ Use *STANDARD* radio phraseology
- ✓ Receive explicit clearance before crossing any runway
- ✓ *READBACK* all runway crossing or hold short clearances using correct phraseology
- ✓ *DO NOT ALLOW* flight crew to be rushed by any party (ATC or Company)
- ✓ *LISTEN* to clearances issued to other aircraft
- ✓ *NEVER* cross red stop bars when entering or crossing a runway unless contingency measures are in force, e.g. to cover cases where the stop bars or controls are unserviceable.
- ✓ Before entering or crossing any runway *CHECK FOR TRAFFIC!!*
- ✓ No checklist activity crossing any runway
- ✓ Ensure correct understanding of the ICAO phraseology a "Taxi to holding position".

Communications

1. Language

Although in certain circumstances the use of local language is allowed, this has been identified as a contributory factor in the causes of some runway incursions. The use of Aviation English in a busy and complicated environment should be encouraged as much as possible. The use of a common aeronautical language not only improves communication but also improves the situational awareness of all the flight crew listening out on the frequency and trying to build the picture of the traffic situation.

2. Proficiency

Conducting and comprehending radiotelephony communications requires competence with standard phraseology as well as general proficiency in the language used for communications.

Speaking slowly is essential when operating in foreign regions. If you slow down your speech rate, the response may be slower and clearer too. Complex and long instructions, incorporating more than one executive instruction, are difficult to absorb and understand, especially when delivered at a high rate as is common in a high traffic density environment. Even if the same language is used everywhere, some essential differences between States remain.

3. Phraseologies

Use standard ATC phraseology at all times. Only strict adherence to standard phraseology avoids miscommunications. See Appendix B (Communications Guidance) for further information.

The most common phraseology problem for non European based flight crew, is the fundamental difference between the North American phraseology "taxi into position and hold" (which has the same meaning as the ICAO standard phrase "line up [and wait]") and the standard ICAO phraseology "taxi to holding position" (which means taxi to, and hold at, a point clear of the runway – ILS Cat 1, 2/3 etc). Listen carefully to the instruction. If unsure – **ASK**.

4. Read Backs

Any clearance requires a readback. The following Standard is included in ICAO Annex 11: The flight crew shall read back to the air traffic controller safety-related parts of ATC clearances and instructions which are transmitted by voice. The following items shall always be read back:

a) ATC route clearances;

- b) clearances and instructions to enter, land on, take off on, hold short of, cross and backtrack on any runway; and
- c) runway-in-use, altimeter settings, SSR codes, level instructions, heading and speed instructions and, whether issued by the controller or contained in ATIS broadcasts, transition levels.

Any readback requires a hear-back. In order to complete this “communication loop”, the read-back must be complete and clear. Always include your call sign. This is the only way to assure that clearances and instructions are well understood. This is essential in all voice communications.

In case of hold short, crossing, take-off or landing instruction readback, always include the runway designator.

Read back the full clearance. “Roger” is not a readback.

5. Listen out

Listen out the frequency at all times. Try to visualise the other traffic in the vicinity. Know what runways you will encounter between where you are and where you are going. Be particularly attentive to all clearances and instructions issued to traffic involving those runways.

Other communication best practices

1. Be extra attentive when another aircraft with similar call sign is on the frequency.
2. When instructed to follow other traffic, this does not automatically include the clearance to enter or cross a runway. Each aircraft requires a specific clearance to enter or cross any runway. If in doubt, seek clarification: **ASK**
3. If you are cleared to “line up and wait”, then only a short delay on the runway should be anticipated. If you find yourself in this position for more an extended period, advise about your position and seek clarification: **ASK**.
4. Both pilots should monitor the frequency and agree upon the acceptance of a clearance to taxi, cross a runway, take-off and land on a nominated runway. Any misunderstanding or disagreement should be cleared up immediately by contacting ATC for clarification: **ASK**.
5. The use of headsets increases the readability of communications with ATC and within the flight deck.
6. Ensure the correct setting of the audio panel, especially after any temporary switch in audio sources.

Situational awareness

Situational awareness is about knowing where you are and where you want to go, as well as building the picture of the traffic in the vicinity. Even during daylight and in good visibility, people get lost. Even worse is the situation where you assume you know your position, but find yourself elsewhere. At times of darkness and Low Visibility, additional care must be taken to ensure that accuracy in navigation on the ground and the highest degree of situation awareness, is undertaken by all members of the flight crew.

The following check list may assist with maintaining situational awareness:

Before Starting the Approach

- ✓ Obtain all needed information
- ✓ Brief planned primary runway exit and taxi route
- ✓ Eliminate as much distraction as possible
- ✓ Have airport diagram available for instant use
- ✓ Maintain situational awareness on final at night
- ✓ Listen for other aircraft clearances

Visual aids

Charts, signs, markings and lighting: These are all aids to assist in determining your position. A high level of awareness must be maintained to observe and respond to mandatory signs and markings. A correct knowledge of all the symbols and signs is therefore a must. All the visual information that is available should correlate with the actual situation. Gathering visual information and the constant questioning and cross checking of your position is the task of the entire flight deck crew. A crew member who is in doubt or does not agree with the situation must speak-up.

A head down situation during taxi should be limited to the minimum possible.

When a pilot not taxiing the aircraft focuses on the instruments in the flight deck, he/she is not able to monitor the progress of the aircraft. Before undertaking head-down actions advise the other pilot, so that added emphasis can be placed by the navigating pilot on maintaining navigational accuracy and situational awareness.

Other aids

The flight deck traffic display (TCAS) is a good tool to detect traffic approaching and departing a runway. Remember, an aircraft may be departing from an intersection closer to the landing threshold out of sight, due to restricted visibility, or line of sight limitations.

Use your heading display or compass to confirm the runway or taxiway alignment with the information available from the charts. If fitted, use the ILS centreline guidance system to confirm the correct runway alignment.

Have a good look out; scan the entire runway and approach in both directions before entering a runway. If in doubt, seek clarification: **ASK**

Conclusion

YOU CAN HELP TO PREVENT RUNWAY INCURSIONS!

HOW?

1. It is essential to adhere strictly to all existing ICAO Standard Operating Procedures and phraseologies.
2. Flight crews need to ensure that they follow the clearance or instructions that are actually received, and not the one the flight crew is expecting to receive
3. A good planning of the ground operations can decrease the workload during taxi. The flight and its associated risks starts already during the preparation.
4. Good situational awareness is the top priority during taxi. All crewmembers should be involved here.
5. Application of the "Crew Resource Management" principles during taxi is as important as during the other phases of flight.
6. Even the most professional and experienced people make mistakes. By being defensive and letting the built-in safety nets do their work, a single mistake should not lead to a serious incident or accident.

References

The following ICAO standards are provided to assist flight crews in understanding the use and application of stop bars.:

Annex 2 Chapter 3: 3.2.2.7.3 An aircraft taxiing on the manoeuvring area shall stop and hold at all lighted stop bars and may proceed further when the lights are switched off.

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5.3.17.9 Selectively switchable stop bars shall be installed in conjunction with at least three taxiway centre line lights (extending for a distance of at least 90 m from the stop bar) in the direction that it is intended for an aircraft to proceed from the stop bar.

5.4.3.35 A taxiway shall be identified by a designator comprising a letter, letters or a combination of a letter or letters followed by a number.

5.4.3.36 Recommendation. When designating taxiways, the use of the letters I, O or X and the use of words such as inner and outer should be avoided wherever possible to avoid confusion with the numerals 1, 0 and closed marking.

5.4.3.37 The use of numbers alone on the manoeuvring area shall be reserved for the designation of runways.

Annex 15 Chapter 5: 5.3.17.14 Note 1. A stop bar is switched on to indicate that traffic stop and switched off to indicate that traffic proceed.

Doc 4444 7.13.7 Stop bars

Stop bars shall be switched on to indicate that all traffic shall stop and switched off to indicate that traffic may proceed.

Other References

ICAO. *Procedures for Air Navigation Services – Air Traffic Management*, Doc 4444, Ed. 14, 2001

ICAO. *Air Traffic Services*, Annex 11, Ed. 13, 2001

ICAO. *Procedures for Air Navigation Services – Aircraft operations*, Doc 8168, Ed. 4, 1993

FAA. *Federal Aviation Regulations / Airman's Information Manual*, 2002

ICAO NACC Regional office, *OPS guidelines for the prevention of runway incursion*, Jan Jurek, 2002

University of Leiden, *Human factors in runway incursion incidents*, Patrick Hudson, Netherlands

FAA, *Runway safety: It's everybody's business*, Kim Cardosi, Ph.D., 2001

FAA, *Runway Safety Blueprint 2002-2004*, 2001

FAA/IATA Runway Incursion Prevention Program

Appendix F. Air Traffic Controller Best Practices

The aim of this appendix is to highlight some of the causal or contributory factors that have resulted in runway safety occurrences, and which were identified during the runway safety survey.

Issue of en-route clearance

Whenever possible an en-route clearance should be passed to an aircraft before start of taxi. If this is not possible, controllers should try and avoid passing the clearance to a pilot engaged in complicated taxiing manoeuvres near the runway due to the possibility of distraction.

An ATC en-route clearance is NOT an instruction to take off or enter an active runway. The words "TAKE OFF" are used only when an aircraft is cleared for take-off, or when cancelling a take-off clearance. At other times the words "DEPARTURE" or "AIRBORNE" are used.

Read Back requirements

Read-back requirements have been introduced in the interests of flight safety. The stringency of the read-back requirement is directly related to the possible seriousness of misunderstandings in the transmission and receipt of ATC clearances and instructions. Strict adherence to read-back procedures ensures that the clearance or instruction has been received and understood correctly by the correct aircraft.

The flight crew shall read back to the air traffic controller safety-related parts of ATC clearances and instructions that are transmitted by voice.

The Air Traffic Controller is responsible for checking the completeness and accuracy of the read back.

The following items shall always be read-back:

- a. ATC route clearances
- b. Clearances and instructions to enter, land on, take off on, hold short of, cross and backtrack on any runway; and
- c. Runway-in-use, altimeter settings, SSR codes, level instructions, heading and speed

instructions and, whether issued by the controller or contained in ATIS broadcasts, transition level.

- d. Other clearances or instructions, including conditional clearances, shall be read back or acknowledged in a manner to clearly indicate that they have been understood and will be complied with.

An aircraft must include its call sign in the readback, and a failure to do this shall be challenged by the controller.

Taxi instructions

Taxi instructions issued by a controller will always contain a clearance limit, which is the point at which the aircraft must stop until further permission to proceed is given. For departing aircraft the clearance limit will normally be the holding position of the runway in use, but it may be any other position on the aerodrome depending on prevailing traffic circumstances. When intersection departures are used, the appropriate holding positions shall be clearly identified by ATC.

When a taxi clearance contains a taxi limit beyond a runway, it shall contain an explicit clearance to cross that runway, or an instruction to hold short, even if the runway is not in use.

Communication with any aircraft using the runway for the purpose of taxiing, should be transferred from the ground controller to the aerodrome controller prior to the aircraft entering / crossing a runway.

It is strongly advised, when practicable, to use standard taxi routes.

For more complicated taxi instructions, it may be appropriate to divide the message into segments, placing the clearances and instructions in sequential order, to avoid the possibility of pilot misunderstanding. For example:

An aircraft shall taxi to RWY06R for take-off. The aircraft has to taxi via taxiway A and B and the taxi route will necessitate a runway crossing (RWY06L). The holding position for RWY 06L on taxiway B is named B2

ATC **AFR 375, TAXI TO HOLDING POSITION B2 VIA TAXIWAY ALPHA and BRAVO, HOLD SHORT OF RWY 06L.**

A/C **HOLDING POSITION B2 VIA ALPHA and BRAVO, HOLDING SHORT OF 06L,**

AFR375

Subsequently

A/C **AFR375 AT HOLDING POSITION B2.**

ATC **AFR375 CROSS RWY 06L, TAXI TO HOLDING POSITION RWY 06R**

A/C **CROSS 06L, TAXI TO HOLDING POSITION 06R, AFR375**

Further guidance on this subject can also be found in Appendix B - 'Communications Guidance'.

It should be noted that the ICAO phraseology "**taxi to holding position ...**" may be misunderstood by some pilots due to the use of non ICAO phraseology within the North America, where "taxi into position and hold..." is used by ATC when issuing a line up clearance. There have been a number of runway safety occurrences due to this misunderstanding, and the read-backs should be very carefully monitored.

Multiple line-ups on the same runway

Line-up instructions may be issued to more than one aircraft at different points on the same runway, using the ICAO criteria contained in ICAO Doc7030. In addition to the standard phraseology in Chapter 12 of PANS-ATM the following ATC phraseology shall be used:

ATC **KLM123 LINE UP AND WAIT RUNWAY 22, INTERSECTION BRAVO, NUMBER 2 FOR DEPARTURE, NUMBER ONE AN AIR FRANCE B737 DEPARTING FROM ALPHA ONE.**

A/C **LINING UP AND WAIT RUNWAY 22, INTERSECTION CHARLIE, NUMBER 2, KLM123**

Stop Bars

Recommendation 4.5.11 states that an Aircraft shall not be instructed to cross stop bars when entering or crossing a runway unless contingency measures are in force. The objective of this recommendation is to maintain the integrity of the stop bars, which are intended in this case to protect the runway.

Contingency

Contingency plans must be produced locally and could include :-

When an alternative, suitable taxi way is equipped with a functioning stop bar, and is available, close the taxiway where the failure happened and use the taxi way with the functioning stop bar.

Taxi behind a follow-me car, if available, with RTF confirmation.

Take-off procedures

At aerodromes with separate GROUND and TOWER functions, aircraft shall be transferred to TOWER at or approaching the holding position.

Since misunderstandings in the granting and acknowledgement of take-off clearances can result in serious consequences, care should be taken to ensure that the phraseology employed during the taxi manoeuvres can not be interpreted as a take-off clearance.

Hand-over

It is apparent that a number of runway safety occurrences take place soon after a controller hand-over takes place. Nav Canada in their Runway Safety Survey believe a significant percentage of incidents involving ATC operational errors take place around this time. To ensure that the complete traffic situation is included in a hand-over, the use of a hand-over check-list should be considered.

Briefing Sessions

Recommendation 5.5.7 states that Runway Safety Issues should be included in team briefing or debriefing sessions that may occasionally be held at unit level, as part of a lesson learning process. From best practice, this should include not only the scenarios that have led to actual runway occurrences, and also other situations that almost resulted in a runway incursion.

Appendix G. Inspection and Audit Guidelines

Aerodrome context

Many States already have established inspection and audit processes that are used to confirm that all requirements placed upon any service provider have been complied with. Some aerodrome operators have established systems for internal audits and inspections as part of their Safety Management System.

This appendix contains inspection and audit guidelines developed by the Group of Aerodrome Safety Regulators (GASR) as guidance on the process of audit and inspection. While developed for the National Aviation Safety Authorities for the audit and inspection of aerodromes against ICAO Annex 14 requirements, the same principles apply to any organisation that needs to perform audits or inspection. It should be noted that Air Traffic Services are required to manage safety primarily according to Annex 11.

A sample of the Audit Report template designed for aerodrome audits is attached. Both the Inspection Manual and the Audit Report template are designed in a generic way. The material can easily be adapted for use in other fields of aviation.

Alternative guidance material can be found in ICAO Doc. 9774, Manual on the Certification of Aerodromes.

ATM context

The overall effectiveness of the safety regulation is dependent not only upon appropriate regulatory provisions, aimed at defining minimum levels of safety, but also on having a system which ensures their full implementation by service-providers. For ATM aspects that are subject to formal safety regulation, the safety regulator requires an effective mechanism for safety oversight. Safety Oversight may be defined as:

“The function undertaken by a designated authority to verify that safety regulatory objectives and requirements are effectively met”.

Therefore, safety regulatory audits and inspections are **techniques** that provide safety oversight with means for ensuring a direct and systematic regulatory verification when needed. Safety regulatory audits and inspections (or

equivalent actions) should be conducted in sufficient depth and scope to satisfy the safety regulator that safety is ensured.

Safety Regulatory Audit may be defined as:

“A systematic and independent examination conducted by the ATM Safety Regulator to determine whether processes and related results comply with required arrangements and whether these arrangements are implemented effectively and are suitable to achieve objectives.”

Safety Regulatory Inspection may be defined as:

“A systematic and independent examination conducted by the ATM Safety Regulator to determine whether ATM services or specific parts of the ATM system comply with prescriptive specifications required and previously published by the safety regulator and whether these specifications are implemented effectively.”

Safety regulatory audits and inspections are equally applicable to both safety oversight processes (safety regulatory approvals and ongoing safety oversight). Principles applicable to the use of safety regulatory audits and inspections in safety oversight processes for ATM are provided within SRC POL DOC 3 National ATM Safety Regulatory Framework and also for each ESARR these principles are developed within guidance material (see SRC web site www.eurocontrol.int/src)”

Need for harmonisation

Harmonisation of the provisions for safety oversight process and associated enablers audits and inspections that are carried out by the safety regulatory bodies in the area of aerodromes and ATM should be subject of further work within the Working Group for Prevention of Runway Incursions.

GASR

Group of Aerodrome Safety Regulators

COMMON INSPECTION MANUAL FOR GASR STATES

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INTRODUCTION

This Manual was developed by the Group of Aerodrome Safety Regulators (GASR) to provide generic guidelines for a harmonised approach to the management and execution of the audit and inspection process. The Manual was designed to conform to modern Quality and Safety Management System principles.

To distinguish activities performed by the Authority from activities performed by the provider or customers, the term inspection has been chosen for tasks performed by the Authority and the term audit has been chosen for tasks performed by the provider or customers. This has necessitated a change of title to "common inspection manual". This choice of terms is also in line with terms used by the JAA.

This said, the principles behind the manual are the same as used for carrying out audits with the necessary changes needed to support the task of the Authority. One example of such adjustment is a stronger emphasis on corrective/preventive action follow-up and monitoring.

The manual is generic so that the principles laid down may be used for managing, planning, executing and following-up of inspections toward all types of providers, aerodromes included.

It is assumed that supplementary guidance material may be developed by the relevant Authorities as necessary.

DEFINITIONS

Audit: A systematic and independent examination carried out by the provider, a third party or by customers to determine whether infrastructure, systems, products or services comply with regulatory or other applicable standards.

Authority: National agency responsible for safety regulation and oversight of the aviation system

Inspection: A systematic examination carried out by the Authority to determine whether the providers infrastructure, systems, products or services comply with regulatory, or other applicable standards including the stated safety management system of the provider.

Provider: Organisation providing a product or service to aviation and which is accountable to the Authority.

AUTHORITY'S MANAGEMENT RESPONSIBILITIES

The Authority responsible for safety oversight should establish a capability to provide overall management of the entire inspection process.

This includes, but is not necessarily limited to the following:

- a) Determine the standards to inspect against.
- b) Develop capabilities to enable them to inspect effectively against such standards.
- c) Formulate the policy on types of inspections, including core and themed areas.
- d) Establish procedures for planning and scheduling the programme of inspections.
- e) Selecting inspectors and lead inspectors for particular assignments in order to ensure that the skills brought to each assignment are appropriate.
- f) Formalise inspection report formats.
- g) Establish boundaries of lead inspector authority
- h) Establish procedures to monitor corrective/preventive action follow-up
- i) Establish policy and procedures in case of major non-conformities.**
- j) Produce a formal and structured training programme for inspectors.
- k) Regularly assess the training needs of inspectors and take appropriate action to maintain and improve inspection skills.
- l) Establish a method of continuously improving the inspection programme.**

INSPECTION OBJECTIVES

Inspections are normally designed for one or more of the following purposes:

- a) To determine the conformity or degree of nonconformity of the provider's infrastructure, system, process, product or service with specified requirements.
- b) To determine the effectiveness of the management system in meeting specified objectives.
- c) To determine that the provider has identified areas and degrees of risk and has managed those effectively.
- d) To evaluate the competence and performance of those accountable for safety.
- e) To meet regulatory obligations.

Inspections are generally initiated for one of the following purposes:

- a) To determine whether initial compliance with regulatory requirements exists
- b) To determine whether continued compliance with regulatory requirements is ensured by the provider.
- c) To follow up the necessary corrective and preventive actions.

These inspections may be programmed (routine), or ad hoc for example prompted by significant changes in the provider's infrastructure, system, process, product or service, or by a need to follow up corrective/preventive action.

ROLES AND RESPONSIBILITIES

The Authority

- a) Determines the need, purpose and general scope of the inspection and initiates the process.
- b) Defines the requirements of each inspection assignment, including the required inspector qualification.
- c) Receives the inspection report and transmits it to the provider.
- d) Approves (or disapproves) the provider's plan for corrective/preventive action follow-up, if necessary determines what immediate action is to be taken and informs the provider's management of it, cfr item 6.
- e) Monitors that decided follow-up action is complied with.

NOTE : When defining the required inspector qualification for a specific task, the following items should be taken into account:

- The type of standard against which the audit is to be conducted.
- The type of service or product and its associated regulatory requirements.
- The need for professional qualification or technical expertise in a particular discipline.
- The absence of any real or perceived conflict of interest.
- Other relevant factors.

In addition the following items can be considered when selecting the lead inspector.

- The size and composition of the inspection team.
- The need for skill in leading and managing the team.
- The ability to make effective use of the skills of the various inspection team members.
- The personal skills needed to deal with a particular provider.
- The required language skills.

The inspection team

1. General

Whether an inspection is carried out by a team or by an individual, a lead inspector should be placed in overall charge.

Depending upon the circumstances, the inspection team may include experts with specialised background, inspector trainees or observers who are acceptable to the Authority, the provider and the lead inspector.

2. Responsibilities

The lead inspector is ultimately responsible for all phases of the inspection. The lead inspector should be given authority to make final decisions regarding the conduct of the inspection and any inspection observations.

The lead inspector's responsibilities should, in addition to inspector's responsibilities cover:

- a) Assisting with the selection of the inspection team.
- b) Preparation of the inspection plan.
- c) Communicating and clarifying inspection requirements to the inspection team.
- d) Communicating the inspection plan to the provider.
- e) Representing the inspection team with the provider's management.
- f) The formulation of the conclusions and non-conformities of the inspection.
- g) The assessment of the level of the found non-conformities.
- h) Submitting the inspection report according to the Authority's procedure.
- i) Ensuring that the inspection is carried out with due regard to ethical standards
- j) Taking or recommending action to the Authority, in accordance with the authority boundaries of the lead inspector, any licensing action that is considered necessary.

Inspectors are responsible for:

- a) Complying with the applicable inspection requirements.
- b) Communicating and clarifying inspection requirements.
- c) Planning and carrying out assigned responsibilities effectively and efficiently documenting the observations.
- d) Reporting the inspection results to the lead inspector.
- e) Co-operating with and supporting the lead inspector.

3. Activities

The lead inspector should:

- a) Plan the inspection.
- b) Ensure that the provider is notified of the inspection

-
- c) Prepare working documents and brief the inspection team.
 - d) Report critical non-conformities.
 - e) Report any major obstacles encountered in performing the inspection.
 - f) Report on the inspection results clearly, conclusively and without undue delay.
 - g) Be accountable for any action taken by the audit team

Inspectors should:

- a) Remain within the inspection scope.
- b) Exercise objectivity.
- c) Collect and analyse evidence to support claims that is relevant and sufficient to define non-conformities and to develop conclusions regarding the inspected system.
- d) Remain alert to any indications (*including body language*) of evidence that *may* influence the inspection results and possibly require more extensive inspection.

The provider (included here for completeness)

The provider's management should

- a) Inform relevant employees about the objectives and scope of the inspection.
- b) Make available members of senior management with safety accountabilities during the inspection.
- c) Appoint members of staff to accompany members of the inspection team when required.
- d) Provide all resources needed for the inspection team in order to ensure an effective and efficient process.
- e) Co-operate with the inspectors to permit the inspection objectives to be achieved.
- f) *On the basis of the inspection report, develop a plan for corrective and preventive action for approval by the authority.***

Note: It is the duty of the Authority to make the provider aware of his responsibilities.

INSPECTING

Initiating the inspection

1. General

The content of para 5.1.2, inspection scope and 5.1.3 inspection frequency could be handled both on a policy basis or an individual basis. One solution is to develop a policy and to make adjustments on an individual basis and also have the option to handle special cases on a fully individual basis.

Refer also to chapter three, inspection objectives.

2. Inspection scope

The Authority makes the final decision on which system elements, physical objects and organisational elements are to be inspected within a specified time frame. (This should be done with the assistance of the lead inspector).

The scope and depth should be designed to meet the Authority's specific information needs, and special consideration should be given if the inspection is performed prior to the grant, renewal or extension (in scope) of the licence.

The standards or documents with which the provider's infrastructure, management system or other aspect is required to comply with are specified by the Authority .

NOTES:

- a) During the inspection, based on observations made, there might be a need to inspect against other documents.
- b) The resources committed to the inspection should be sufficient to meet its intended scope and depth.

3. Inspection frequency and timing

The need to perform an inspection is determined by the Authority, taking account of specified or regulatory requirements and any other pertinent factors. Significant changes in infrastructure, management, organisation, policy, processes (techniques or technologies) that could affect safety, or changes to the management system itself and the results of previous inspections, are

typical of the circumstances to be considered when deciding inspection frequency.

Inspections to determine initial compliance with regulatory requirements should be performed prior to the grant or extension (in scope) of a licence.

Inspections to determine continued compliance with regulatory requirements should, unless indications of non-compliance are received, be performed routinely at intervals determined by the Authority.

When determining the interval and timing, consideration should be given to the complexity of the provider, its management system and its traffic situation, particularly changes.

Another consideration is the level of confidence the Authority has in the provider's competence, possibly as a result of safety concerns or accidents/incidents.

Preparing the inspection

1. Review of the provider's documentation.

As a basis for planning the inspection, the lead inspector *should request* and review for adequacy the provider's safety assurance documentation, and any other documentation and records found necessary, such as internal audit reports, manuals, risk analysis, safety data etc.

Former inspection reports with follow-up action should also be reviewed.

2. Inspection plan

Based on the defined depth and scope of the inspection and taking into account the results the review of the provider's documentation and records, the lead inspector should prepare an inspection plan.

The inspection plan should be approved by the Authority and communicated to the inspection team carefully and in detail, and to the provider to the extent deemed necessary for an effective and efficient execution of the inspection.

The plan should be designed to be flexible in order to permit changes in emphasis based on information gathered during the inspection, and to permit flexible use of resources.

The plan should include at least the following:

-
- a) The inspection objectives and scope.
 - b) Identification of the organisational elements to be inspected.
 - c) Identification of all reference documents that the inspection will be carried out against (such as the applicable regulations, provider's documentation etc).
 - d) Identification of inspection team members.
 - e) The date and place where the inspection is to be conducted.
 - f) The expected time and duration for each major inspection activity, including meetings with key personnel.
 - g) The schedule of meetings to be held with aerodrome management.
 - h) Inspection report distribution and expected date of issue.

If the provider objects to any provisions in the inspection plan, such objections should immediately be made known to the lead inspector. They should be resolved between the lead inspector and the provider and, if necessary, the Authority before executing the inspection.

3. Inspection team assignment

Each inspector should be assigned specific tasks or organisational elements to inspect - such assignments should be made by the lead inspector in consultation with the inspectors concerned.

4. Working documents

The internal documents and forms required to facilitate the inspector's investigations, and to document and report results, may include:

- a) Check lists, with attention points or questions to be asked (normally prepared by the inspector assigned to inspect that specific element).
- b) Forms for reporting inspection observations.
- c) Forms for documenting supporting evidence for conclusions reached by the inspectors.
- d) Former audit and inspection reports.
- e) Results of the performed document evaluation (if applicable!)

Working documents should be designed so that they do not restrict additional inspection activities or investigations which may become necessary as a result of information gathered during the inspection.

Executing the inspection

1. Opening meeting with the provider's management.

The purpose of the opening meeting is to:

- a) Introduce the members of the inspection team.
- b) Become acquainted with the people who have the major safety accountabilities.
- c) Review the scope and objective of the inspection.
- d) Provide a short summary of the methods and procedures to be used to conduct the inspection.
- e) Establish the official communication links between the inspection team and the provider organisation.
- f) Confirm that the resources and facilities needed by the inspection team are available.
- g) Confirm the time and place for the closing meeting and any interim meetings of the inspection team and the senior management of the aerodrome.
- h) Clarify any unclear details of the inspection plan.

2. Examination

Fact finding

Factual information should be collected through interviews, examination of documents and records and observations of activities and conditions of infrastructure in the areas of concern. Clues suggesting non-conformities should be noted if they seem significant, even though not covered by the scope of the inspection, and should be investigated. Information gathered through interviews should be tested by acquiring the same information from other independent sources, such as additional interviews, physical observations, measurements and records.

During the inspection the lead inspector has to organise periodical meetings with the team members to evaluate the interim results. Based in this information the lead inspector may make changes to the inspectors' work assignments, and to the inspection plan if this is necessary to ensure the optimal achievement of the inspection objectives.

If the inspection objectives appear to become unattainable, the lead inspector should report the reason to his superior and the provider's management.

Observations

All observations should be documented. When the fact finding phase is complete, the inspection team should review all of their observations to determine which are to be reported as non-conformities. The inspection team should ensure that these are documented in a clear, concise manner and are supported by evidence. Non-conformities should be identified in terms of the specific requirements of the standard or other related document against which the inspection has been conducted. Observations should be reviewed, analyzed and carefully formulated by the lead inspector. All relevant observations should be presented during the closing meeting with the provider's management and should be acknowledged by the provider's management.

Closing meeting with provider's management

At the end of the inspection, prior to preparing the inspection report, the inspection team should hold a meeting with the provider's senior management and those responsible for the organisational elements concerned.

The main purpose of the meeting is to present observations, especially non-conformities, to the senior management in such a manner that they clearly understand the result of the inspection.

The lead inspector should present the inspection team's conclusions regarding the safety management system's effectiveness in ensuring that objectives are being met (if applicable).

The lead inspector should present observations, taking into account their perceived significance.

The lead inspector shall also use this meeting to inform the provider about any need for corrective and preventive action, without being inappropriately specific or prescriptive about the detail of the action; that is for the provider to determine and seek agreement as necessary with the Authority on any action plan and time-scale referring to the found non-conformities and discrepancies. Information shall also be given about final reporting and monitoring by the Authority.

Inspection report

1. Report preparation

The inspection report is prepared under the direction of the lead inspector, who is responsible for its accuracy and completeness.

2. Report content

The inspection report should faithfully reflect both the tone and conduct of the inspection. It should be dated and signed by the lead inspector. It should at least contain the following items as applicable:

- a) Identification of the inspection report.
- b) Identification of the organisation inspected.
- c) Inspection dates.
- d) Identification of the provider's representatives
- e) Identification of the inspection team members.
- f) The scope and objectives of the inspection.
- g) Identification of the reference documents against which the inspection was conducted.
- h) Identification of the organisational elements concerned.
- i) All subjects verified, reference and facts pertaining thereto.
- j) Observations.
- k) Non-conformities.
- l) The inspection team's judgement of the extent of the provider's compliance with the applicable standards.
- m) The inspection team's judgement of the safety management system's ability to achieve defined safety objectives;
- n) The inspection report distribution list.

Any communication made between the closing meeting and the issue of the report should be made by the lead inspector.

3. Report distribution

The inspection report should be sent by the Authority to the provider's senior management.

The report may be accompanied by requirements for initial follow-up action, cfr para 6.

If it cannot be issued within an agreed time period, the reasons for delay should be given to the provider's management and a revised issue date established.

*CORRECTIVE/PREVENTIVE ACTION
FOLLOW-UP*

The provider's management should be responsible for determining and initiating corrective/preventive actions, primarily needed to eliminate possible causes and to prevent recurrence of similar non-conformities in the future and secondarily to correct the found non-conformity or discrepancy, or make a safety case for a variation to the requirements..

The provider's management should be required to submit a plan, including a schedule for corrective/preventive actions within a time-frame specified by the Authority.

This plan should, if satisfactory, be approved by, and follow-up should be monitored by the Authority.

If the plan is not satisfactory, the Authority may be required to specify changes to it.

If, during the inspection, there is found a nonconformity which has a direct and negative influence on safety, the lead inspector should, according to laid down policy or in consultation with his superior, order immediate corrective or temporary actions.

COMPETENCE OF PERSONNEL

1. General :

It is assumed that personnel employed by the Authority have general basic and professional education. The following paragraphs only focus on additional competence in relation to inspecting and the Authority's responsibility to maintain and if possible improve the competence of its personnel.

2. Training

Inspector candidates should have undergone training to the extent necessary to ensure their competence in the skills required for carrying out inspections, and lead inspectors also for managing inspections. Training in the following areas should be regarded as particularly relevant:

- a) Knowledge and understanding of the standards against which inspections may be performed.
- b) Assessment techniques of examining, questioning, evaluating and reporting.
- c) Additional leadership skills required for managing an inspection, such as planning organising, communicating and directing.
- d) Knowledge of hazard identification and risk analysis.
- e) Knowledge of safety and quality management systems.

Such competency should be demonstrated through written or oral examinations, or other acceptable means.

3. Experience

Inspector candidates should have some full-time appropriate practical workplace experience (not including training), preferably some of which should have been in auditing activities.

Prior to assuming responsibility for performing inspections as an inspector, the candidates should have gained experience in the entire inspection process as described above. This experience should have been gained by participating in a minimum of three inspections, for a total of at least 15 days, including proper preparation, documentation review, actual inspection activities and inspection reporting.

Lead inspector candidates should have acted as qualified inspectors in at least three complete inspections performed in accordance with the recommendations in this manual before being evaluated for lead inspector duties.

All relevant experience should be reasonably current.

4. Personal attributes

Inspector candidates should be open-minded, objective and mature; possess sound judgement, analytical skills and tenacity; have the ability to perceive situations in a realistic way, to understand complex operations from a broad perspective, and to understand the role of individual units within the overall organisation.

The inspector should be able to apply these attributes in order to:

- a) Obtain and assess objective evidence fairly.
- b) Remain true to the purpose of the inspection without fear or favour.
- c) Evaluate constantly the effects of inspection observations and personal interactions during an inspection.
- d) Treat concerned personnel in a way that will best achieve the inspection purpose.
- e) Perform the inspection process without deviating due to distractions.
- f) Commit full attention and support to the inspection process.
- g) React effectively in stressful situations.
- h) Arrive at generally acceptable conclusions based on objective inspection observations.
- i) Have the resolve to resist pressure to change a conclusion if the challenge is not reasonable and valid.

5. Leadership skills

Lead inspector candidates should demonstrate through suitable means their knowledge of, and capability of using, the necessary leadership and communication skills required for planning and execution of a complete inspection, managing a team and, for an accurate reflection of the inspection results by means of the written word and the spoken one.

6. Maintenance and improvement of competence

Inspectors should maintain their competence by:

- a) Ensuring that their knowledge of the standards they are supposed to inspect against is current.
- b) Ensuring that their knowledge of inspection procedures and methods is current.
- c) Participating in refresher training where necessary.

The Authority should:

- a) Continually evaluate the performance of their inspectors, either through observation of inspections or *by other means*. Such information should be used to improve inspector selection and performance, and to identify unsuitable performance.
- b) Establish methods to measure and compare inspector performance to achieve consistency among inspectors. Such methods may include:
- c)
 - Inspector training workshops.
 - Inspector performance comparison.
 - Reviews of inspection reports.
 - Performance appraisals.
 - Rotation of inspectors between inspection teams.

These measures should ensure that the inspector continues to meet all the requirements of this manual. Inspector reviews should take into account any additional information, positive or negative, developed subsequent to the previous review.

JOINT INSPECTIONS

There may be instances when several organisations co-operate to inspect jointly a provider. Where this is the case, agreement should be reached on the specific responsibilities of each organisation, particularly in regard to lead inspector authority, interfaces with the provider, methods of operation and distribution of inspection results before the inspection commences

Note: Joint inspections may be at a national or international level.

CODE OF ETHICS

Inspection programme management should consider the need to include a code of ethics into the operation and management of the inspection programmes.

MODEL AUDIT REPORT TEMPLATE

XXXXXX AERODROME

XX-XX-XXXX

**PREPARED BY
XXXX XXXXXX**

General

Delete text frames when used! Examples of wording can be used as they are or changed according to the findings. Wording is given in the examples as true statements that need not to be changed if they are according to the safety/quality system requirements.

This template can be used either for internal audits performed by an auditing function or an Aviation Safety Authority when establishing the operational safety status of the Aerodrome.

REPORT FROM AUDIT OF XXXX AERODROME XX-XX-200X

The main purpose of this Audit has been to establish the operational status of the Aerodrome in relation to design and operational requirements. Inspections of the Manoeuvring Area and Ramp Area were performed including facilities and equipment.

The report comprises two parts:

- Fact-finding
- Safety Assessment

The Fact-finding part displays compliance or non-compliance covering relevant audit areas. The Fact-finding result will form a basis for Safety Assessment of the design and operational status of the Aerodrome.

The Audit was performed against Standards and Recommended Practices given in the ICAO Annex 14 and this does not take into account the differences filed to ICAO. The operational system of the Aerodrome was audited against contemporary Safety Management-/Quality System Requirements. It was decided to perform the Audit against requirements for Reference Code XX.

The Fact-finding part has been communicated to the Aerodrome Management representatives and there was no objection to the findings.

The risk assessment of the non-compliance's is based on a Risk Assessment Matrix based JAR 25 AMJ 1309 adapted to aerodrome operations. Further explanation and clarification can be found in the guidelines to Safety Management Requirements. The following basis for assessment and classification of non-compliance's is used for every area audited where observed hazards can cause accidents, which are classified according to consequence and probability:

Catastrophic	Review	Unacceptable	Unacceptable	Unacceptable	Unacceptable
Hazardous	Review	Review	Unacceptable	Unacceptable	Unacceptable
Major	Acceptable	Review	Review	Review	Review
Minor	Acceptable	Acceptable	Acceptable	Acceptable	Review
	Extremely improbable	Extremely remote	<i>Remote</i>	Reasonably probable	Frequent

Guidance

The Audit Team shall assess the variations to International and national Aviation Safety Standards as required. The assessment should however be based on the following Safety Objective:

An Aerodrome organisation with its facilities, equipment and systems shall be designed and operated so that for any hazard the combination of the probability of occurrence and the seriousness of the consequences of the hazard occurring must not result in a level of risk that is unacceptable.

Conclusive Evaluation:

The Aerodrome has been audited against state of the art requirements for Safety Management Systems. The Physical Characteristics and the Operational Status of the Aerodrome has been found to be xxxx with regard to the number and severity of many of the non-compliances in comparison to the requirements in Annex 14.

Compared to international standards and even for domestic use which should not constitute a difference XXXXX Airport has to decide whether it should or not be kept as an international aerodrome based on the fact that the number and severity of the non-compliances.

It must be said to the advantage of the Aerodrome although the non-compliances constitute a fairly large part of requirements given in Annex 14, is functioning with all its systems including the navigational aids.

Guidance

State as applicable the administrative data under paragraphs 1--1.4.

FACT FINDING

1. General

This audit has been performed on request from the XXXXX to establish the status of the Aerodrome mainly with regard to the requirements in the ICAO Annex 14 and state of the art quality system requirements.

1.1 Owner and Operator

The government operates the Aerodrome.

1.2 Address, telephone and facsimile

1.3 Aerodrome Approval with Operations Specifications

Not applicable.

1.4 Miscellaneous

Guidance

The text under 2.1 needs not to be changed since it is referring to the comprehensive attachment on Annex 14 requirements.

2. PHYSICAL CHARACTERISTICS AND SPECIFIC AUDIT OBJECTS

2.1 Aerodrome Data

The database displaying facts of physical characteristics, facilities and equipment relevant to the assigned Aerodrome reference code can be found in Annex 14 Aerodrome Basic Data, attachment 1.

2.2 Exemptions

Guidance

List exemptions from requirements given by the national safety authority under this paragraph.

2.3 Agreements

Guidance

List contractors to the aerodrome under this paragraph.

Documented "Performance agreements" have been established between the aerodrome and contractors as follows:

1).....

2.4 Specific audit objects

Guidance

Describe if any specific of items/objects are subject to "on site inspection" or if the audit has any specific thematic inkling.

3. MANAGEMENT AND OPERATIONS SYSTEM

3.1 Management function

Guidance

Describe in overall terms the organisation of the aerodrome with its management function, departments and divisions. Continue by checking if the following statements are true. In some instances it could be beneficial to divide the audit results from management and the aerodrome entities into separate chapters in the report. If so, copy paragraphs 3.3-3.7 for each entity audited. The audit has a main purpose on one hand to establish that systems are fit for operation and on the other hand to ensure that the prescriptive requirements in ICAO Annex 14 Volume 1 are there.

The Audit has established that processes and procedures are documented and that existing documented processes within each area are in compliance with requirements.

The Aerodrome safety management system includes the following:

1. A statement that the highest priority is attached to safety in relation to all business activities.
2. A business objective for safety is given that minimises the Aerodrome's contribution to Aviation accident risk to as low as reasonably practicable.
3. There is a commitment by the organisation to adopt an explicit, pro-active approach to safety management.
4. Statements of safety-related responsibilities have been documented throughout the organisations manual system.

5. Requirement for compliance with all appropriate safety standards has been stated.
6. That the safety assurance processes used by its external suppliers comply with the Aerodrome's safety management standards and requirements.

3.2 The Aerodrome manual

The aerodrome documentation i.e. the Aerodrome Manual has administrative data displaying ability to trace operational belonging, process title, issuing unit, editions, approvals, date and number of pages. Procedures are given for working assignments and contain pertinent data, instructions and directives.

3.3 References, purpose and scope

Guidance

In order to have the ability to trace requirements and latest editions of policies and so forth it is necessary to give reference to national rules and regulations, internal directives, policies e.t.c. Mainly when scrutinizing procedures/routines it is necessary to establish interfaces between different procedures in the production chain. It is therefore necessary to receive evidence that each statement from paragraph 3.3 to 3.7 below is valid.

- a) References are given in the Aerodrome Manual to governing requirements for the process/procedures.
- b) The purpose and scope for the processes/procedures have been clearly defined.

3.4 Safety Standards

Guidance, Questions! *Are checklists or references to training documents and manuals available? Is the expected performance of men and machines described? What must be measured and forwarded in the organisation?*

Is the working assignment described to a satisfying degree? Are references made to training documents? Are there dependencies in the interaction between others in the organisation? Has each procedure been safety assessed from risk management viewpoint.

- a) The standards to be monitored have been quantified by management and are documented.

- b) Operational procedures and routines including risk management in the procedures have been described.

3.5 Competency

Guidance, Questions! *Is individual training planning in place? Are training documents and manuals available? Are refresher training sessions planned? Is there a listing made over competencies available to the organisation?*

The staff has the required competency for their working assignments.

3.6 Responsibility and authority

Guidance, Questions! *Has Top Management delegated responsibility and at the same time given authority to decide? Is there a specific delegation order in place?*

Responsibility and authority are clearly defined and delegation of authority has been stated.

3.7 Monitoring procedures

Guidance, The monitoring procedures can be if preferred described centrally in the aerodrome Manual.

Systematic production monitoring in relation to performance and deviations is in place.

4. SAFETY ASSESSMENT

4.1 List of Non-compliances

Guidance

To accomplish an abbreviated but comprehensive list of non-compliances, list all deviations, variations and identified hazards having in mind that the safety assessment is made later under the safety assessment paragraph.

- 1.
- 2.
- 3.
- 4.

Analysis and severity of risk of the non-compliances

Guidance on risk analysis 1

Each deviation from, variation to standard or identified hazard must be risk assessed for its risk contribution to aircraft. Assess the seriousness of the consequences of the hazard occurring.

The consequence of each identified hazard occurring should be assessed for its effect on aircraft safety. The table below provides the safety criticality classification scheme (JAR 25) that systems on aerodromes shall be assessed against.

Consider the chances of it happening

The probability of occurrence can be defined in both qualitative and quantitative terms.

Numerical (quantitative) methods may be required to further support the analysis of systems, which have the potential to produce catastrophic or hazardous results. For lower levels of classification of risk, qualitative methods will often produce valid and acceptable results.

It will be noted that many of the hazards identified are acceptably mitigated by the application of existing Standards, regulations, procedures or practices.

The figure below illustrates the relationship between qualitative and quantitative probability of occurrence.

Determine whether the consequent risk is acceptable and within the organisation's acceptable safety performance criteria?

Once the severity of a hazard has been assessed and the probability of it arising has been estimated, a judgement can be made on whether the consequent risk is acceptable or not and whether it can be further reduced at reasonable cost. Common sense dictates that a major consequence of an undesired event with a high probability of occurrence is unacceptable, however it may be tolerable if the probability of occurrence is very low although it may be undesirable.

The process of judging tolerability of risks and the results can be presented in tabular form as illustrated below.

Actions to reduce the severity of the hazard or the probability of it arising to reduce the risk to a tolerable level (managing risks)

Where the table indicates that the risk is currently unacceptable, action must be taken to reduce the probability of occurrence and/or the severity of the hazard. If neither mitigating measure is available, the system clearly does not satisfy the safety objectives. In any process where judgement is applied there will be situations where the tolerability is not clearly defined. An issue that falls into this area of uncertainty is likely to require, before implementation, the endorsement of the individual ultimately accountable for safety within the organisation.

Guidance on risk analysis 2

Safety Criticality Classification (JAR 25) that results in one or more of the following effects;

Catastrophic	Hazardous	Major	Minor
Loss of the Aircraft. Multiple Fatalities	A large reduction in safety margins. Physical distress or a workload such that the flight crew cannot be relied upon to perform their tasks accurately or completely. Serious injury or death of a relatively small proportion of the occupants	A significant reduction in safety margins. A reduction in the ability of the flight crew to cope with adverse conditions as a result of increase in workload or as a result of conditions impairing their efficiency. Injury to occupants	Nuisance. Operating Limitations. Use of alternative or Emergency procedures

Risk Assessment Matrix

Catastrophic	Review	Unacceptable	Unacceptable	Unacceptable	Unacceptable
Hazardous	Review	Review	Unacceptable	Unacceptable	Unacceptable
Major	Acceptable	Review	Review	Review	Review
Minor	Acceptable	Acceptable	Acceptable	Acceptable	Review
	Extremely improbable	Extremely remote	Remote	Reasonably probable	Frequent

Probability of occurrence definitions

Probability of Occurrence classification	Extremely improbable	Extremely remote	Remote	Reasonably probable	Frequent
Qualitative definition	Should virtually never occur in the whole fleet life.	Unlikely to occur when considering several systems of the same type, but nevertheless, has to be considered as being possible	Unlikely to occur during total operational life of each system but may occur several times when considering several systems of the same type	May occur once or during total operational life of single system	May occur once or several times during operational life
Quantitative definition	< 10 ⁻⁹ per flight hour	10 ⁻⁷ to 10 ⁻⁹ per flight hour	10 ⁻⁵ to 10 ⁻⁷ per flight hour	10 ⁻³ to 10 ⁻⁵ per flight hour	10 ⁻³ per flight hour

The table above is reproduced from JAR 25 and is specifically related to the probability of an event occurring during flight. It is considered that the definitions are equally valid for aircraft movements at an aerodrome but with probabilities decreased as stated in the Safety Objectives in paragraph 3. must be indicated in the safety assurance document.

It is worth noting that either Quantitative or Qualitative methods, as tools of analysis, can achieve more than a demonstration of figures or reasoning based

on assumptions. Clearly both ways are indicative and the assessments must be acceptable to the National Aviation Safety Authority.

Example

Erroneous Aerodrome data

Erroneous data in the publications to Air Operators can contribute to accidents and incidents. It depends of course on what kind of data that is erroneous. For the sake of the argument let us suggest that threshold elevation is too low on one runway end. In Low Visibility Conditions under darkness the reaction time for the flying pilot can be very short. This can in succession lead to higher G-loads either due to hard landing or manoeuvring with higher G-loads on final approach to that runway!

The **probability** of occurrence can be assumed to be **remote** which is in the qualitative definition described as "May occur once or during total operational life of a single system"

The **severity** of the hazard of such an occurrence can mean significant reduction in safety margins, a reduction in the ability of the flight crew to cope with adverse conditions as a result of increase in workload or as a result of conditions impairing their efficiency or injury to occupants which is assumed to be **hazardous**

The combination of the above probability and severity indicates that this is **not acceptable** and that the risk has to be eliminated or mitigated of some sort.

When deciding the probability and severity it is advisable to engage concerned aerodrome staff, Air traffic management staff and representatives from the pilot side to achieve good results. Empirical data can be made available through national or international databases to assist in the safety assessment of identified safety hazards.

In terms of probability and the risk assessment matrix any risk with that is deemed more probable than "Frequent" is not acceptable and likewise at the other end any risk that is less probable than "Extremely improbable" is acceptable.

XXXX XXXXX, Aerodrome Safety Inspector

Attachment 1

AERODROME BASIC DATA, ANNEX 14

Requirement fulfilled

1.1.1 Aerodrome Basic data are referred to Reference Code 2C

RWY 02-20 referred to as the Main Runway
(N/A=not applicable, Yes=compliant with SARPs)

1. Aerodrome Data

1. Aerodrome reference point, established, deg-min-sec	Yes No N/A
2. Aerodrome and runway elevations,	Yes No N/A
3. Aerodrome reference temperature, determined	Yes No N/A
4. Aerodrome dimensions and related information, published	Yes No N/A
5. <i>Runway - true bearing</i>	Yes No N/A
6. <i>Strip - RESA, SWY, length</i>	Yes No N/A
7. CWY - length	Yes No N/A
8. <i>TWY- designation, width, surface type</i>	Yes No N/A
9. <i>Apron - surface type, A/C stands</i>	Yes No N/A
10. <i>Manoeuvring Area, established</i>	Yes No N/A
11. <i>Visual aids - approach</i>	Yes No N/A
12. <i>Marking of RWYs, TWYs, Aprons</i>	Yes No N/A
13. <i>Signs, stopbars, docking systems</i>	Yes No N/A
14. VOR AD checkpoint/frequency	Yes No N/A
15. Standard taxi routes, designation/location	Yes No N/A
16. <i>ILS/MLS, position</i>	Yes No N/A
17. THR, co-ordinates, deg-min-sec	Yes No N/A
18. A/C stands, deg-min-sec	Yes No N/A
19. Obstacles in approach and take-off area	Yes No N/A
20. PCN	Yes No N/A
21. ACL	Yes No N/A
22. Declared distances, TORA, TODA, ASDA, LDA	Yes No N/A
23. Condition of movement area and related facilities	
24. <i>Construction or maintenance work</i>	Yes No N/A
25. <i>Rough or broken surfaces on RWY, TWY or Aprons</i>	Yes No N/A
26. <i>Snow, slush or ice on RWY, TWY or Aprons</i>	Yes No N/A
27. <i>Standing water on RWY, TWY or Aprons</i>	Yes No N/A
28. <i>Snow banks or drifts adjacent to RWY, TWY or Aprons</i>	Yes No N/A
29. <i>Anti- or De-icing fluids on RWY, TWY or Aprons</i>	Yes No N/A
30. <i>Temporary hazards</i>	Yes No N/A
31. <i>Failure or irregular operation of visual aids</i>	Yes No N/A
32. <i>Failure of normal or secondary power supply</i>	Yes No N/A

33. Wet friction values, determined	Yes No N/A
34. Disabled A/C removal services, at hand	Yes No N/A
35. Rescue and fire-fighting services, level of protection	Yes No N/A
36. Visual approach slope indicator systems, published	Yes No N/A
37. Co-ordination between AIS and AD, published	Yes No N/A

2. Physical characteristics

1. RWY orientation, 95%	Yes No N/A
2. Cross wind, >1500m/20kt, >1200m/13kt, < 1200m/10kt	Yes No N/A
3. Location of THR, normal	Yes No N/A
4. RWY length, adequate to traffic	Yes No N/A
5. Secondary RWY, available	Yes No N/A
6. SWY or CWY , available	Yes No N/A
7. RWY, width, Normal (Code 2, 30m actual is45m)	Yes No N/A
8. Parallel RWY, available	Yes No N/A
9. Parallel RWY, Minimum parallel distance adapted to traffic	Yes No N/A
10. Slopes on RWY	
11. <i>Longitudinal slopes, total (3-4-1%,1-2-%)</i>	Yes No N/A
12. <i>Slope portionally (3-1,5%, 4-1,25% and last ¼ slope 0,8%)</i>	Yes No N/A
13. <i>Consecutive slope changes (3-4 1,5%, 1-2 2%)</i>	Yes No N/A
14. <i>Vertical radius (4-30000m, 3-15000m, 1-2 7500m)</i>	Yes No N/A
15. <i>Sight distance (CDE-3m, B-2m, A-1,5m)</i>	Yes No N/A
16. <i>Distance between slope changes (4-30000m, 3-15000m, 1-2 5000m)</i>	Yes No N/A
17. <i>Transverse slopes (CDE-1,5%, A-B 2%)</i>	Yes No N/A
18. Strength of RWYs, adapted to critical ACN	Yes No N/A
19. RWY shoulders (DE 60m)	Yes No N/A
20. <i>Slopes on RWY shoulders (2,5%)</i>	Yes No N/A
21. RWY strips, instrument RWYs	Yes No N/A
22. <i>Strip length (234-60m, 30m non-instr)</i>	Yes No N/A
23. <i>Strip width (34-300m,12-150m)</i>	Yes No N/A
24. <i>Non-Instument RWY strips (3-4 150m, 2-80m, 1-30m)</i>	Yes No N/A
25. <i>Objects (120m,)</i>	Yes No N/A
26. <i>Strip grading and strengthening (34-75m, 12-80m)</i>	Yes No N/A
27. <i>Longitudinal slopes (4-1,5%, 3-1,75%, 12-2,%)</i>	Yes No N/A
28. <i>Transverse slopes (34-2,5%, 12-3%)</i>	Yes No N/A
29. RESA (90-240m, slope down 5%, transv +-5%)	Yes No N/A
30. CWY (width 150m, slope +1,25%, ditches !/2 span)	Yes No N/A
31. SWY (>0,8%+slope, change in vertical radius 10000m, strength)	Yes No N/A
32. Radio altimeter operating area (300m, slope change 2%/30m)	Yes No N/A

33. TWYs	
34. <i>Edge clearance (A-1,5m,B-2,25m, C-3-4,5m/18m A/C length)</i>	Yes No N/A
35. <i>TWY width A-7,5m, B-10,5m, C-15-18m, D-18-23m/wheelsp 9m, E-23m)</i>	Yes No N/A
36. <i>TWY curves and fillets</i>	Yes No N/A
37. <i>TWY separation distances</i>	Yes No N/A
38. <i>Longitudinal slopes (CDE-1,5%, AB-3%)</i>	Yes
39. <i>Longitudinal slope changes (CDE-3000m, AB-2500m)</i>	Yes No N/A
40. <i>Sight distance (CDE-3m/300m)</i>	Yes No N/A
41. <i>Transverse slopes (CDE-1,5%)</i>	Yes No N/A
42. <i>Strength adapted to ACN</i>	Yes No N/A
43. <i>Surface even and with good friction</i>	Yes No N/A
44. <i>Rapid exit TWYs (Turn radius 34-550m/93kmh)</i>	Yes No N/A
45. <i>Fillets and intersection angles (25-40°)</i>	Yes No N/A
46. <i>TWY shoulders (E-44m, D-38m, C-25m)</i>	Yes No N/A
47. <i>TWY strips (table 3.1)</i>	Yes No N/A
48. <i>TWY strip grading (E-22m, D-19m,BC-12,5m)</i>	Yes No N/A
49. <i>TWY strip slopes (CDE-2,5%)</i>	Yes No N/A
50. <i>Holding bays, TWY holding positions (Table 3.2)</i>	Yes No N/A
51. Aprons	
52. Slope (1%)	Yes No N/A
53. Clearance distance (DE-7,5m, C-4,5m, AB-3m)	Yes No N/A
54. Isolated A/C parking position	Yes No N/A

3. Obstacle restriction and removal

1. Obstacle limitation surfaces (Table 4.1)	Yes No N/A
2. <i>Conical surface, free</i>	Yes No N/A
3. <i>Horizontal surface, free</i>	Yes No N/A
4. <i>Approach surface, free</i>	Yes No N/A
5. <i>Transitional surface, free</i>	Yes No N/A
6. <i>Inner transitional surface, free</i>	Yes No N/A
7. <i>Balked landing surface, free</i>	Yes No N/A
8. <i>Take-off climb surface, free</i>	Yes No N/A

4. Visual aids for navigation

1. Wind direction indicators, installed	Yes No N/A
2. Landing direction indicator, installed	Yes No N/A
3. Signal area	Yes No N/A
4. Markings (applied)	
5. <i>RWYs (Loc. and charact. of THR, RWY #, TDZ, Aim. Pt, CL, Edge)</i>	Yes No N/A

6. TWYs (Location and characteristics of CL , holding pos. Cat I-III)	Yes No N/A
7. Aprons (Loc. and charact. of lead-in and out turn and stand markings)	Yes No N/A
8. Apron safety lines	Yes No N/A
9. TWY intersection marking (transv. broken single line)	Yes No N/A
10.VOR Aerodrome check-point marking(Location and characteristics)	Yes No N/A
11.Road holding position markings(Traffic Act)	Yes No N/A
12.Information marking on pavement(If not possible to install signs)	Yes No N/A

4.1 Lights

1. Danger and confusion to A/C, eliminated	Yes No N/A
2. Confusion to mariners	Yes No N/A
3. Frangibility on light fixtures and structures, applied	Yes No N/A
4. Strength of surface mounted lights, applied	Yes No N/A
5. Light intensity and control, available and functioning	Yes No N/A
6. Emergency lighting	Yes No N/A
7. Aeronautical beacons (AD/ID, loc. and charact.)	Yes No N/A
8. Approach lighting systems	
9. Simple approach (Location and characteristics)	Yes No N/A
10.Precision approach Cat I-III (Location and characteristics)	Yes No N/A
11.PAPI (Location and characteristics)	Yes No N/A
12.Circling guidance lights (Location and characteristics)	Yes No N/A
13.RWY lead-in lights (Location and characteristics)	Yes No N/A
14.RWY TRID (Location and characteristics)	Yes No N/A
15.RWY Edge lights(Location and characteristics)	Yes No N/A
16.RWY THR and wingbar lights (Location and characteristics)	Yes No N/A
17.RWY End lights (Location and characteristics)	Yes No N/A
18.RWY CL lights (Location and characteristics)	Yes No N/A
19.RWY TDZ lights (Location and characteristics)	Yes No N/A
20.SWY lights (Location and characteristics)	Yes No N/A
21.TWY CL lights (Location and characteristics)	Yes No N/A
22.TWY CL lights on Rapid exit TWYs (Location and characteristics)	Yes No N/A
23.TWY CL lights on other exit TWYs (Location and characteristics)	Yes No N/A
24.TWY Edge lights (Location and characteristics)	Yes No N/A
25.Stop bars (Location and characteristics)	Yes No N/A
26.TWY intersection lights (Location and characteristics)	Yes No N/A

27. RWY Guard lights (Location and characteristics)	Yes No N/A
28. Apron Floodlighting (Location and characteristics)	Yes No N/A
29. Visual docking guidance system (Location and characteristics)	Yes No N/A
30. A/C stand manoeuvring lights (Location and characteristics)	Yes No N/A
31. Road holding position lights (Location and characteristics)	Yes No N/A

4.2 Signs

1. Frangibility, applied	Yes No N/A
2. Mandatory instructions signs (Location and characteristics)	Yes No N/A
3. Information signs (Location and characteristics)	Yes No N/A
4. Direction signs (Location and characteristics)	Yes No N/A
5. Location signs (Location and characteristics)	Yes No N/A
6. VOR check point sign (Location and characteristics)	Yes No N/A
7. AD identification sign (Location and characteristics)	Yes No N/A
8. A/C stand identification signs (Location and characteristics)	Yes No N/A
9. Road holding position sign identification sign (Location and characteristics)	Yes No N/A

4.3 Visual aids for denoting obstacles

1. <i>Marking and lighting</i>	Yes No N/A
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4.4 Visual aids for denoting restricted use areas

1. Closed RWYs (Location and characteristics)	Yes No N/A
2. Non-load bearing surfaces (Location and characteristics)	Yes No N/A
3. Pre-THR area (Location and characteristics)	Yes No N/A
4. Unserviceable areas	Yes No N/A
5. Unserviceability lights, markers, cones, and marker boards	Yes No N/A

5. Equipment and installations

1. Secondary power supply (Sign, AD, Obst, Met, Sec, Flood lights)	Yes No N/A
2. Secondary power supply (Max switch over time)	Yes No N/A
3. Electrical systems (monitoring and not inadequate or misleading info)	Yes No N/A
4. Fencing (animals and unauthorised persons)	Yes No N/A
5. Security lighting	Yes No N/A
6. Airport design (security)	Yes No N/A
7. AD vehicle operations	Yes No N/A
8. SMGCS (A/C, vehicles, signs, lights and markings, RWY Guard Lights, stopbar/TWY CL illumination and suppression)	Yes No N/A
9. Detection of vehicles and A/C (Surface Movement Radar)	Yes No N/A

6. Emergency and other services

- | | | | |
|--|-----|----|-----|
| 1. A/D emergency planning | Yes | No | N/A |
| 2. Emergency Ops centre and command post | Yes | No | N/A |
| 3. Communication systems | Yes | No | N/A |
| 4. A/D emergency exercise | Yes | No | N/A |

6.1 Rescue and fire fighting

- | | | | |
|---|-----|----|-----|
| 1. Level of protection (<700 m/3 bus. mths, 99/2, 2000/1- cat below) | Yes | No | N/A |
| 2. A/D category adapted to traffic | Yes | No | N/A |
| 3. Extinguishing agents, enough (foam and complementary, capacity/discharge rate) | Yes | No | N/A |
| 4. Rescue equipment | Yes | No | N/A |
| 5. Response time | Yes | No | N/A |
| 6. Emergency access roads | Yes | No | N/A |
| 7. Rescue vehicles, numbers | Yes | No | N/A |
| 8. Fire stations | Yes | No | N/A |
| 9. Disabled A/C removal | Yes | No | N/A |

7. AD maintenance programme

- | | | | |
|--|-----|----|-----|
| 1. Pavements | Yes | No | N/A |
| 2. Facilities (Visual aids, fencing, drainage systems and buildings) | Yes | No | N/A |
| 3. Friction characteristics measurements (Wet RWY) | Yes | No | N/A |
| 4. FOD programme | Yes | No | N/A |
| 5. Winter season friction characteristics maintenance and measurements | Yes | No | N/A |
| 6. Visual aids maintenance | Yes | No | N/A |
| 7. Bird Hazard reduction | Yes | No | N/A |
| 8. Apron management service | Yes | No | N/A |
| 9. Ground servicing of A/C (Fuel fire, emergency evacuation exits) | Yes | No | N/A |

Appendix H. Safety Management Systems

General

All Safety Management Systems require that Safety be managed systematically and consistently through the elaboration and implementation of a Safety Management Policy and the accompanying organisation of the work including the clear assignment of responsibilities.



Figure 1.

What are the rules for runway safety?

Safety Management for Air Traffic Management (ATM) is governed by the ESARR 3 (use of Safety Management Systems by ATM Service Providers). Annex 11 describes the necessary Safety Management provisions and minimum safety management practices in Air Traffic Services (ATS).

Aerodrome operations, for example, runway maintenance, refuelling, apron management, are governed by the Annex 14 safety management provisions. Certification of aerodromes is based upon the Aerodrome Operator's Safety Management System as depicted in Figure 1, which shows a generic Safety Management System. As a complement to the Annex 14 objective based requirement on SMS, reference is made to the GASR Model Regulations found at the end of this document. Aircraft Operators have provisions for aerodrome assessment, before commencing flight operations, in their regulations (JAR OPS 1 & 3). Requirements for flight

operations to comprise aerodrome specific issues are found in the flight operations manual issued by the Aircraft Operator. Each State manages the sets of rules according to their local needs. Commonly the following scenarios exist in Europe.

1. Single Organisation

One operator is responsible for the aerodrome and its ATM services. The organisation will have to implement a Safety Management System compliant with ICAO Annex 11 and ESARR 3 for its ATS/ATM services and compliant with ICAO Annex 14 for its aerodrome operations. A single SMS covering both ATM and the aerodrome would be an advisable approach. The benefits are:

- Consistent with a gate-to-gate approach,
- Rationalisation of resources
- Facilitation of the implementation of safety management in small organisations like the one referred to,
- The potential benefits of addressing aviation safety as a whole.

A single SMS covering ATM and aerodrome operations could be recognised as an acceptable means of compliance to meet all the safety requirements and standards applicable if there is consistency between Annex 11, Annex 14 and ESARR 3. EUROCONTROL has produced as means of compliance a Safety Management Implementation Plan.

2. Two Organisations

The Air Navigation Service Provider is responsible for ATM services and the Aerodrome Operator is responsible for the aerodrome, runway, apron management etc.

When ATM services and aerodrome operations are provided by two different organisations, two separate SMS may be found, but not exclusively. The ATM safety regulator may consider the arrangements between both organisations acceptable for setting up a common SMS.

It should be noted that defining and allocating safety responsibilities is key in any SMS and may be complicated by working across two independent organisations. An appropriate definition and allocation of responsibilities requires a clearly established organisational framework. The same considerations apply to the definition, adoption and review of safety policies and safety objectives.

3. Other situations

Alternative scenarios for managing safety may arise from different owners of the management of things like the Apron, power supply and Nav aids etc.

Please note that, in accordance with Annex 11, Apron Management is not ATM.

RATIONALE:

1. The definition of "apron" explicitly excludes the "manoeuvring area"
2. The definition of "aerodrome traffic" concerns the traffic on the "manoeuvring area"
3. The aerodrome control service is defined as a service provided in regard with "aerodrome traffic"

Therefore, the management of the traffic in the apron is not part of the aerodrome control service. So it is not an ATM (or ATS) service. However, safety management has to be implemented in regard to Apron Management because it has to be covered by the SMS established for aerodrome operations in accordance with ICAO Annex 14. If apron management is provided by the same organisation that provides ATM services (TWR for example), then it can be considered as a "supporting service" under the managerial control of the ATM service-provider organisation. As a result, it would be covered by the SMS of the ATM provider (in accordance with ESARR 3).

Risk Analysis

An integral part of Safety Management is Risk Analysis. Each party involved in the flight operations process; Aerodrome Operators, Aircraft Operators and Air Navigation Service Providers, may contribute towards risks that could affect the aircraft operations. JAR 25/1309 and ESARR 4 can be used and adapted depending upon the area of operation that the risk analysis is focused on. Risk assessment matrices facilitate conclusions about what combination of probability of occurrence and seriousness of consequences may be accepted as tolerable levels of risk.

Different applications are in place to satisfy this common view according to the stated objective below.

An Aviation Community organisation with its facilities, equipment and systems shall be designed and operated so that for any risk the combination of probability of occurrence and seriousness of the consequences of the hazard occurring must not result in a level of risk that is unacceptable.

Risk Assessment and Mitigation in ATM is described in ESARR4 and further supported through the guidance material available.

AGA, AERODROMES AND GROUND AIDS

For aerodrome operators there are provisions written in ICAO Annex 14 about implementation of an SMS. ICAO has also issued a Manual on Aerodrome Certification that includes SMS, Doc. 9774. The GASR has approved Model regulations including guidelines on aerodrome safety assessment which they support with the Fact Based Resource Optimisation, FRO system (the FRO system paper is found at the end of this document).

OPS, AIRCRAFT OPERATIONS

For the Flight Operations side JAA has issued JAR OPS 1 and 3 containing Quality System requirements.

Reference material

ICAO Annex 11 section 2.26,

Annex 13 REPORTING OF RUNWAY INCURSIONS "in view of the importance of finding solutions to alleviate the problem of runway incursions, States be urged to report such occurrences in accordance with Annex 13." EANPG/44 Meeting (Paris, 2-5 December 2002).

ESARR3 Safety Management Systems in ATM

ESARR4 Risk Assessment and Mitigation in ATM

EUROCONTROL Safety Management Implementation Plan

JAR-OPS

GASR Proposal for model regulations

GASR Guidelines to Safety Assessment

GASR Aerodrome Audit Report Template

Useful Web site addresses

<http://www.eurocontrol.be/src/index.html>

http://www.eurocontrol.int/safety/GuidanceMaterials_SafetyPolicyImplementationGuide.htm

<http://www.jaa.nl>

FACT BASED RESOURCE OPTIMISATION, FRO-SYSTEM

1. Background

In terms of risk contribution all enterprises being either aerodromes, air traffic services or the flight operator contributes to risk differently and thus affect airworthiness both operationally and technically.

In a safety management system a full information support is needed in order to find all system deficiencies. It is also essential that the resources available are optimised for the task of obtaining maximum cost efficiency i.e. ALARP (As Low As Reasonably Practicable, the principle of not putting more resources into the effort than to achieve an acceptable safety objective).

The concept in this paper contains a model for a system solution in handling of the optimisation process. The model is applicable for all types of branches and organisations within the aviation industry.

2. Strategies and Main Objective

The FRO-system shall process information from both the inspection/audit findings and the outcome from accident/incident investigation and deviation reporting of occurrences related to flight safety.

The definition of elements of the aviation system in the FRO-system and risk classification methods shall be compatible between information from inspection/audit and occurrence reports. The objective is to achieve Fact Based Resource Optimisation, which means that both service providers and regulators have clear indications on problem areas to be focused on and prioritised.

3. Objectives occurrence reporting processing

FRO shall process information from structured information stored in databases in such a manner, which gives possibilities to analyse the data in a rational way using existing international standard for definitions of elements.

The definition standard for data collection and structuring shall be ICAO ADREP 2000 including the structure of Events and related Causal Factors.

Each occurrence and findings from inspections/audits shall be given a risk classification such that the degree of flight safety relations are clearly defined, i.e. an occurrence risk classification system should be applied in accordance with the model in Figure 1 and 2.

The risk classification system shall give analysis capability where ranking of occurrence related events and cause factors are possible.

The system for collection of data shall be structured and managed in such a way that trend analysis is possible. Trend analysis is defined as the capability to study changes of significant elements over a period of time.

Significant elements for trend analysis shall be defined as System Indicators.

The occurrence reporting analysis system shall be able to use risk exposure data, i.e. operational production data, in order to calculate absolute risk values.

4. Objectives Inspection/Audit information processing

The FRO-system shall process structured information from inspections/audits stored in databases in such a manner, which gives possibilities to analyse the data in a rational way using as the basic concept for existing international standard for definitions of elements adopted for the task.

The FRO-system for collection of data from inspections/audits shall be structured and managed in such a way that analysis of significant elements is possible.

The definition of elements for collection of data in the FRO-system shall be compatible with the definitions of elements in the occurrence reporting system i.e. the definition standard for data collection and structuring shall be compatible with the taxonomy in ICAO ADREP 2000.

The final risk classification system is already defined and shall be used as devised in the risk assessment matrix specified in JAR 25 with the application modifications given in the guidelines to SMS in Appendix I in this manual and as suggested in the Model Audit Report Template.

The risk classification system mentioned above shall be compatible with the risk classification used for occurrence reporting.

The system for collection of data shall be structured and managed in such a way that trend analysis is possible. Trend analysis is defined as the capability to study changes of significant elements over a period of time.

Significant elements for trend analysis shall be defined as System Indicators and compatible with System Indicators in occurrence reporting.

5. Synthesis of analysis from both information sides

The synthesis of analysis using results from both sides of information collection and analysis shall give compatible results for the FRO-system process, i.e. optimisation of resource allocation and cost effective flight safety priorities.

The synthesis of analysis shall include a method for cost analysis as given in Figure 2.

6. System support

The system support for the FRO-process shall consist of databases for storing of data collected from both inspection/audit findings and occurrence reporting.

The software shall contain support for structuring of the data collected in accordance with ICAO ADREP 2000 standard.

Analysis tools for risk and trend analysis shall be contained together with data storage of operational production data in such a manner that absolute risk can be calculated for use in the synthesis of analysis.

7. Figures on FRO-system concept and the FRO model

In figure 2 is the concept of the overall FRO-system shown in accordance with the text description and in figure 3 the FRO-model including ALARP and economical filtering.

Figure 2.

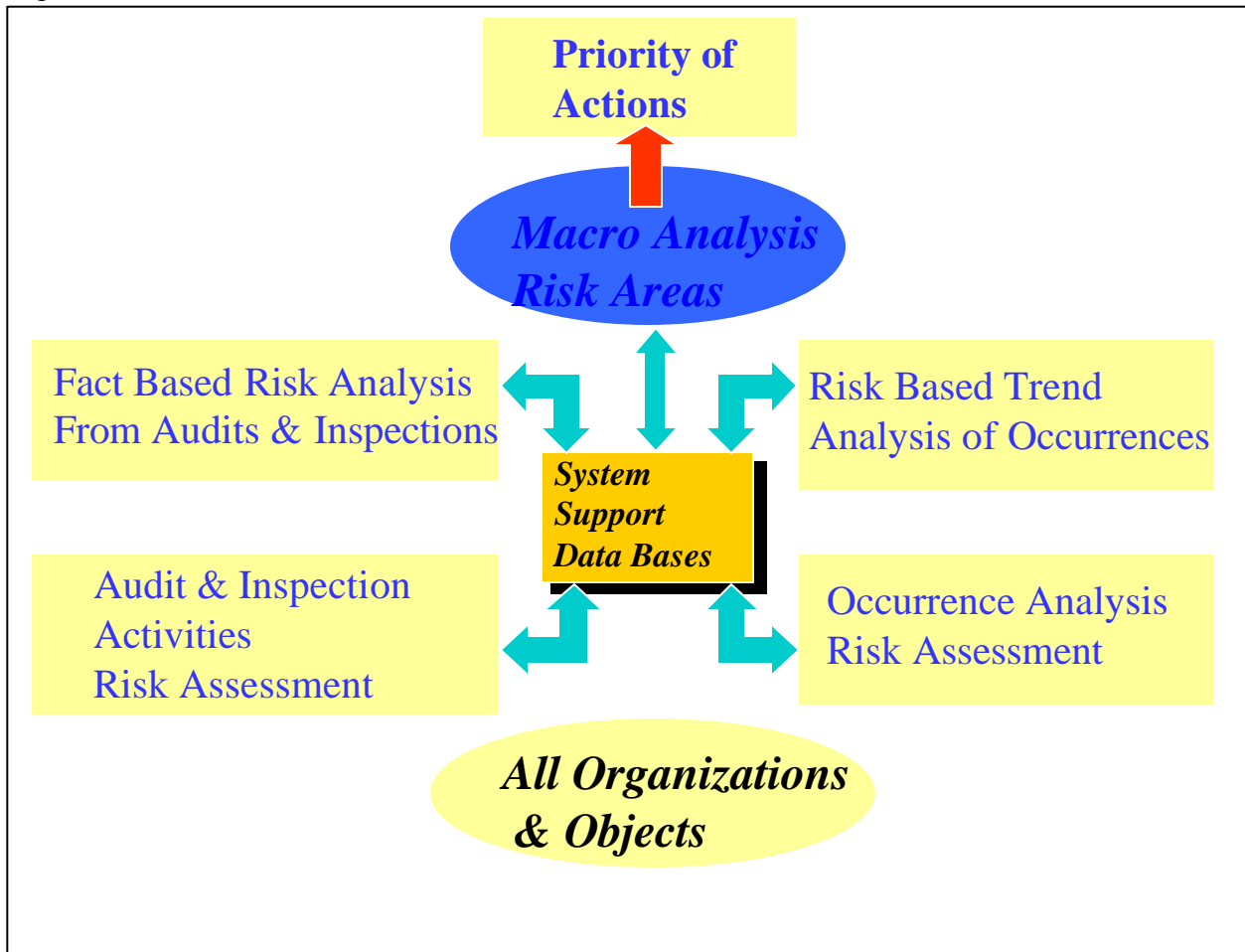
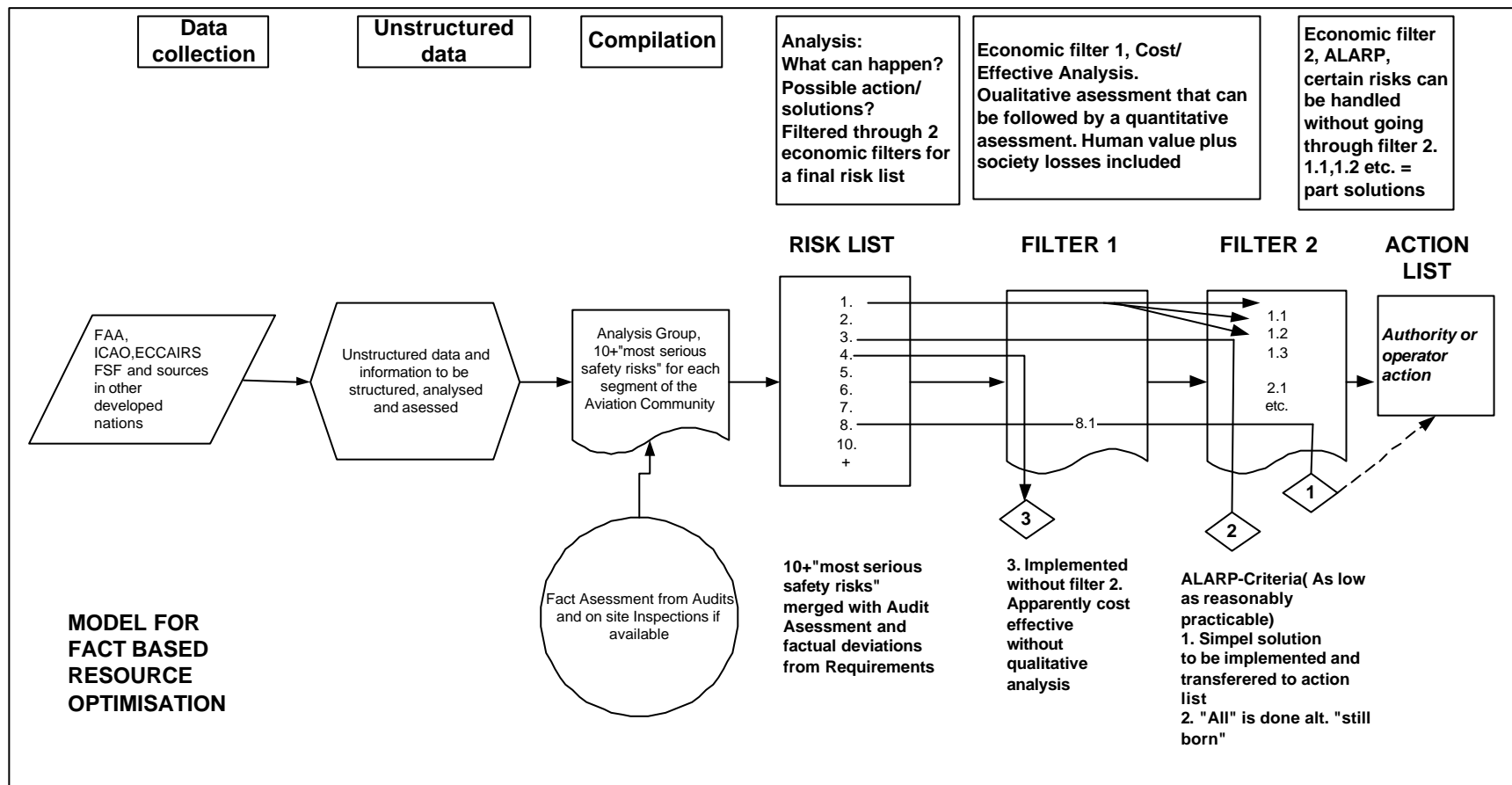


Figure 3.



GASR proposal to Model Regulation,

REQUIREMENTS FOR A SYSTEMATIC MANAGEMENT OF SAFETY BY AERODROME LICENSEES

PREFACE

The Group of Aerodrome Safety Regulators (GASR) has produced a set of requirements for the systematic management of safety, in an effort to harmonise the regulatory approach to the “how” of Aerodrome operations to complement the “what” that is provided by ICAO SARPs.

The purpose of these requirements is to ensure that the risk level in operation of an Aerodrome remains acceptable i.e. eliminate or minimise an Aerodromes contribution to aviation accident risk.

It is understood that a National Aviation Safety Authority according to national legislative provisions will adopt the requirements. This has the meaning that the requirements can be translated into and interpreted in national Codes of Practice, existing regulation e.t.c.

1. Application

- 1.1 These requirements apply to Aerodromes licensed for Commercial Air Transportation as determined by the National Aviation Safety Authority
- 1.2 As a part of licensing requirements an Aerodrome must have a system for managing safety, to which it is committed, and readily identifiable by the Aerodrome and the National Aviation Safety Authority. The System shall be documented, preferably in the Aerodrome Manual.

2. Safety Objective

- 2.1 An Aerodrome organisation with its facilities, equipment and systems shall be designed and operated so that for any hazard the combination of the probability of occurrence and the seriousness of the consequences of the hazard occurring must not result in a level of risk that is unacceptable.

3. Safety Management Policy Statements

- 3.1 Safety management systems shall include the following:

-
- a) A statement that the highest priority shall be attached to safety in relation to all business activities.
 - b) A business objective for safety that shall minimise the Aerodrome's contribution to Aviation accident risk to as low as reasonably practicable.
 - c) A commitment by the organisation to adopt an explicit, pro-active approach to safety management.
 - d) Statements of safety-related responsibilities throughout the organisation.
 - e) Compliance with all appropriate safety standards.
 - f) That the safety assurance processes used by its external suppliers comply with the Aerodrome's safety management standards and requirements.

4. Safety Management principles

4.1 Safety achievement

4.1.1 Safety Levels

Whenever practicable, quantitative safety levels shall be derived, maintained and improved for all aviation products and services delivered by the Aerodrome. When quantitative safety levels cannot be derived a qualitative reasoning shall be performed in order to meet the safety objectives.

4.1.2 System Safety Assessment

An Aerodrome organisation shall assess all existing operations, proposed changes, additions or replacements for their safety significance.

4.1.3 System Safety Assessment Records

An Aerodrome organisation shall identify and record the safety requirements for a service or product, the results of the safety assessment process and evidence that the safety requirements

have been met. These records shall be maintained throughout the life of the service or product.

4.1.4 Competency

An Aerodrome organisation shall ensure that staff remains adequately trained and qualified for the job they are required to do, and for which they have accountability.

4.2 Safety Assurance

4.2.1 Safety Management Accountability

An Aerodrome organisation shall ensure that there is accountability, at a suitable senior level in its organisation for the management, production and monitoring of the safety management system.

4.2.2 Safety Audits

An Aerodrome organisation shall routinely carry out safety audits to provide assurance of the safety of activities and to confirm compliance with the safety requirements and the safety management system.

4.2.3 Safety Monitoring and reporting

An Aerodrome organisation shall have in place suitable monitoring arrangements so that undesirable trends in service or product performance can be recognised and be subject to remedial action. In order to achieve this the Aerodrome management shall;

- a) Establish a reporting system for accident and incident-reporting ensuring that the National Aviation Safety Authority is informed of the aviation safety aspects in connection with the operation of the Aerodrome.
- b) Investigate safety significant occurrences, identifying any failures of its management of safety and to take corrective action if required

4.2.4 Document and Data control

The Aerodrome management shall establish and maintain procedures for ability to trace all documents and data related to the safety management system. The procedures must ensure that all safety related documents and data are available. Invalid or obsolete documents and data must be eliminated and secured against unintended use

5. Operational Safety Assurance Documentation

An Aerodrome organisation shall produce and maintain safety assurance documentation. This documentation shall cover:

- a) All safety related roles and functions
- b) A safety based risk assessment of the roles and functions where practicable
- c) For those safety related tasks and functions, that a process of risk management is established to ensure that identified risks remain tolerable
- d) Safety Performance measurement of the current operations as part of the ongoing risk management
- e) Corrective procedures and measures that modify the original task or function to address inadequate performance.

6. Safety Assurance Documentation on systems requiring approval

- 6.1 An Aerodrome organisation shall, when the intention is to introduce new systems into operation, or introduce changes to, or replace existing systems, submit an application for approval by the National Aviation Safety Authority.

Note:

This is also applicable when changes are made that affect approvals in the Aerodrome licensing documentation issued by the National Aviation Safety Authority

- 6.2 The Aerodrome management shall show compliance with the safety requirements for any operational system. This can only take place

after the Aerodrome licensee is satisfied that their own safety requirements, as well as those issued by the National Aviation Safety Authority, are met.

Appendix I. Aeronautical Information Management

The crucial importance of information relevancy, currency, accuracy and timeliness for the prevention of runway incursions, on the flight deck, to the air traffic controller and on the aerodrome surface, is fully acknowledged. This appendix provides guidance towards that objective.

Working closely with the AIM Unit and NAV Domain, the EUROCONTROL Regulatory Unit (RU) will soon launch an Advanced EUROCONTROL Noticed of Proposed Rule-Making (A-ENPRM) discussion paper on a proposed regulatory approach. In parallel to the above, AIM and NAV are developing generic processes and other procedures and training requirements to support a coordinated approach across the States towards achieving enhanced data accuracy and integrity.

The following additional material complements the ICAO provisions for the recommendations 4.8.2 - 4.8.4 and 4.8.6 found in the European Action Plan for the Prevention of Runway Incursions. In case of any questions please contact ais.info@eurocontrol.int

Recommendation 4.8.2 Information provision

Most relevant ICAO references

Annex 3	Meteorological Service for International Air Navigation
Annex 4	Aeronautical Charts
Annex 14	Volume I: Aerodrome Design and Operations
	Chap 2 Aerodrome data
	Chap 2.13 Co-ordination between AIS and aerodrome authorities
	Appendix 5 Aeronautical Data Quality requirements
Annex 15	Aeronautical Information Services

Most relevant EUROCONTROL references

- AI RAC Adherence FAQ (<http://www.eurocontrol.int/ais> --> AIS AHEAD AI RAC)
- Electronic AIP (<http://www.eurocontrol.int/ais> --> AIS AHEAD --> Paperless AIS)
- Integrated Briefing (<http://www.eurocontrol.int/ais> --> AIS AHEAD --> Integrated Briefing)
- AIS Data Process and Static Data Procedures (<http://www.eurocontrol.int/ais>--> SDP)
- AIS Service Level Agreements and Key Performance Indicators (<http://www.eurocontrol.int/ais> --> AIS AHEAD --> Service Levels)

The implementation of these deliverables is further assisted by the following ECIP Objectives (www.eurocontrol.int/ecip/level2)

- INF02 Implement ISO9001:2000 in AIS
www.eurocontrol.int/ecip/level2/INF02.pdf
- INF03 Impl. Improved Aeronautical Information
www.eurocontrol.int/ecip/level2/INF03.pdf
- INF04 Implement Integrated Briefing
www.eurocontrol.int/ecip/level2/INF04.pdf

Recommendation 4.8.3 Post-AIS data providers

- EUROCAE ED 76/RTCA DO 200A, Standards for processing Aeronautical data
- EUROCAE ED 77/RTCA DO 201A, Standards for Aeronautical information
- JAA TGL 9 Recognition of ED76 (RTCA DO-200A) Standards for Processing Aeronautical Data www.ecacnav.com/files/tgl9_jaa.pdf.

Recommendation 4.8.4 Feedback process

Please all subscribe to EUROCONTROL's AIS AGORA 'Voicing Problems - Sharing Solutions'. Improving communication among all aeronautical information stakeholders <http://www.eurocontrol.int/aisagora>.

Recommendation 4.8.6 Electronic Exchange

The Aeronautical Information Exchange Model (AIXM) provides the standard structures according to which aeronautical information/data can be exchanged between (heterogeneous) database systems. One such database is the EAD (European AIS Database, www.eurocontrol.int/ead)

The AIXM exchange format is an XML specification intended for computer to computer exchange of aeronautical information. It is based on the [W3C XML Schema Recommendation](#). The [Extensible Markup Language](#) (XML) is a meta language, which can be used to describe the logical structure of a wide variety of documents and data in different ways according to the application. This universal, flexible and extensible approach opens up an almost unlimited range of uses for XML, from word processing to electronic business and data archiving.

The implementation of the EAD and associated data population & migration is further laid down in the ECIP Objective INF01

- ECIP INF01 Implement the European Aeronautical Information Services (AIS) Database www.eurocontrol.int/ecip/level2/INF01.pdf

The document 'EUROCAE ED 99/RTCA DO 272, User requirements for airport mapping' further specifies the user requirements for airport aeronautical information.