



**INTERNATIONAL CIVIL AVIATION ORGANIZATION**

**SOUTH AMERICAN REGIONAL OFFICE**

**SAFETY ASSESSMENT FOR THE  
IMPLEMENTATION OF AMENDMENT 1 TO THE  
PANS/ATM (DOC 4444) RELATED TO THE NEW  
FLIGHT PLAN FORMAT**

September 2011

## TABLE OF CONTENTS

Chapter	Contents	Page No.
	Executive Summary .....	3
1.	Prologue.....	4
	1.1 Objective .....	
	1.2 Scope .....	
	1.3 General background information.....	
2.	Description of the flight plan system of the SAM Region.....	6
	2.1 General status of the flight plan system of the SAM Region	
	2.2 Status following the implementation of the new flight plan format (FPL)	
	Appendix A - Amendment 1 to the 15th Edition of the ICAO PANS-ATM (Doc 4444)	
3.	Hazard identification for the implementation of the new flight plan format (FPL).....	19
	3.1 Introduction	
	3.2 Analysis of the hazard identification process	
	3.3 Methodology for identifying hazards for the implementation of the new flight plan format	
	3.4 Identification of hazards for the implementation of the new flight plan format	
	3.5 Description of hazards analyzed by the SAM/RA/02 panel	
	3.6 Conclusions reached in identifying hazards and judging the consequences for the implementation of the new flight plan format	
	Appendix A – List of experts who participated in the SAM/RA/2 Workshop	
4.	Operational risk management process for the implementation of the new flight plan format .....	25
	4.1 Introduction	
	4.2 Aspects considered to determine the likelihood of risk	
	4.3 Aspects considered to determine the severity of risks associated with the implementation of the new flight plan format	
5	Assessment and mitigation of operational risks associated with the implementation of the new FPL format	27
	5.1 Introduction	
	5.2 Criteria for mitigating operational risks.....	
	5.3 Description of measures for mitigating risks associated with the implementation of the new flight plan format in the SAM Region.....	
	Appendix A – Hazard identification and risk assessment (HIRA) format	
6	Recommendations stemming from the safety assessment for the implementation of the new flight plan format.....	39
	6.1 Introduction	
	6.2 Recommendations	
	Appendix A - Definitions and acronyms	

## **Executive Summary**

1. The purpose of this document is to assess safety from the viewpoint of the South American region before Amendment 1 to the 15th Edition of ICAO's PANS-ATM (Doc 4444) takes effect with regard to the implementation of the new contents of the flight plan (NEW format) on 15 November 2012 and during the transition period starting on 1 July 2012, when airspace users are expected to use both the CURRENT and NEW formats.
2. The aim of this document is to serve States for reference purposes, as needed. It should be added here that this safety assessment does not release States from the responsibility for making their own assessments of safety as a result of the implementation of the new flight plan format, as stipulated in national action plans on the subject.
3. The ICAO guidelines for incorporating flight plan information pursuant to Amendment 1 to Doc 4444 were made known to the States at the SAM/IG meetings. The Implementation Group agreed to prepare an initial plan describing the amendment implementation strategy, together with an action plan determining the steps to be taken for the amendment's implementation on 15 November 2012. This action plan calls for the preparation of a safety assessment relating to the implementation of the new flight plan format.
4. The area covered in the safety assessment for the new flight plan format (FPL) extends to the borders of the SAM Region and encompasses the following FIRs: Antofagasta, Amazónica, Atlántico, Asunción, Barranquilla, Brazilia, Bogotá, Comodoro Rivadavia, Córdoba, Curitiba, Ezeiza, Georgetown, Guayaquil, La Paz, Lima, Maiquetía, Mendoza, Montevideo, Panama, Paramaribo, Puerto Montt, Punta Arenas, Recife, Resistencia, Rochambeau and Santiago.
5. The document describes the FPL system in the SAM Region and explains the hazard identification process and the consequences of implementing the new FPL format by analyzing aspects of the process for identifying risks for the implementation of the new flight plan format. The risks associated with implementation of the new flight plan format were then evaluated and mitigated and conclusions reached for the cited implementation.
6. It comes to an end by putting forward a series of recommendations for assessing operational risks associated with the implementation of the new FPL format that are intended for States and air navigation service providers.
7. From the description and examination of this safety study, it may be noted that the introduction and implementation of safety risk mitigation measures will ensure that these risks are reduced to an acceptable and, in some cases, a tolerable, level that will mean that the risk is controlled and that Amendment 1 to Doc 444 regarding the new flight plan format in the South American Region can be safely implemented. There are also some recommendations whose implementation is considered essential for keeping safety rates at an acceptable level. The HIRA form in Appendix A to Chapter 5 clearly spells out which tasks should be taken into consideration from a regional viewpoint by States and air navigation service providers in the South American Region.

## **Chapter 1: Prologue**

### **1.1 Objective**

- 1.1.1 The purpose of this document is to make a safety assessment from the viewpoint of the South American Region before Amendment 1 to the 15th edition of the ICAO Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM, Doc 4444), related to the implementation of the new contents of the flight

plan (NEW format) as of 15 November 2012, becomes effective and during the transition period starting on 1 July 2012, when airspace users are expected to make use of both the CURRENT and NEW formats.

1.1.2 This document is also intended to serve States for reference purposes, when needed. It should be added here that this safety assessment does not release States from their responsibility for making their own evaluations of safety as a result of the implementation of the new flight plan format, as stipulated in national action plans on the subject.

1.1.3 Implementation of the new flight plan format will help to contribute directly to the accomplishment of the following Strategic Objectives of ICAO:

- **A. Safety** — *Enhance global civil aviation safety.*
- **C. Environmental protection and sustainable development of air transport** – *Promote harmonized and economically viable development of international civil aviation that does not unduly harm the environment.*

## 1.2 Scope

1.2.1 The safety assessment covered an area extending to the borders of the SAM Region and also considered several aspects of adjacent regions that could affect the implementation. The following FIRs were involved: Antofagasta, Amazonian, Atlantic, Asunción, Barranquilla, Brazilia, Bogotá, Comodoro Rivadavia, Córdoba, Curitiba, Ezeiza, Georgetown, Guayaquil, La Paz, Lima, Maiquetía, Mendoza, Montevideo, Panama, Paramaribo, Puerto Montt, Punta Arenas, Recife, Resistencia, Rochambeau and Santiago (see Figure 1).

## 1.3 General background information

1.3.1 ICAO informed the States in communication AN13/2.1-08/50, of 25 June 2008, about the publication of Amendment 1 to Doc 4444 (PANS-ATM), which serves to update ICAO's flight plan format to meet the needs of aircraft with advanced capabilities and the evolving requirements of automatic air traffic management (ATM) systems, while, at the same time, bearing in mind the compatibility of existing systems, human elements, instruction, cost and aspects of the transition.

1.3.2 On evaluating the creation of the new CNS/ATM Subgroup and its terms of reference and working programme, GREPECAS/15 examined the new flight plan model. Deeming it advisable to establish a CAR/SAM regional strategy for its implementation, it formulated Conclusion 15/35 "*Implementation of the new ICAO flight plan model*," in which States were asked to take the necessary measures to prepare for the transition and the CNS/ATM Subgroup to create an auxiliary body to elaborate the strategy for that transition.

1.3.3 South American Region Implementation Group (SAM/IG) Meetings considered the amendment's possible impact on automated systems, in the light of PBN implementation. It was noted that the amendment in question is complex and involves other aspects in addition to PBN and the Group was of the opinion that a regional strategy needed to be adopted to modify automated ATC systems.

1.3.4 As a result of all of this, the SAM/IG Meeting agreed to include a task in the working programme of the SAM PBN Implementation Group, calling for its assessment of the implementation of Amendment 1 to the PANS/ATM. This activity was also to serve as a basis and reference for the work entrusted to the above-cited specific GREPECAS CNS/ATM/SG Task Force. This activity was accordingly included in the work to be accomplished from 2009 until the conclusion of the implementation under the auspices of SAM Regional Project RLA/06/901.

1.3.5 In the course of the SAM/IG Meetings, the ICAO Guidelines for incorporating flight plan information pursuant to Amendment 1 to ICAO's 15th edition of the Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM, Doc 4444) were presented to the States. Based on discussions within the Implementation Group, it was agreed to draw up an initial plan, with a description of the strategy for implementing that amendment, together with an action plan that would spell out the measures to be taken for implementing the amendment on 15 November 2012 and during the transition period. That action plan calls for the preparation of a safety assessment relating to the implementation of the new flight plan format.

1.3.6 States in the SAM Region elaborated their action plans for implementing Amendment 1 to Doc 4444 based on the regional strategy and incorporating the various activities to be carried out during the implementation process.

1.3.7 ICAO has organized and conducted several different activities to help States with both the implementation process and the planning and elaboration of their action plans, as well as the performance of the tasks specified in those plans.

## **Chapter 2 Description of the SAM Region's flight plan system**

### **2.1 General status of the SAM Region's flight plan system**

2.1.1 The aim of the guidelines elaborated by ICAO for incorporating flight plan information in accordance with Amendment 1 is to help airspace users and air navigation service providers (ANSPs) make the flight plan changes to be incorporated as a result of Amendment 1 to Doc 4444 and to contribute to a coordinated global effort during the transition period to ensure its success by the date of application.

2.1.2 The guidelines do not amend any provision on complementing and accepting flight plans contained in Annex 2 — Rules of the Air or the PANS-ATM.

2.1.3 Amendment 1 to the 15th edition of the PANS-ATM, Doc 4444, basically stipulates the following changes:

#### **1. Flight Plan**

- a. Flight Plan Form: carriers and air traffic service units will observe all restrictions defined in aeronautical information publications (AIPs);
- b. Filing of the Flight Plan: changes in deadlines for filing flight plans;
- c. Item 7: Aircraft Identification: use of alphanumeric characters;
- d. Item 8: Flight Rules: specification of one or more changes in flight rules;
- e. Item 10: Equipment: changes in equipment and capability designations
- f. Item 13: Departure Aerodrome and Time
- g. Item 15: Route
- h. Item 16: Destination Aerodrome and Total Estimated Elapsed Time, Alternate Destination Aerodromes
- i. Item 18: Other Data

#### **2. Air Traffic Service Messages**

- a. Composition of CHG, CNL, DLA, DEP, RQP and RQS messages

2.1.4 The impact on ATM systems of the changes defined by ICAO, in the guidelines for implementing those changes and in the present scenario in the SAM Region, has been identified as affecting the regulatory, technical and operational fields, particularly those concerning the automated systems and operational personnel, air traffic controllers, flight plan operators, CNS experts and airspace users in general.

2.1.5 Insofar as the regulatory change is concerned, States should revise and adjust regulations concerning the application of Amendment 1 to Doc 4444 and the Operating Manuals of ATS and ARO/AIS units to bring them into line with the new operating procedures resulting from the implementation of Amendment 1.

2.1.6 In the technical area, the SAM Region today shows evidence of different degrees of technological evolution of ATM automation that can be classified into one of the following situations:

- SAM States possessing automated ACC systems (Flight plan and radar data processing): Argentina, Brazil, Chile, Colombia, Ecuador, French Guiana, Panama, Peru, Uruguay and Venezuela;
- States possessing automated ATM systems and that are currently updating those systems, like Brazil and Peru;
- States that have no automated ATM systems, but that will implement them shortly, like Guyana, Suriname and Paraguay; and
- States that have no automated ATM systems and that are not known to have any plans to acquire such systems in the short or medium term, such as Bolivia.

2.1.7 The AFTN is the principal means used in the Region today to transmit flight plans and is currently in transition to an AMHS system. All SAM States are expected to have AMHS systems installed by 2010. The communications system used to transmit AFTN information in the Region is the REDDIG.

2.1.8 There are many variables that need to be considered in the changes that will have a direct impact on operating personnel, particularly air traffic controllers and flight plan operators. That impact will be reduced if automated ATM systems are given the capacity to provide air traffic controllers with the necessary information for their air traffic planning and for sounding warnings whenever there is a change in the data filed in the Flight Plan.

2.1.9 In order to mitigate the impact, personnel must be given a significant amount of training in both the use of the new resources of the automated system and in manually processing Flight Plan data, as well as in making adjustments to the operating manuals.

2.1.10 A more specific analysis of those aspects can be found in the Strategy for Implementing Amendment 1 to the 15th Edition of the ICAO PANS-ATM (Doc 4444) in the CAR/SAM Regions (see **Appendix A**).

## 2.2 **Status after implementation of the new Flight Plan format (FPL)**

2.2.1 The changes in the Flight Plan format proposed in Amendment 1 to the PANS/ATM are able to meet the needs of aircraft with advanced capabilities and the evolving requirements of automated air traffic management (ATM) systems, while bearing in mind compatibility with existing systems, human factors, training, cost and aspects of the transition.

## Appendix A to Chapter 2

### STRATEGY FOR IMPLEMENTING AMENDMENT 1 TO THE 15TH EDITION OF THE ICAO PANS-ATM (DOCUMENT 4444) IN THE CAR/SAM REGIONS

#### (SAM/RA/02- Item 2 – Appendix B)

#### TABLE OF CONTENTS

1.	Purpose .....	
2.	General Considerations .....	9
3.	Principles .....	10
4.	Application .....	10
5.	Reference documents .....	10
6.	Analysis .....	10
6.1.	Amendment 1 to the 15th Edition of Doc 4444; .....	10
6.2.	Implementation Guidelines .....	11
6.3.	Present scenario in the SAM Region .....	12
6.4.	Impact .....	6
7.	Implementation Strategy .....	
7.1.	Critical Criteria .....	
7.2.	Preparation .....	15
7.3.	Transition .....	16
7.4.	Post-Transition .....	17
8.	Administrative Aspects .....	17
9.	Financial Aspects .....	17



## 1. Purpose

The purpose of this Document is to establish the strategy for implementing Amendment 1 to the 15th Edition of the ICAO PANS-ATM (Doc 4444) in the SAM Region, in response to conclusions GREPECAS 15/35 and SAM/IG/3-8.

## 2. General Considerations

ICAO, considering that:

- Dynamic management of the information will offer the most appropriate and integrated vision of the ATM situation in historical, present, planned or future terms and will provide a basis for decision-making by the entire ATM community;
- The *Global Air Traffic Management Operational Concept* (Doc 9854) calls for taking information management measures to support ATM operations by means of correct, quality and timely data; and
- ATM requirement N° 87 of the *Manual on Air Traffic Management System Requirements* (Doc 9882) defines the 4-D paths that will be used in traffic synchronization applications, in order to achieve ATM system performance objectives, and explains that both “ground” and “air” applications will be used extensively to create an efficient and safe air traffic flow during all flight phases.

ICAO informed the States in communication AN13/2.1-08/50, of 25 June 2008, about the publication of Amendment 1 to Doc 4444 (PANS-ATM), which updates the ICAO Flight Plan (FPL) format to meet the needs of aircraft with advanced capabilities and the evolving requirements of automated air traffic management (AFM) systems, while bearing in mind the compatibility with existing systems, human factors, instruction, cost, and aspects connected with the transition.

GREPECAS/15, on evaluating the creation of the CNS/ATM Subgroup and its terms of reference and working programme, examined the new model Flight Plan format and, considering that a CAR/SAM regional strategy should be established for its implementation, formulated Conclusion 15/35 “*Implementation of the new ICAO Flight Plan model.*” In that Conclusion, States are asked to take the necessary measures to prepare for the transition and the CNS/ATM//SG to create an auxiliary body to draw up the strategy for the transition.

The SAM/IG/2 Meeting evaluated the possible impact of this amendment on automated systems, in the light of PBN implementation. Inasmuch as the amendment in question was found to be complex and to involve other aspects, in addition to PBN, the Meeting was of the opinion that a strategy needed to be adopted to modify automated ATC systems.

Considering these elements, the Meeting agreed to include, within the working programme of the SAM PBN Implementation Group, the task of evaluating PBN implementation in the light of Amendment 1 to the PANS/ATM. This activity was to serve as support and background for the work entrusted to the above-cited GREPECAS CNS/ATM/SG Task Force. As a result, this task was included in the work to be done in the SAM Region in 2009 under the auspices of Regional Project RLA/06/901.

During the SAM/IG/3 Meeting, States were given the ICAO guidelines for incorporating the Flight Plan information called for by Amendment 1 to the 15<sup>th</sup> edition of ICAO Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM, Doc 4444).

Conclusion SAM/IG/3-8 considered that the RLA/06/901 Project should elaborate an initial plan describing the strategy for implementing that amendment for presentation to the SAM/IG/4 Meeting.

### **3. Principles**

The following aspects were considered in preparing this document:

1. the sovereign will of the States;
2. that it would serve SAM States as a guidance manual for preparing their action plans for implementation of the contents of Amendment 1 to Doc 4444.

### **4. Application**

This document is applicable to all SAM States and specifically to all air navigator service providers and airspace users.

### **5. Reference documents**

This strategy follows the recommendations made by ICAO in the following documents:

- a) 15<sup>th</sup> edition of the ICAO PANS-ATM (Doc 4444)
- b) Amendment 1 to the 15th Edition of Doc 4444;
- c) Guidelines for incorporating Flight Plan information in keeping with Amendment 1 to the 15<sup>th</sup> edition of Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM, Doc 4444) (State Letter AN 13/2.1-09/9 of 6 February 2009);
- d) Final Report of GREPECAS 15; and
- e) Final Reports of the SAM/IG meetings.

### **6. Analysis**

#### **6.1. Amendment 1 to the 15th Edition of Doc 4444;**

ICAO considered that in order to meet the needs of aircraft with advanced capabilities and the evolving requirements of automated air traffic management (ATM) systems, Flight Plan formats needed to be updated.

It accordingly published Amendment 1 to the 15th Edition of PANS-ATM, Doc 4444, which basically makes the following changes:

3. Flight Plan
  - a. Flight Plan Format: carriers and air traffic service units will observe all restrictions decided upon in aeronautical information publications (AIP);
  - b. Filing of the Flight Plan: changes in deadlines for filing flight plans;
  - c. Item 7: Aircraft Identification: use of alphanumeric characters;

- d. Item 8: Flight Rules: specification of one or more changes in flight rules;
- e. Item 10: Equipment: changes in equipment and capability designations;
- f. Item 13: Departure Aerodrome and Time
- g. Item 15: Route
- h. Item 16: Destination Aerodrome and Total Estimated Elapsed Time, Alternative Destination Aerodromes
- i. Item 18: Other Data

#### 4. Air Traffic Service Messages

Composition of CHG, CNL, DLA, DEP, RQP and RQS messages

### 6.2. Implementation Guidelines

In its Letter AN 13/2.1-09/9, of 6 February 2009, ICAO defines the guidelines for incorporating Flight Plan information as called for by Amendment 1 to the Procedures for Air Navigation Services.

Generally speaking, ICAO stresses that the changes will have a pronounced impact on ANSP flight data processing systems that check and accept flight plans and associated messages, use Flight Plan data from screen presentations for controller reference purposes, use data for ANSP automation and facilitate communications among ANSPs during flights, and will also have consequences for airspace users.

Until a starting date is set for the application of changes in flight planning, the transition period is expected to run from 25 June 2008 to 15 November 2012.

It also acknowledges that the changes will be applied in keeping with the specific schedules of each ANSP and airspace user and will be based on their own individual needs, but that a certain degree of coordination will be required.

To conclude, it stresses that all parties involved in the issue must be in a position by 15 November 2012 to file and process flight information in keeping with the stipulations of Amendment 1 to the PANS-ATM.

The following considerations are presented in reference to the planning environment:

1. The present flight planning formats and ATS messages contained in the existing version of the PANS-ATM are defined as being CURRENT;
2. The flight planning formats and ATS messages specified in Amendment 1 to the PANS-ATM are defined as being NEW;
3. The ATM system should simultaneously support both CURRENT and NEW information for a certain period, in order to allow for time to deal with particular performance cases;

4. Amendment 1 does not alter the filing of flight plans by different means (individual filing of flight plans with each ANSP, filing of flight plans at a centralized location and their distribution by the ATM system), but the transition to implementation of Amendment 1 could impose some requirements during the transition period;
5. The Amendment makes changes in the contents of flight plan messages sent from one ANSP to another.

The contents of the ICAO guidelines are summarized as follows:

**Guideline 1.** Recommends that ANSPs have the capability to operate during the transition period using the two types of Flight Plan information, CURRENT and NEW. ANSPs will not be required to accept and process CURRENT data after 15 November 2012. This is applicable to situations in which some ANSPs and/or airspace users fail to apply the flight planning changes until the end of the transition period.

**Guideline 2.** Regional Planning and Implementation Groups are encouraged to plan and publish the changes sufficiently in advance of the application date. It considers that transition plans should bear in mind that airspace users will most likely be unable to make use of the new opportunities offered by the NEW information until ANSPs have made the transition and that even in that case the application of the NEW information could be limited if flights continue to involve ANSPs that have not yet made the transition.

**Guideline 3.** Explains that airspace users will decide whether to provide the ANSP with CURRENT or NEW information during the transition period, once the ANSP has reported that it is in a position to accept the NEW information.

**Guideline 4.** In the event that not all ANSPs have made the transition to use of the NEW information, airspace users should ensure that ANSPs that have not yet made the transition are given CURRENT information. It stresses its concern over the fact that ANSPs that use CURRENT information could misinterpret and reject information filed by airspace users more than 24 hours before flight time and that ANSPs that use NEW information may not be equipped to provide essential coordination to ANSPs that use CURRENT information.

**Guideline 5.** Reports that ICAO will maintain a website listing the capacity of each ANSP to accept CURRENT or NEW information. Each ANSP will inform its respective ICAO Regional Office about its capacity to accept the NEW information as soon as possible.

**Guideline 6.** Complementing Guideline 4, ANSPs that accept NEW information may convert the flight information into CURRENT information, for use in coordinating with adjacent ANSPs that have not yet made the transition.

### **6.3. Present scenario in the SAM Region**

The SAM Region today shows evidence of the presence of different degrees of technological evolution in terms of ATM automation, which can be classified into one of the following situations:

- SAM States possessing automated ACC systems (Flight plan and radar data processing): Argentina, Brazil, Chile, Colombia, Ecuador, French Guiana, Panama, Peru, Uruguay and Venezuela. Many of the automated systems installed in the Region are based on the AIRCON (INDRA) solution, but using different versions.

- States possessing automated ATM systems and that are currently updating those systems, like Brazil and Peru;
- States that have no automated ATM systems, but will implement them in the short term, like Guyana, Suriname and Paraguay.
- States that have no automated ATM systems and that are not known to have any plans to acquire such systems in the short or medium term, such as Bolivia.

The implementation strategy should bear in mind the different degrees of evolution existing in the Region.

AFTN is the principal means used in the Region to transmit flight plans and is currently in transition to an AMHS system. All of the States in the SAM Region are expected to have installed AMHS systems by 2012. The means of communication used in the Region to transmit AFTN information is the REDDIG.

#### **6.4. Impact**

A macroanalysis is presented below of both the technical and operational impact on ATM systems, whether automated or not, and on the data communication systems, of the changes defined by ICAO, in the guidelines for implementing those changes and in the current scenario in the SAM Region.

##### **6.4.1. Technical Impact**

For States with no automated ATM systems, the changes in the new Flight Plan format will affect only AFTN or AMHS-based data communication systems, primarily in relation to the Human-Machine Interface (HMI) of the system terminals available at AIS offices or other specific sites for insertion into flight plans.

It should be stressed that changes in the Flight Plan format consist of the introduction of further options for filling in the Items in the format and that this could give rise to more errors in message creation by terminals, which do not have the capability to check data consistency, but only message syntax.

It is necessary to stress that those changes in the Flight Plan format introduce more options that could increase the likelihood of errors in filling it out.

For States possessing automated ATM systems, the changes will have a major technical impact, making adjustments necessary in at least the following subsystems: flight plan treatment, communication interfaces with other systems, control screen HMIs and recording and re-visualization.

These adjustments should take into account at least the following aspects:

- Make all of the changes called for in Amendment 1 and described in Item 6.1 of this Document;
- Give air traffic controllers all of the necessary information for air traffic planning and management, including warnings of changes in status of aircraft capacity;
- Make it possible to correctly transmit all Flight Plan information, whether CURRENT or NEW, to all control centres involved;

- Clearly define the sizes of the Items and their respective subdivisions, as well as the sequence of the data (for example: Data inclusion sequence for Item 10);
- Include the updating of all of the technical documentation of the system; and
- Carry out advance testing in order to validate the changes.

Therefore, the effort needed to change these systems should be considered, taking into account, as well, the problems inherent in technological obsolescence and insufficient technical training of maintenance personnel, which could create the greater financial expense of having to hire third parties and entail a larger risk of failure.

For States that are in the process of acquiring new automated systems, whether or not to replace existing ones, the impact will be felt on their specification, for they must be able to process the changes called for in the amendment.

Another important aspect is the need for ICAO to consider implementing a transition period during which ANSPs should have the capability to process both CURRENT and NEW information; this means adjusting their software so that it is able to recognize the information format that is being used.

#### **6.4.2. Operational Impact**

The changes will directly impact operating personnel, particularly air traffic controllers and flight plan operators.

Nonetheless, there are many variables that should be considered, among them the association of the data entered in different FPL Items (Items 10 and 18, for example), which could change in accordance with the aircraft status.

That impact will be less pronounced if the automated ATM system is given the capacity to provide air traffic controllers with the necessary information for air traffic planning and for issuing warnings whenever a change occurs in the scenario in regard to the data filed in the Flight Plan.

The operational difficulty existing during the transition period should also be considered, when it is important to have the capability of operating using both CURRENT and NEW information.

A clear and formal explanation of aspects not fully defined in Amendment 1 and in the guidelines is also necessary. A case in point is the use of COM/NAV in Item 10, where the letter S represents RTF VHF, VOR or ILS standard equipment, but does not refer to NDB.

In order to mitigate the impact, considerable staff training must be provided, both in the use of the new resources of the automated system and for manual Flight Plan data processing. Adjustments must also be made in the operating models and controversial matters must be clearly defined.

## **7. Implementation Strategy**

### **7.1 Critical Criteria**

The implementation of Amendment 1 in the SAM Region should consider the following aspects:

- Ensure that by 15 November 2012 all States and airspace users have made all of the changes called for in Amendment 1, and not just in some selected aspects of it;
- States that do not implement the amendment in its entirety before 15 November 2012 shall be obliged to publish those non-conformities in their AIPs as a “SIGNIFICANT DIFFERENCE.” Furthermore, failure to implement the change will be considered a deficiency and will be included on the List of Deficiencies in the SAM Region; and
- Ensure that, as of 15 November 2012, all States and airspace users accept and disseminate only the information of the NEW Flight Plan format and associated ATS messages, and disable all processing capabilities of the CURRENT format.

## **7.2 Preparation**

In order to successfully implement the changes, States in the SAM Region first need to prepare an action plan that will take account of the impact the change will have on their systems, giving due consideration to the aspects covered in this strategy.

To be successful, States, coordinated by the ICAO Regional Office and GREPECAS, need to elaborate their action plans based on the impact the changes will have on their systems and considering the changes, guidelines and critical criteria defined above.

Those plans should cover at least the following subjects:

- Classification of the degree of evolution of their systems;
- Detailed assessment of the technical and operational impact;
- Solutions for reducing the impact, together with their respective schedules for implementation and the responsible parties;
- Deadline for implementing the solutions;
- Tests for validating the solutions;
- Technical and operational training programmes; and
- Contingency measures.

Those plans should be presented at the SAM/IG/5 Meeting.

The ICAO SAM Regional Office will monitor the following tasks:

<b>TASK</b>	<b>START</b>	<b>END</b>	<b>RESPONSIBLE PARTY</b>
Ensure that automated system requirements include all changes made in the FPL format	2009	2012	Each State will indicate the responsible party
Ensure appropriate modification of automated ATM systems, in order to be able to analyze the information correctly and properly identify the order in which the messages are received, so that no mistakes are made in interpreting the data	2009	2012	Each State will indicate the responsible party
Comparative analysis of Flight Plan data processed in the NEW format with data processed using the CURRENT format.	2010	2011	Each State will indicate the responsible party

It is also necessary for the States to jointly agree on the definition of possible points that are not clearly explained in the amendment before taking measures to adjust their systems.

### **7.3 Transition**

During this transition phase, it is important to:

- Follow GREPECAS' guidance;
- Observe the ICAO guidelines described in paragraph 6.2;
- Act jointly with the coordinator of the implementation;
- Conduct the activities specified in the action plans, in order to mitigate the technical and operational impact of the changes;
- Recognize that the advantages for airspace users will only become effective when the changes are jointly implemented.

The transition period in the SAM Region for giving ANSPs the capability to process data using both the CURRENT and NEW Flight Plan formats will run from 18 July 2011 to 15 November 2012.

Even so, States are urged to implement the NEW format between 18 July 2011 and 20 July 2012 and not to use the NEW format before the transition period.

States should, therefore, stay up-to-date in coordinating the evolution of their action plans and report any possible changes in date, deadlines and so forth.

In addition, airspace users should take steps to ensure the precise and proper adjustment of their systems in accordance with the NEW and CURRENT Flight Plan formats.

The coordinating body for the implementation will hold periodic meetings to evaluate the plans, which will conclude with the meeting scheduled for 15 June 2011, where the decision will be taken to start the transition.

Each State should nominate a person to serve as a liaison for the necessary coordination with ICAO and with other States during the transition phase for making changes in the new Flight Plan format.



#### **7.4 Post-Transition**

States should stop processing Flight Plans using the CURRENT format starting on 15 November 2012.

They should also ensure that ATM systems, whether automated or not, correctly process all information contained in the NEW Flight Plan format, and also provide support for their operation.

Occasional difficulties noted should be evaluated and resolved by the parties involved, ANSPs and/or airspace users.

### **8 Administrative Aspects**

States should evaluate all documents concerned with the subject, including Operational Letters of Agreement, Contingency Plans and Operational Models.

This document accordingly establishes the following process for all purposes:

1. The holding of periodic meetings and discussions to identify requirements and preferential technical solutions, alternatives and options for implementing the new Flight Plan format;
2. The sharing of reports and technical documentation, plans and programmes that may be needed to ensure the successful and timely completion of these efforts.
3. Under the coordination of the ICAO Lima Office, the planning, technical coordination and performance of activities with other SAM States.

### **9 Financial Aspects**

Participating States, as well as individual administrations, will be responsible for covering any financial obligation in paying for any direct or indirect expenses incurred in carrying out this strategy, including those of buying equipment and spare parts, training technical and operational personnel, and establishing lines of communication, among other things.

The cost of any possible updating of the REDDIG to handle an increase in traffic will be shared equally among all of the States involved.

States should create the necessary mechanisms for implementing this strategy, such as through ICAO Technical Cooperation Projects under the coordination of the ICAO SAM Office.

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### **Chapter 3: Hazard identification for the implementation of the new Flight Plan format**

#### **3.1 Introduction**

3.1.1 The safety assessment was carried out in 7 stages or orderly steps, following the guidelines described in Doc 9859, the SMM Manual, as listed below:

Step 1: Preparation (or obtaining) of a full description of the system being evaluated and the environment in which it should operate.

Step 2: Identification of hazards and their consequences.

Step 3: Assessment of the risk, expressed in terms of its likelihood.

Step 4: Assessment of the risk, expressed in terms of its severity.

Step 5: Risk tolerance/index.

Step 6: Risk mitigation.

Step 7: Elaboration of safety assessment documents.

#### **3.2 Analysis of the hazard identification process**

3.2.1 A hazard is defined as a potential situation that could affect the acceptable level of safety. The materialization of a hazard has consequences that could have an impact on all spheres of operation, such as: technical aspects, loss of separation, increase in the service workload, etc. A clear understanding of the relationship between hazards and their consequences makes it possible to move on to the next stage, that of operational risk management, which is described in Chapter 4 of this document.

3.2.2 A regional workshop (SAM/RA/02) was planned and held on 5 to 9 September, in order to identify the hazards of implementing the new Flight Plan format. Participating in this workshop was a multidisciplinary panel of professionals and experts (see **Appendix A** to this Chapter) with a broad knowledge of and experience in the current FPL system and in the proposed changes, in safety management systems, human elements, automated systems and other areas of air navigation.

3.2.3 The hazard identification process is able to determine only the hazards that exist within a described system. For that reason, the system's coverage has been made broad enough to encompass all possible effects.

3.2.4 The effects on safety of a possible system loss or degradation will determine, in part, the characteristics of the operating environment of the new scenario or system to be implemented. For that reason, the description of that environment included all elements that could have a major impact on safety. Those elements vary from one case to the next; they could include, for example, the unique features of the system used in the State or the degree of automation of the ATS system and other related factors, which should be evaluated by States in making their own safety assessments.

#### **3.3 Methodology for identifying hazards for the implementation of the new Flight Plan format**

3.3.1 The methodology used is the one described in Doc 9859 (SMM Manual), which enables possible hazardous situations to be identified both logically and sequentially, thereby making it possible to determine the technical viability of implementing the new Flight Plan format in the SAM Region without impairing safety. A hazard identification and risk assessment (HIRA) form was adopted to document the process.

3.3.2 It is important to stress that the hazard identification process has enabled possible alternatives with a region-wide impact to be analyzed; these have ranged from alternatives with low incidence to the most probable scenario. As a result, “worst” conditions or contexts have been properly foreseen. It is also important to point out that the hazards recorded by this team of experts have been “believable,” given the context and operational experience of all participants.

3.3.3 At the conclusion of the different discussion activities of the SAM/RA/02 Workshop, a registry of hazards was prepared, containing a description of each, duly validated by the panel of experts.

### 3.4 **Hazard identification for the implementation of the new Flight Plan format**

3.4.1 All possible sources of system failures were studied during the hazard identification stage. The following sources, among others, were considered:

- a) equipment (design, physical and logical support);
- b) operational environment;
- c) regulatory elements, including their application, equipment certification, surveillance, etc.
- d) human operators;
- e) human-machine interface;
- f) operational procedures and practices;
- g) elements of defence, including factors like the supply of appropriate detection and warning systems, error tolerance of equipment and capability of equipment to recover from errors and failures;
- h) maintenance procedures;
- i) communication, including means, terminology and language;
- j) organizational elements, like resource allocation, operational pressures, etc.

3.4.2 During the hazard identification process, answers were specifically sought to questions like: “how could personnel interpret this procedure erroneously?” or “how could a qualified person misuse this new function or this new system (voluntarily or involuntarily) within the sphere of action of the implementation of the new FPL format?” or “What could turn out badly during the transition period or after the implementation of Amendment 1?” and so forth.

### 3.5 **Description of the hazards analyzed by the SAM/RA/02 panel**

3.5.1 The following hazards for the implementation del new Flight Plan format were identified:

- a) Failure to comply with agreements reached for the implementation of Amendment 1.
- b) Inadequate planning by ATCO in accordance with the contents of the New Flight Plan format.
- c) Loss, in the transition period, of Flight Plan information/data during the handling of Associated Messages between FIRs that apply and do not apply Amendment 1.
- d) Loss of information and/or flight information during the processing of Repetitive Flight Plans (RPL).

3.5.2 The specific components defined during the workshop as causes of hazards were determined for each of these hazards, as follows:

**Hazard 1: Failure to comply with agreements reached for the implementation of Amendment 1**

- a) Lack of an Action Plan for implementing Amendment 1.
- b) Lack of human resources.
- c) No motivation to make the change.
- d) Lack of Technological resources (equipment and software to support the processing of flight plans)
- e) Lack of economic resources (training budget; technological implementation);
- f) Lack of corporate communication and communication with users.

**Hazard 2: Inadequate planning by ATCO, in accordance with the contents of the New Flight Plan format.**

- a) Lack of, or inadequate, regulations for the filing, approval and processing of the Flight Plan and associated messages (RPL, FPL, CPL and CHG, DLA and CNL)
- b) Inadequate interpretation by ATCO of the new CPL data/information;
- c) Inadequate application by ATCO of the new CPL data/information;
- d) Failures in the presentation of CPL data in the flight progress strips.
- e) Failures in the presentation of CPL data on the runway label.
- f) Inadequate interpretation by ARO-AIS in the processing of the Flight Plan and of associated messages.
- g) Inadequate interpretation and/or application of the new Flight Plan format by flight operations officers and crews.
- h) Software failure in the processing of the Flight Plan and associated messages.
- i) Inadequate disclosure of the implementation of the new Flight Plan format.

**Hazard 3: Loss, in the transition period, of Flight Plan information/data during the handling of Associated Messages between FIRS that apply and do not apply Amendment 1.**

- a) Inadequate filling out in the NEW and CURRENT formats of Flight Plans and associated messages;
- b) Inadequate interpretation of the NEW and CURRENT contents during the Flight Plan acceptance process;
- c) Failure in the (automated or manual) conversion from the CURRENT to the NEW format of the Flight Plan and associated messages;
- d) Software failure in the processing of Flight Plans that present the DOF for associated messages;
- e) Failure in compliance with the sequence established in Amendment 1 for introducing data/information in Item 18 while generating/transmitting the FPL.
- f) Failure in the conversion of DOF data and route descriptions with course and distance for FIRs that do not apply Amendment 1.
- g) Failure in the updating of the ICAO FITS site with respect to the implementation status of Amendment 1 to Doc 4444.
- h) Failure in access to the ICAO FITS site with regard to the implementation status of Amendment 1 to Doc 4444.

**Hazard 4: Loss of flight information and/or data during the processing of Repetitive Flight Plans (RPL)**

- a) Incompatibility between the new data/information of Flight Plan Item 10 (equipment and capabilities) and RPL Box Q; and
- b) Failure in the order in which the data/information is filled out in RPL Box Q.

### 3.6 **Conclusions reached in identifying hazards and judging the consequences for the implementation of the new Flight Plan format**

3.6.1 After identifying the hazards and the specific components of those hazards, the different scenarios and consequences stemming from each of those hazards were analyzed.

3.6.2 Among the consequences examined by the workshop, one of the most critical aspects noted was the reduction of aircraft separation with an operational error ranging from low to moderate severity. In most of the cases studied, there was a significant increase in the workload of the ATC and of air traffic controllers (ATCO) that could result in a potential flight delay, with repercussions and disadvantages that could have a negative impact on the system.

3.6.3 The Working Group later identified the current defences/existing requirements for each hazard. These defences were evaluated in terms of regulations, existing terminology and, if relevant, existing instruction programmes. As a result, the following current defences/existing requirements were determined:

#### **Regulations**

- a) Requirements for implementing Amendment 1 to the 15th Edition of ICAO Doc 4444.
- b) Regulations for each providing State.
- c) Action plan - Implementation of the new Flight Plan format with the application of Amendment 1 to the 15<sup>th</sup> Edition.
- d) Guidance manuals for the elaboration of action plans for implementing Amendment 1.
- e) Conclusions of regional meetings, seminars and workshops.
- f) SAM table for conversion of the contents of Flight Plan Items 10 and 18 from the CURRENT to the NEW format.
- g) Operational letters of agreement among ATC units.

#### **Technology**

- a) Automated systems (Flight plan and radar data processing);
- b) Flight plan communication and transmission media using AFTN
- c) Flight plan communication and transmission media using AMHS
- d) Digital network (REDDIG)

#### **Training**

- a) Repeated refresher programmes
- b) Training programmes in new systems

3.6.4 Once the hazards had been identified and their consequences determined, steps were taken toward the risk management process that will be discussed in the following chapter.

## **Appendix A to Chapter 3**

### **List of experts who participated in the SAM/RA/02 Workshop**

#### **BOLIVIA**

Fernando Azuga  
Miguel Ángel Castillo Ochoa  
Fátima Luz Ontiveros  
Jorge Rojas

#### **BRAZIL**

July César de Souza Pereira  
Jorge Wilson de Avila Ferreira Penna  
Enidio Arístides dos Santos

#### **PARAGUAY**

Liz Rocío Portillo Castellanos

#### **PERU**

Fredy Núñez Munárriz  
Paulo Vila Millones  
Alfredo Harvey Palomino  
Juan Pablo Portilla Venero  
José Víctor Mondragón  
Renzo Gallegos  
Walter Warthon  
Manuel Cabredo  
Jorge Merino Rodríguez

#### **URUGUAY**

Rosanna Barú Banchieri

#### **VENEZUELA**

Henry Iván Rodríguez Manrique

#### **OACI/ ICAO**

Roberto Arca  
Celso Figueiredo  
Jorge Fernández  
Onofrio Smarrelli

## **Chapter 4: Operational risk management process for the implementation of the new Flight Plan format**

### **4.1 Introduction**

4.1.1 During this stage of the process, the background elements defined in the previous chapter were analyzed and compared and, using this information, the methodology was applied to determine the associated level of risk. This stage of analysis was carried out in keeping with two variables defined as: **likelihood** of the occurrence of an event and the worst possible foreseeable scenario, seen as the **severity or seriousness** of an event, using a qualitative type analysis. The table of operational risks was then applied and subsequent actions, applicable by consensus of the panel of experts and that could efficiently minimize or contain operational risks associated with the implementation of the new Flight Plan format, were determined.

### **4.2 Aspects considered to determine the likelihood of risk**

4.2.1 The table contained in the SMM Manual shown below and which is defined by ICAO as a tool for risk management analysis was employed for this stage of the study, together with some criteria applied by States in the Region that have experience in conducting safety assessments.

**Table for determining the likelihood of an event**

	<b>Meaning</b>	<b>Value</b>
Frequent	Likely to occur many times (has occurred frequently)	5
Occasional	Likely to occur some times (has occurred infrequently)	4
Remote	Unlikely to occur, but possible (has occurred rarely)	3
Improbable	Highly unlikely to occur (not known to have occurred)	2
Highly improbable	Almost inconceivable	1

4.2.2 This table is based on recorded data of operational experiences at the global level and is defined for each of the probabilities of an event's occurrence, in accordance with the associated quantitative details:

- Frequent: 1 to  $10^{-3}$  per hour of flight
- Occasional:  $10^{-3}$  to  $10^{-5}$  per hour of flight
- Remote:  $10^{-5}$  to  $10^{-7}$  per hour of flight
- Improbable:  $10^{-7}$  to  $10^{-9}$  per hour of flight
- Highly improbable:  $+ 10^{-9}$  per hour of flight

### **4.3 Aspects considered to determine the severity of risks associated with the implementation of the new Flight Plan format**

4.3.1 It should be noted that this severity analysis constituted the fourth step of the operational risk assessment process, making it possible to determine the likelihood of an event in relation to its severity, which represents the essence of risk management.

4.3.2 All of the hazards and consequences identified in the preceding chapters were analyzed at this stage, with a view to determining the worst imaginable scenario and, using it as a reference point, identifying possible defences for promoting a stronger scenario able to tolerate operational errors.

4.3.3 The following table defined in the SMM Manual, together with some criteria applied by States in the Region, were used to determine this important risk management function:

**Risk severity (seriousness)**

Seriousness of the event	Meaning	Value
Catastrophic	-Destruction of equipment -Multiple deaths	
Hazardous	-Considerable reduction in safety margins, physical damage or such a heavy workload that operators are unable to perform their duties precisely and fully -Serious injuries -Major damage to equipment	B
Major	-Significant reduction in safety margins, reduction of the operator's skill in responding to adverse conditions due to an increased workload or as a result of conditions impeding his/her efficiency -Serious incident -Bodily injuries	C
Minor	-Interference -Operational limitations -Use of emergency procedures -Minor incidents	D
Insignificant	-Slight consequences	E

4.3.4 Once the **severity** of all identified consequences of hazards were judged and the results catalogued, in accordance with the risk assessment process, they were recorded in the HIRA table.



## Chapter 5 Assessment and mitigation of operational risks associated with the implementation of the new FPL format

### 5.1 Introduction

5.1.1 The level of risk was determined at this stage of the process. It was gauged to determine its acceptability by comparing the various criteria listed in the tables. The aim was to evaluate the level of operational risk and to assign its respective tolerance rate, based on defences applied later. The idea has definitely been to reduce operational risk to an acceptable level (ALoS), while maintaining a realistic outlook in keeping with the Region's characteristics.

### 5.2 Criteria for mitigating operational risks

5.2.1 The acceptability of a risk will depend upon the result of the defences analyzed in the proposed scenario. For purposes of the implementation of the new Flight Plan format, the defences existing in the SAM Region were determined for each of the hazards identified (see paragraph 3.6 above).

5.2.2 The SAM/RA workshop used the table below to assess the safety risks, based on the current defences/existing requirements:

Safety risk assessment table

Risk probability	Risk Severity				
	Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
<b>Frequent</b> 5	<b>5A</b>	<b>5B</b>	<b>5C</b>	<b>5D</b>	<b>5E</b>
<b>Occasional</b> 4	<b>4A</b>	<b>4B</b>	<b>4C</b>	<b>4D</b>	<b>4E</b>
<b>Remote</b> 3	<b>3A</b>	<b>3B</b>	<b>3C</b>	<b>3D</b>	<b>3E</b>
<b>Improbable</b> 2	<b>2A</b>	<b>2B</b>	<b>2C</b>	<b>2D</b>	<b>2E</b>
<b>Extremely improbable</b> 1	<b>1A</b>	<b>1B</b>	<b>1C</b>	<b>1D</b>	<b>1E</b>

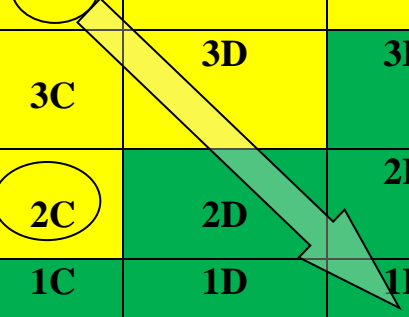
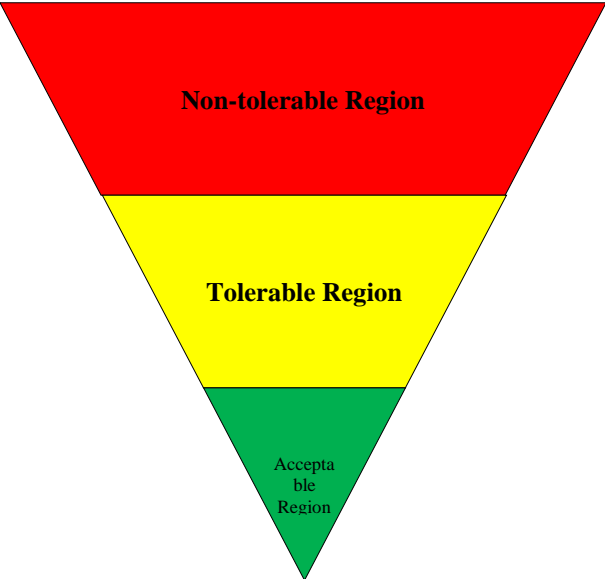


Figure 04 Pattern for risk tolerability assessment

5.2.3 Insofar as the concept of tolerable risk is concerned, there is an area between acceptable and unacceptable risks where the decision as to its acceptability is not clear and decisive. These latter risks belong to a category in which the risk may be tolerable if reduced as low as reasonably practicable (ALARP). Risks categorized as belonging in the intermediate area of the triangle of operational risk mitigation criteria (shown in the figure below) are marked as being acceptable, if the risk is mitigated. These risk levels may require taking a decision at the management level. Risks in this category are not classified as tolerable without careful consideration. Each case must be examined individually, as stated

in the previous chapters, in the light of the costs and benefits to be derived from implementation of the proposed changes.

**Table of operational risk mitigation criteria**

<b>Suggested Criteria</b>	<b>Risk assessment rate</b>	<b>Suggested criteria</b>
	<b>5A, 5B, 5C, 4A, 4B, 3A</b>	<b>Unacceptable under existing circumstances</b>
	<b>5D, 53, 4C, 4D, 4E, 3B, 3C, 3D, 2A, 2B, 2C</b>	<b>Acceptable, based on risk mitigation. May require decision from the directorate</b>
	<b>3E, 2D, 2E, 1A, 1B, 1C, 1D, 1E</b>	<b>Acceptable</b>

**Figure 5 Tolerability pattern of safety risk**

After considering the above information and examining the current defences/existing requirements, the SAM/RA workshop classified each identified hazard in the following way:

**Hazard 1: Failure to comply with agreements reached for the implementation of Amendment 1**

Occasional (4) Minor (D) - Acceptable if the risk is mitigated.

**Hazard 2: Inadequate planning by ATCO, in accordance with the contents of the New Flight Plan format**

Remote (3) Major (C) - Acceptable if the risk is mitigated.

**Hazard 3: Loss, in the transition period, of Flight Plan information/data during the handling of Associated Messages between FIRs that apply and do not apply Amendment 1.**

Occasional (4) Minor (D) - Acceptable if the risk is mitigated

**Hazard 4: Loss of information and/or flight data during the processing of Repetitive Flight Plans (RPL)**

Frequent (5) Minor (D) - Acceptable if the risk is mitigated

5.2.4 In all cases, the classification of the safety risks, after the analysis described above and application of the tables on the assessment and mitigation of those risks, revealed them to be acceptable, provided that action was taken to mitigate those risks.

**5.3 Description of measures for mitigating risks associated with the implementation of the new Flight Plan format in the SAM Region**

5.3.1 Using the results of the analysis for reference purposes, at this stage of the process risk management was applied and the projected scenario in the region was examined.

5.3.2 To facilitate the analysis, the mitigating and defensive measures that must be incorporated in order to keep risks at an acceptable level and obtain effective and safe implementation of the new Flight Plan format are described in detail below. The residual risk foreseen after its implementation is presented, together with the mitigating measures to keep the risk at a controlled level. The causes or components of the hazards and their relationship to the mitigating measures to be implemented can be noted more clearly in the HIRA form (**Chapter 5, Appendix A**), as follows:

**Hazard 1: Failure to comply with agreements reached for the implementation of Amendment 1**

- a) Drafting and complying with the Action Plan, which will make it possible to reduce the impact of cause 1;
- b) Having trained human resources available to implement the Action Plan, which will make it possible to reduce the impact of cause 2;
- c) The assistance of the ICAO Regional Office in helping States implement Amendment 1, which will make it possible to reduce the impact of causes 3 and 6;
- d) Conducting seminars, workshops and courses and publishing bulletins and the web page that report on the change, which will make it possible to reduce the impact of causes 3 and 6;
- e) Possessing the necessary technological and economic resources to implement the Action Plan, which will make it possible to reduce the impact of causes 4 and 5.

**Residual risk: Improbable (2) Minor (D) -Acceptable**

**Hazard 2: Inadequate planning by ATCO, in accordance with the contents of the New Flight Plan format**

- a) Revising and adjusting regulations concerning the application of Amendment 1 to Doc 4444, which will make it possible to reduce the impact of causes 1 and 2;
- b) Publishing the revised regulations far enough in advance to support the ATM community in the necessary training for implementing the contents of Amendment 1, which will make it possible to reduce the impact of causes 1 and 2;
- c) Preparing and disseminating AICs that contain guidelines and procedures for implementing Amendment 1, which will make it possible to reduce the impact of causes 1 and 2;
- d) Revising the Operational Manuals of the ATS and ARO/AIS units in order to adjust them to the new operational procedures stemming from the implementation of Amendment 1, which will make it possible to reduce the impact of causes 1 and 2;

- e) Planning, preparing and carrying out the training envisaged in causes 2, 3, 6, 7 and 9, ensuring that objectives are fulfilled and, if necessary, promoting occasional corrections;
- f) Evaluating whether the technical requirements already identified will ensure that causes 4, 5 and 8 do not arise and promoting occasional corrective technical measures;
- g) Updating its software to satisfy the requirements identified for the implementation of Amendment 1, with a view to guaranteeing that causes 4, 5 and 8 do not arise; and
- h) Conducting external and internal tests to ensure that causes 4, 5 and 8 do not arise.

**Residual risk: Improbable (2) Major (C) -Acceptable if the risk is mitigated (controlled risk)**

**Hazard 3: Loss, in the transition period, of Flight Plan information/data during the handling of Associated Messages between FIRs that apply and do not apply Amendment 1.**

- a) Preparing and disseminating AICs that contain guidelines and procedures for implementing Amendment 1, which will make it possible to reduce the impact of causes 1, 2, 3 and 5;
- b) Preparing an AIP Supplement containing guidelines and operational procedures for acceptance of the Flight Plan and the handling of associated messages during the transition period, which will make it possible to reduce the impact of causes 1, 2, 3 and 5;
- c) Planning the implementation, dissemination and training of the ATM community in operational procedures for elaborating, accepting and handling Flight Plans and associated messages during the transition period, which will make it possible to reduce the impact of causes 1, 2, 3 and 5;
- d) Preparing and displaying in the ARO/AIS rooms a checklist (conversion of data/information from the current to the new contents and a list showing the status of FIRs as to the application of the Amendment), in order to reduce errors in Flight Plan acceptance and handling, which will make it possible to reduce the impact of causes 1, 2, 3 and 5;
- e) Making arrangements to provide access to the ICAO FITS website in the ARO/AIS rooms, which will make it possible to reduce the impact of causes 1, 2, 3 and 5;
- f) Evaluating whether the technical requirements already identified ensure that causes 3 and 4 will not arise and promoting any occasional corrective technical measures;
- g) Maintaining the necessary software to meet the identified requirements for implementing Amendment 1, with a view to ensuring that causes 3 and 4 do not arise;
- h) Conducting external and internal tests to ensure that causes 3 and 4 do not arise;
- i) Updating the automated systems, when appropriate, to put the data/information for Flight Plan Item 18 in the order established in Amendment 1, which will make it possible to reduce the impact of cause 5;
- j) Establishing procedures for managing DOF information and route descriptions containing the course and distances when handling messages to FIRs that do not yet apply Amendment 1, which will make it possible to reduce the impact of cause 6;
- k) Establishing an effective procedure for updating the FITS website, which will make it possible to reduce the impact of cause 7;
- l) Establishing procedures to enable PSNA officials to immediately issue NOTAMs on any change in implementation status of the Amendment in national FIRs, which will make it possible to reduce the impact of cause 7; and
- m) Establishing an alternative procedure for failure of access to the FITS website, which will make it possible to reduce the impact of cause 7.

**Residual risk: Improbable (2) Minor (D) -Acceptable**

**Hazard 4: Loss of information and/or flight data during the processing of Repetitive Flight Plans (RPL)**

- a) Developing standardized procedures for conversion of RPL files produced by airline companies for dispatch to and insertion in automated air traffic control systems, which will make it possible to reduce the impact of cause 1; and
- b) Developing standardized procedures for RPL handling that make it impossible not to fill in the RPLQ Box with the priority stipulated by Amendment 1 regarding Flight Plan Item18, which will make it possible to reduce the impact of cause 2.

**Residual risk: Remote (3) Insignificant (E) -Acceptable**

APPENDIX A TO CHAPTER 5

HAZARD IDENTIFICATION AND RISK MANAGEMENT (HIRA) FORM

Description of Hazard Nº 1	Failure to comply with agreements reached for the implementation of Amendment 1					
Causes	Scenario	Current defences/Existing Requirements	Consequences associated with the hazard	Initial Risk Likelihood Severity	Mitigating Measures	Residual Risk Foreseen
<p>1) Lack of an Action Plan for implementing Amendment 1;</p> <p>2) Lack of human resources;</p> <p>3) No motivation to make the change;</p> <p>4) Lack of technological resources (equipment and software to support the processing of flight plan);</p> <p>5) Lack of economic resources (training budget; technological implementations);</p> <p>6) Lack of corporate communication and communication with users.</p>	<p>1) Organizational structure of the States and rest of the aeronautical community;</p> <p>2) Transition phase; and</p> <p>3) Global application of Amendment 1 as of 15 Nov. 2012.</p>	<p>1) Requirements for implementation of Amendment 1 to the 15<sup>th</sup> Edition of ICAO Doc 4444.</p> <p>2) Regulations for each providing State.</p> <p>3) Action plan - Implementation of the new Flight Plan format through the application of Amendment 1 to the 15th edition.</p> <p>4) Guidance manuals for preparing action plans for the implementation of Amendment 1.</p> <p>5) Conclusions of the regional meetings, seminars and workshops.</p>	<p>1) Significant increase in the ATC workload.</p> <p>2) Flight delays.</p>	<p>Occasional (4) Minor (D)</p> <p>Acceptable if the risk is mitigated</p>	<p><u>Cause 1</u> 1/1 Elaborating and complying with the Action Plan, which will make it possible to reduce the impact of Cause 1;</p> <p><u>Cause 2</u> 2/1 Having trained human resources available to implement the Action Plan, which will make it possible to reduce the impact of Cause 2;</p> <p><u>Causes 3 and 6</u> 3/1 The assistance of the ICAO Regional Office in helping States implement Amendment 1, which will make it possible to reduce the impact of Causes 3 and 6;</p> <p>4/1 Conducting seminars, workshops and courses and publishing bulletins and web pages that report on the change, which will make it possible to reduce the impact of Causes 3 and 6;</p> <p><u>Causes 4 and 5</u> 5/1 Possessing the necessary</p>	<p>Improbable (2) Minor (D)</p> <p>Acceptable</p>

					technological and economic resources to implement the Action Plan, which will make it possible to reduce the impact of Causes 4 and 5.	

### HAZARD IDENTIFICATION AND RISK MANAGEMENT (HIRA) FORM

Description of Hazard Nº 2	Inadequate planning by ATCO, in accordance with the contents of the New Flight Plan format					
Causes	Scenario	Current defences/Existing Requirements	Consequences associated with the hazard	Initial Risk Likelihood Severity	Mitigating Measures	Residual Risk Foreseen
<p>1) Lack of or inadequate regulations for the filing, approval and processing of the Flight Plan and associated messages (RPL, FPL, CPL and CHG, DLA and CNL);</p> <p>2) Inadequate interpretation by ATCO of the new CPL data/information;</p> <p>3) Inadequate application by ATCO of the new CPL data/information;</p> <p>4) Failures in the presentation of CPL data in the flight progress strip;</p>	<p>1) Interface, during the transition period, between ATC units that apply and do not apply Amendment 1;</p> <p>2) Controlled airspaces;</p> <p>3) Sectors with a large volume of traffic.</p>	<p>1) Requirements for implementation of Amendment 1 to the 15<sup>th</sup> edition of ICAO Doc 4444.</p> <p>2) Regulations of each providing State.</p> <p>3) Action plan - Implementation of the new Flight Plan format through the application of Amendment 1 to the 15<sup>th</sup> edition.</p> <p>4) Guidance manuals for preparing Action Plans for the implementation of Amendment 1.</p> <p>5) Conclusions of regional meetings, seminars and workshops.</p>	<p>Reduction of aircraft separation with an operational error of low/moderate severity</p>	<p>Remote (3) Major (C)</p> <p>Acceptable if the risk is mitigated</p>	<p><u>Causes 1 and 2</u></p> <p>1/2) Revising and adjusting regulations concerning the application of Amendment 1 to Doc 4444, which will make it possible to reduce the impact of causes 1 and 2;</p> <p>2/2) Publishing the revised regulations far enough in advance to support the ATM community in the necessary training for implementing the contents of Amendment 1, which will make it possible to reduce the impact of causes 1 and 2;</p> <p>3/2) Elaborating and disclosing AICs that contain guidelines and procedures for implementing Amendment 1, which will make it possible to reduce the impact of Causes 1 and 2;</p> <p>4/2) Revising the Operational Manuals of the ATS and</p>	<p>Improbable (2) Major (C)</p> <p>Acceptable if the risk is mitigated</p>

Description of Hazard N° 2	Inadequate planning by ATCO, in accordance with the contents of the New Flight Plan format					
Causes	Scenario	Current defences/Existing Requirements	Consequences associated with the hazard	Initial Risk Likelihood Severity	Mitigating Measures	Residual Risk Foreseen
<p>5) Failures in the presentation of CPL data on the runway label;</p> <p>6) Inadequate interpretation by ARO-AIS in the processing of the Flight Plan and of associated messages;</p> <p>7) Inadequate interpretation and/or application of the new Flight Plan format by flight operations officers and crew;</p> <p>8) Software failure in the processing of the Flight Plan and associated messages.</p> <p>9) Inadequate disclosure of the implementation of the new Flight Plan format.</p>		<p>6) Automated systems</p> <p>7) Media for communication and transmission of flight plans.</p> <p>8) Digital network (REDDIG)</p> <p>9) Repetitive refresher programmes and training programmes in new systems</p>			<p>ARO/AIS units in order to adjust them to the new operational procedures stemming from the implementation of Amendment 1, which will make it possible to reduce the impact of Causes 1 and 2;</p> <p><u>Causes 2, 3, 6, 7 and 9</u> 5/2) Planning, preparing and carrying out the training envisaged in causes 2, 3, 6, 7 and 9, ensuring that the objectives are fulfilled and, if necessary, promoting the adoption of occasional corrections;</p> <p><u>Causes 4, 5, and 8</u> 6/2) Evaluating whether the technical requirements already identified will ensure that causes 4, 5 and 8 do not arise and promoting occasional corrective technical measures;</p> <p>7/2) Updating its software to satisfy the requirements identified for the implementation of Amendment 1, with a view to guaranteeing that causes 4, 5 and 8 do not arise;</p> <p>8/2) Conducting external and internal tests to ensure that causes 4, 5 and 8 do not arise.</p>	



### HAZARD IDENTIFICATION AND RISK MANAGEMENT (HIRA) FORM

Description of Hazard Nº 3	Loss, in the transition period, of Flight Plan information/data during the handling of Associated Messages between FIRs that apply and do not apply Amendment 1,					
Causes	Scenario	Current defences/Existing Requirements	Consequences associated with the hazard	Initial Risk Likelihood Severity	Mitigating Measures	Residual Risk Foreseen
<p>1) Inadequate filling out of the Flight Plan and associated messages in the NEW and CURRENT formats;</p> <p>2) Inadequate interpretation of the NEW and CURRENT contents during the Flight Plan acceptance process;</p> <p>3) Failure in the (automated or manual) conversion from the CURRENT to the NEW format of the Flight Plan and associated messages;</p> <p>4) Software failure in the processing of Flight Plans that present the DOF for associated messages;</p> <p>5) Failure in compliance with the sequence established in</p>	<p>1) Handling of Flight Plans and associated messages regarding international flights between FIRs that apply and do not apply the NEW content;</p> <p>2) Coordination of the traffic between FIRs in adjacent States;</p> <p>3) Controlled airspace;</p> <p>4) Sectors with high traffic density; and</p> <p>5) States with a low level of automation</p>	<p>1) Requirements for implementation of Amendment 1 to the 15<sup>th</sup> Edition of ICAO Doc 4444;</p> <p>2) Regulations of each providing State;</p> <p>3) Action plan - Implementation of the new Flight Plan format through the application of Amendment 1 to the 15th Edition of the ICAO PANS-ATM (Doc 4444);</p> <p>4) Guidance manuals for preparing Action Plans for the implementation of Amendment 1;</p> <p>5) Conclusions of regional meetings, seminars and workshops;</p>	<p>Significant increase in ATC workload</p>	<p>Minor (4) Occasional (D)</p> <p>Acceptable if the risk is mitigated</p>	<p><u>Causes 1, 2, 3 and 5</u></p> <p>1/3) Elaborating and disclosing AICs that contain guidelines and procedures for implementing Amendment 1, which will make it possible to reduce the impact of causes 1, 2, 3 and 5;</p> <p>2/3) Elaborating an AIP Supplement containing guidelines and operational procedures for acceptance of the Flight Plan and the handling of associated messages during the transition period, which will make it possible to reduce the impact of causes 1, 2, 3 and 5;</p> <p>3/3) Planning the implementation, disclosure and training of the ATM community in operational procedures for elaborating, accepting and handling Flight Plans and associated messages during the transition period, which will make it possible to reduce the impact of causes 1, 2, 3 and 5;</p> <p>4/3) Preparing and displaying in the ARO/AIS rooms a checklist (conversion of data/information</p>	<p>Improbable (2) Minor (D)</p> <p>Acceptable if the risk is mitigated</p>

Description of Hazard Nº 3	Loss, in the transition period, of Flight Plan information/data during the handling of Associated Messages between FIRs that apply and do not apply Amendment 1,					
Causes	Scenario	Current defences/Existing Requirements	Consequences associated with the hazard	Initial Risk Likelihood Severity	Mitigating Measures	Residual Risk Foreseen
<p>Amendment 1 for introducing data/information in Item 18 while generating/transmitting the FPL.</p> <p>6) Failure in the conversion of DOF data and route descriptions with course and distance for FIRs that do not apply Amendment 1.</p> <p>7) Failure in the updating of the ICAO website (FITS) with respect to the implementation status of Amendment 1 to Doc 4444.</p> <p>8) Failure in access to ICAO's website (FITS) with respect to the implementation status of Amendment 1 to Doc 444.</p>		<p>6) SAM Conversion Table from the CURRENT to the NEW contents of Flight Plan Items 10 and 18;</p> <p>7) Automated systems;</p> <p>8) Flight Plan communication and transmission media;</p> <p>9) Digital network (REDDIG);</p> <p>10) Repeated refresher programmes and training programmes in new systems</p>			<p>from the current to the new contents and a list showing the status of FIRs as to the application of the amendment), in order to reduce errors in Flight Plan acceptance and handling, which will make it possible to reduce the impact of causes 1, 2, 3 and 5;</p> <p>5/3) Making arrangements to provide access to ICAO's FITS website in the ARO/AIS rooms, which will make it possible to reduce the impact of causes 1, 2, 3 and 5;</p> <p><u>Causes 3 and 4</u></p> <p>6/3) Evaluating whether the technical requirements already identified ensure that causes 3 and 4 will not arise and promoting any occasional corrective technical measures;</p> <p>7/3) Maintaining the necessary software to meet the identified requirements for implementing Amendment 1, with a view to ensuring that causes 3 and 4 do not arise;</p> <p>8/3) Conducting external and internal tests to ensure that causes 3 and 4 do not arise;</p>	

Description of Hazard Nº 3	Loss, in the transition period, of Flight Plan information/data during the handling of Associated Messages between FIRs that apply and do not apply Amendment 1,					
Causes	Scenario	Current defences/Existing Requirements	Consequences associated with the hazard	Initial Risk Likelihood Severity	Mitigating Measures	Residual Risk Foreseen
					<p><u>Cause 5</u> 9/3) Updating the automated systems, when appropriate, to put the data/information for Flight Plan Item 18 in the order established in Amendment 1, which will make it possible to reduce the impact of cause 5;</p> <p><u>Cause 6</u> 10/3) Establishing procedures for managing DOF information and route descriptions containing the course and distances when handling messages to FIRs that do not yet apply Amendment 1, which will make it possible to reduce the impact of cause 6;</p> <p><u>Cause 7</u> 11/3) Establishing an effective procedure for updating the FITS website, which will make it possible to reduce the impact of cause 7;</p> <p>12/3) Establishing procedures to enable PSNA officials to immediately issue NOTAMs on any change in implementation status of the Amendment in national FIRs, which will make it possible to reduce the impact of cause 7;</p> <p>13/3) Establishing an alternative</p>	

Description of Hazard Nº 3	Loss, in the transition period, of Flight Plan information/data during the handling of Associated Messages between FIRs that apply and do not apply Amendment 1,					
Causes	Scenario	Current defences/Existing Requirements	Consequences associated with the hazard	Initial Risk Likelihood Severity	Mitigating Measures	Residual Risk Foreseen
					procedure for failure of access to the FITS website, which will make it possible to reduce the impact of cause 7.	

#### HAZARD IDENTIFICATION AND RISK MANAGEMENT (HIRA) FORM

Description of Hazard Nº 4	Loss of information and/or flight data during the processing of Repetitive Flight Plans (RPL)					
Causes	Scenario	Current defences/Existing Requirements	Consequences associated with the hazard	Initial risk Likelihood Severity	Mitigating measures	Residual Risk Foreseen
1) Incompatibility between the new data/information of Flight Plan Item 10 (equipment and capabilities) and RPL Box Q; and  2) Failure in the order in which the data/information is filled out in RPL Box Q.	1) RPL importation for automated systems;  2) Handling of RPL lists among States that signed the RPL Letter of Agreement; and  3) Large percentage of the daily RPL movement.	1) Requirements for implementation of Amendment 1 to the 15 <sup>th</sup> Edition of ICAO Doc 4444.  2) Action Plan – Implementation of the new Flight Plan format through the application of Amendment 1 to the 15 <sup>th</sup> edition.  3) Guidance manuals for preparing Action Plans for the	Significant increase in the ATCO workload	Frequent (5) Minor (D)  Acceptable if the risk is mitigated	<u>Cause 1</u> 1/4) Developing standardized procedures for conversion of RPL files produced by airline companies for dispatch to and insertion in automated air traffic control systems, which will make it possible to reduce the impact of cause 1;  <u>Cause 2</u> 2/4) Developing standardized procedures for RPL handling that make it impossible not to fill in the RPLQ Box with the priority stipulated by Amendment 1 regarding Flight Plan Item 18, which will make it possible to reduce the impact of cause 2.	Remote (3) Insignificant (E)  Acceptable

Description of Hazard Nº 4	Loss of information and/or flight data during the processing of Repetitive Flight Plans (RPL)					
Causes	Scenario	Current defences/Existing Requirements	Consequences associated with the hazard	Initial risk Likelihood Severity	Mitigating measures	Residual Risk Foreseen
		implementation of Amendment 1; and  4) Repetitive Flight Plan Letters of Agreement.				

## **Chapter 6      Recommendations stemming from the safety assessment for the implementation of the new Flight Plan format**

### **6.1              Introduction**

6.1.1              This Chapter sets out the recommendations resulting from the qualitative study made by experts during the SAM/RA/02 workshop to determine the level of risk associated with the implementation of the new Flight Plan format.

The conclusion to be reached from what has been described and examined in this safety study is that the introduction and implementation of mitigating measures could keep safety risks at an acceptable and, in some cases, tolerable level. This means that the risk is controlled and that the implementation in the South American Region of Amendment 1 to Doc 4444 regarding the new Flight Plan format would be operationally safe. Some recommendations whose implementation is considered essential for keeping safety rates at an acceptable level are spelled out below. The HIRA Form in Appendix A to Chapter 5 clearly stipulates the tasks that, from the regional viewpoint, should be considered by States and air navigation service providers in the South American Region.

### **6.2              Recommendations**

6.2.1              The commitment of States and Organizations in the Region, whether civil aviation authorities (DGCA), air navigation service providers (ANSP), air carriers or airspace users, is of basic importance for achieving the level of safety needed to implement Amendment 1 to Document 4444 with regard to the new Flight Plan format. What is needed is an extremely strong commitment from all parties involved to the execution of the Regional Action Plan and particularly of the national plans for implementing the new Flight Plan format.

6.2.2              **Civil aviation authorities** need to closely follow-up on and continuously monitor the preparatory activities that air navigation service providers, air carriers and different airspace users should carry out, providing coordination and assisting all actors in the process whenever necessary. They must also commit to develop, approve and publish, by the appropriate deadlines defined in the Regional and national Action Plans, the standards, regulations, advisory circulars and other documentation containing guidelines and procedures for implementing Amendment 1, so that the ATM community is able to comply with the agreements entered into at the regional and global levels.

6.2.3              They must also have sufficient trained human resources and the necessary technological and economic means to implement the Action Plan as appropriate. As an additional measure, authorities, when needed, should hold seminars, workshops and courses, publish bulletins and post sufficient information in their websites containing the expected changes and necessary documentation.

6.2.4              **Air navigation service providers** (ANSP) should carefully perform the activities stipulated in the Action Plans and, insofar as regulations are concerned, update the Operational Manuals of the ATS and ARO/AIS units, in order to bring them into line with the new operational procedures stemming from the implementation of Amendment 1. They should also prepare checklists to simplify the task of ARO/AIS personnel of replacing the CURRENT contents with the NEW information and a list specifying the Flight Plan application status in the FIRs. An in-depth analysis should be conducted, as well, of the internal operational letters of agreement within the ANSPs and ATC units and with units of adjacent States. In this connection, the letters of application of repetitive flight plans should be revised and standardized procedures developed for their treatment, as needed. For the transition period, ANSPs should draw up contingency plans and procedures to deal with sudden changes in the implementation status of Amendment 1.

6.2.5 When needed, they should update their software to put the sequence established in Amendment 1 in the proper order and in that way meet the requirements identified in that Amendment and fulfill the technical requirements to ensure its safe implementation.

6.2.6 ANSPs should take action, in the area of personnel training, to plan the execution, disclosure and training of the ATM community in the operational procedures for filling out, elaborating, accepting and handing Flight Plans and associated messages during the transition period.

6.2.7 The **ICAO South American Regional Office**, for its part, will continue to offer full support for the implementation of Amendment 1 to Doc 4444 by organizing regional events and facilitating the participation of States, ANSPs, air carriers and users in general. It must also make the necessary changes, together with States that have problems in implementing Amendment 1, in the mechanisms for assistance, whether they be specific missions or staff training. In addition, it should establish an effective alternate procedure for acceding to the FITS website in order to update the status of execution of the Action Plan for implementing the new Flight Plan format.

6.2.8 Although this safety assessment is aimed at States and service providers, **air carriers and airspace users** are a key player in the execution and fulfillment of Amendment 1 and as such should promote and apply the new Flight Plan format, in keeping with the Region's Action Plan. For that reason, it is important for the air carriers and airspace users involved to take the necessary measures to provide for mitigating action and measures in the areas of regulation, technology and personnel training, with a view to facilitating the implementation of the new Flight Plan format during both the transition period and as of the 15 November 2012 final deadline, after which only the NEW Flight Plan format will be accepted.

6.2.9 To repeat, the purpose of this safety assessment is to serve States for reference purposes. It should be stressed that this safety assessment in no way releases States from their obligation to make their own assessment of safety as a result of the implementation of the new Flight Plan format, as stipulated in national action plans on the subject.

6.2.10 In ending, it is recommended that the observations made and conclusions reached in this assessment of safety for the implementation of Amendment 1 to Doc.4444 should be conserved as part of the Region's safety library and should make it possible to jointly define the baseline for recording improvements suggested in the future with regard to risk management and the level of safety achieved by the SAM Region.

## Appendix A Chapter 6

### Definitions

**Control Area:** A controlled airspace extending upwards from a specified limit above the earth. The concept of Control Area also covers airways and the TMA.

**Area Control Centre:** A unit established to provide air traffic control service to controlled flights in areas under its jurisdiction.

**Flight Plan:** Specified information provided to air traffic service units, relative to an intended flight or portion of a flight of an aircraft.

**CURRENT Flight Plan:** Current flight planning and ATS message formats defined in the existing version of the PANS-ATM

**NEW Flight Plan:** Flight planning and ATS message formats specified in Amendment 1 to the PANS-ATM

**Filed Flight Plan:** The Flight Plan as filed with an ATS unit by the pilot or a designated representative, without any subsequent changes.

**Current Flight Plan:** The Flight Plan, including changes, if any, brought about by subsequent clearances.



### Acronyms

ACC	Area Control Centre
AFTN	Aeronautical Fixed Telecommunication Network
AIC	Aeronautical Information Circular
AIM	Aeronautical Information Management
AIS	Aeronautical Information Service
AIP	Aeronautical Information Publication
ALARP	As Low As Reasonably Practicable
ALoS	Acceptable Level of Safety
AMHS	Automatic Message Handling System
ANSP	Air Navigation Service Provider
ATC	Air Traffic Control
ATCO	Air Traffic Controller
ATM	Air Traffic Management
ATS	Air Traffic Service
ARO	Air Traffic Services Reporting Office
CHG	Message to Change
CNL	Message to Cancel
CNS	Communications, Navigation and Surveillance
DEP	Departure Message
DLA	Delay Message
DEL	En Route Delay Message
DOF	Date of Flight
FIR	Flight Information Region
FITS	Flight Plan Implementation and Tracking System
FPL	Filed Flight Plan Message
GREPECAS	CAR/SAM Planning and Implementation Group
HIRA	Hazard Identification and Risk Assessment Form
ICAO	International Civil Aviation Organization
HMI	Human-Machine Interface
NOTAM	Notice to Airmen
PANS	Procedures for Air Navigation Services
PBN	Performance-Based Navigation
REDDIG	Digital network
RQP	Request Flight Plan
RQS	Request Supplementary Flight Plan
SAMIG	SAM Implementation Group
SAMRA	Workshop on the Safety Assessment of the South American Region
SMM	Safety Management Manual