INTERNATIONAL CIVIL AVIATION ORGANIZATION
South American Regional Office

SECOND MEETING OF AIR NAVIGATION AND SAFETY DIRECTORS OF THE SAM REGION

FINAL REPORT

Lima, Peru, 14 to 16 September 2015

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of ICAO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

TABLE OF CONTENTS

HISTORY OF THE MEETING

ii-1 PLACE AND DURATION OF THE MEETING

The Second Meeting of Air Navigation and Safety Directors of the SAM Region was held at the premises of the ICAO Regional Office in Lima, Peru, from 14 to 16 September 2015.

ii-2 OPENING CEREMONY AND OTHER MATTERS

Mr. Oscar Quesada, Deputy Regional Director of the ICAO South American Office, greeted the participants and acknowledged their continuous support to the regional activities undertaken by the South American Regional Office, as well the continuous support of civil aviation authorities of the South American Region. Likewise, he highlighted the importance that implementation priorities in the SAM Region had been identified by the Meeting, with the respective goals and associated metrics.

ii-3 SCHEDULE, ORGANIZATION, WORKING METHODS, OFFICERS AND SECRETARIAT

The Meeting agreed to hold its sessions from 08:30 to 15:00 hours, with appropriate breaks. The Meeting decided to work as a single committee and in working groups.

The Meeting had two Secretaries: Mr. Onofrio Smarrelli, Regional CNS Officer of the Lima Regional Office, on the part of air navigation, and Mr. Marcelo Ureña, Regional Safety Officer of the Lima Regional Office, in the safety area.

The Secretariat also reckoned with the support of all the Officers of the Lima Regional Office: Mrs. Lia Ricalde, Regional Officer for Aerodromes, Air Routes and Ground Aids, Miss Verónica Chávez, Technical Assistance Officer, Mr. Jorge Armoa, Regional Aeronautical Information Management and Meteorology Officer, Mr. Roberto Arca, Regional Air Navigation Services and Safety Officer, Mr. Jorge Fernández, Air Transport Management and Search and Rescue Advisor, and Mr. Marcio Abreu, Air Accident and Incident Investigation Expert.

ii-4 WORKING LANGUAGES

The working language of the Meeting was Spanish.

ii-5 AGENDA

The following Agenda was adopted:

Agenda Item 1:	Declaration of Bogota: Follow-up to the implementation of air navigation priorities
Agenda Item 2:	Declaration of Bogota: Follow-up to the implementation of safety priorities
Agenda Item 3:	Follow-up to the results of the Second Safety Conference
Agenda Item 4:	Follow-up to the State-Industry collaborative process for the transition from the existing air navigation support systems to those specified in the ASBU

Agenda Item 5: Safety and air navigation implementation priorities for the period 2017-2019

Agenda Item 6: Other business

ii-6 **ATTENDANCE**

The Meeting was attended by 23 participants from 11 SAM States (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Panama, Paraguay, Peru, Uruguay, and Venezuela), one representative of IATA, in addition to ICAO Officers. The list of participants appears on page iii-1.

LISTA DE PARTICIPANTES

ARGENTINA

Ignacio Oliva Whiteley
Director de Inspección y Auditoría
ANAC
Azopardo 1405, Piso 3
C.A. Buenos Aires C1107, Argentina
Tel: +5411 5941-3000, Ext. 69328
E-mail: ioliva@anac.gob.ar
Website: www.anac.gob.ar

Guillermo Ricardo Cocchi
Director de Servicios de Navegación Aérea
Dirección General de Control de Tránsito Aéreo
Junín 1060, 1er piso
Buenos Aires, Argentina
Tel: +54 11 5789-8419
E-mail: dsna@faa.mil.ar

Alejandro Daniel Núñez
Jefe Departamento GSO
Dirección General de Control de Tránsito Aéreo
Junín 1060, 1er piso
Buenos Aires, Argentina
Tel: +54 11 5789-8419
E-mail: a.nuniez@gmail.com

BOLIVIA

Franz Tamayo de la Rocha
Director de Seguridad Operacional
Dirección General de Aeronáutica Civil
Edificio Multicine Piso # 9
Av. Arce # 2631
La Paz, Bolivia
Tel: + (5912) 2444450
E-mail ftamayo@dgac.gob.bo

Eric Piérola Miranda
Inspector de Operaciones
Dirección General de Aeronáutica Civil
Edificio Multicine Piso # 9
Av. Arce # 2631
La Paz, Bolivia
Tel: + (5912) 2444450
E-mail: epierola@dgac.gob.bo

Oscar Arauco Frías
Jefe de Proyecto OACI-BOL
Dirección General de Aeronáutica Civil
Edificio Multicine Piso # 9
Av. Arce # 2631
La Paz, Bolivia
Tel: + (5912) 2444450
E-mail: oarauco@dgac.gob.bo

BRASIL / BRAZIL

Gustavo Adolfo Camargo de Oliveira
Jefe del Sudepartamento de Operaciones
Departamento de Control del Espacio Aéreo (DECEA)
Av. General Justo 160
Rio de Janeiro 20021-130, Brasil

Tel: +55 21 994996391
E-mail: gustavogaco@decea.gov.br
Website: http://www.decea.gov.br

Alexandre Simões Lima
Jefe de ASEGCEA
Departamento de Control del Espacio Aéreo (DECEA)
Av. General Justo 160
Rio de Janeiro 20021-130, Brasil

Tel: +55 21 994996749
E-mail: asegcea@decea.gov.br
simoesasl@decea.gov.br
Website: http://www.decea.gov.br

CHILE

Lorenzo Sepúlveda
Director de Seguridad Operacional
Dirección General Aeronáutica Civil (DGAC)
Miguel Claro 1314
Providencia, Santiago, Chile

Tel: +56 2 439-2000
E-mail lsepulveda@dgac.gob.cl
Website: www.dgac.gob.cl

Alonso Lefno
Director de Prevención de Accidentes
Dirección General Aeronáutica Civil (DGAC)
Miguel Claro 1314
Providencia, Santiago, Chile

Tel: +56 2 439-2000
E-mail alefno@dgac.gob.cl
Website: www.dgac.gob.cl

COLOMBIA

Edgar Francisco Sánchez Canosa
Director Servicios a la Navegación Aérea
Unidad Administrativa Especial de
Aeronáutica Civil (UAEAC)
Av. El Dorado No. 112-09
Bogotá, Colombia

Tel: +57 317 517-0991
E-mail: Edgar.FSanchez@aerocivil.gov.co
Website: www.aeronautica .gob.co

Freddy Augusto Bonilla Herrera
Secretario de Seguridad Aérea
Unidad Administrativa Especial de
Aeronáutica Civil (UAEAC)
Av. El Dorado No. 103-23
Bogotá, Colombia

Tel: +57 91 296-2028
E-mail: freddy.augusto@aerocivil.gov.co
Website: www.aeronautica.gob.co

Sergio Francisco Velásquez Vega
Jefe Grupo de Seguridad Operacional
Unidad Administrativa Especial de
Aeronáutica Civil (UAEAC)
Av. El Dorado No. 103-23
Bogotá, Colombia

Tel: +57 91 296-2364
E-mail: sergio.velasquez@aerocivil.gov.co
Website: www.aeronáutica.gob.co

ECUADOR

Patricio Eguez
Coordinador CNS
Dirección General de Aviación Civil (DGAC)
Buenos Aires Oe1-53 y 10 de Agosto
Quito, Ecuador

Tel: 593 2 294 7400 Ext. 4536
E-mail: patricio.eguez@aviacioncivil.gob.ec
patricio_eguez@yahoo.com
Website: www.aviacioncivil.gob.ec

PANAMA

Flor Eneida Silvera Cardales
Directora de Navegación Aérea
Autoridad de Aeronáutica Civil de Panama (AACP)
Albrook, Edificio 646
Ciudad de Panamá
República de Panamá

Tel: +507 315 9801 9846
E-mail fsilvera@aeronautica.gob.pa
Website: www.aeronautica.gob.pa

PARAGUAY

Roque Díaz Estigarribia
Director de Aeronáutica
Dirección Nacional de Aeronáutica Civil (DINAC)
Mariscal López 1164
Edificio Ministerio de Defensa
Asunción, Paraguay

Tel: +595 21 211978
E-mail roquediaze@gmail.com
dac@dinac.gov.py
Website: www.dinac.gov.py

Hernán Colman
Coordinador Nacional de Seguridad Operacional
Dirección Nacional de Aeronáutica Civil (DINAC)
Mariscal López 1164
Edificio Ministerio de Defensa
Asunción, Paraguay

Tel: +595 21 203615
E-mail: hc_dac@dinac.gov.py
Website: www.dinac.gov.py

PERÚ

Miguel Gonzales Saldarriaga
Coordinador Técnico de Aeronavegabilidad
Dirección General de Aeronáutica Civil (DGAC)
Jr. Zorritos 1203
Lima, Perú

Tel: +511 6157869
E-mail: mgonzales@mtc.gob.pe
Website: www.mtc.gob.pe/transportes/aeronautica_civil

José Víctor Mondragón Hernández
Inspector
Dirección General de Aeronáutica Civil (DGAC)
Jr. Zorritos 1203
Lima, Perú

Tel: +511 6157800
E-mail: jmondragon@mtc.gob.pe
Website: www.mtc.gob.pe/transportes/aeronautica_civil

URUGUAY

Guillermo Gurbindo Marroni
Director de Navegación Aérea
Dirección Nacional de Aviación Civil
Infraestructura Aeronáutica (DINACIA)
Wilson Ferreira Aldunate 5519
Canelones, Uruguay

Tel: +5982 604-0408; 098592116
E-mail: ggurbindo@dinacia.gub.uy
Website: www.dinacia.gub.uy

Marcos Revetria
Jefe Departamento Aeronavegabilidad
Dirección Nacional de Aviación Civil
Infraestructura Aeronáutica (DINACIA)
Wilson Ferreira Aldunate 5519
Canelones, Uruguay

Tel: +5982 604-0408
E-mail:
Website: www.dinacia.gub.uy

VENEZUELA

José Leonardy Jardines García
Director de los Servicios de la Navegación Aérea
Instituto Nacional de Aeronáutica (INAC)
Torre Británica - Altamira
Caracas, Venezuela

Tel: +58 416 6091705
E-mail: jose.jardines@inac.gob.ve
Website: http://www.inac.gob.ve

Carlos Mata Sosa
Gerente General de Seguridad Aeronáutica
Instituto Nacional de Aeronáutica (INAC)
Torre Británica - Altamira
Caracas, Venezuela

Tel: +58 412 3337369
E-mail: carlos.mata@inac.gob.ve
Website: http://www.inac.gob.ve

IATA

Julio de Souza Pereira
Assistant Director, Safety Flight Operations
Av. Ibirapuera, 2.332, cj22, Torre I
Sao Paulo, Brasil

Tel: +51 11 2187-4236 / 993800953
E-mail: pereiraj@iata.org

OACI / ICAO

Onofrio Smarrelli
Oficial Regional CNS
Oficina Regional Sudamericana
Av. Víctor Andrés Belaúnde No.147
Centro Empresarial Real, Vía Principal No.102
Edificio Real 4, Piso 4, San Isidro
Lima 27, Perú

Tel: +511 611-8686
Fax: +511 611-8689
E-mail: osmarrelli@icao.int
Web: www.icao.int/sam

Marcelo Ureña
Oficial Regional FLS
Oficina Regional Sudamericana
Av. Víctor Andrés Belaúnde No.147
Centro Empresarial Real, Vía Principal No.102
Edificio Real 4, Piso 4, San Isidro
Lima 27, Perú

Tel: +511 611-8686
Fax: +511 611-8689
E-mail: murena@icao.int
Web: www.icao.int/sam

Lia Ricalde
Oficial Regional AGA
Oficina Regional Sudamericana
Av. Víctor Andrés Belaúnde No.147
Centro Empresarial Real, Vía Principal No.102
Edificio Real 4, Piso 4, San Isidro
Lima 27, Perú

Tel: +511 611-8686
Fax: +511 611-8689
E-mail: lricalde@icao.int
Web: www.icao.int/sam

Verónica Chávez
Oficial Regional TAO
Oficina Regional Sudamericana
Av. Víctor Andrés Belaúnde No.147
Centro Empresarial Real, Vía Principal No.102
Edificio Real 4, Piso 4, San Isidro
Lima 27, Perú

Tel: +511 611-8686
Fax: +511 611-8689
E-mail: vchavez@icao.int
Web: www.icao.int/sam

Jorge Armoa
Oficial Regional AIM-MET
Oficina Regional Sudamericana
Av. Víctor Andrés Belaúnde No.147
Centro Empresarial Real, Vía Principal No.102
Edificio Real 4, Piso 4, San Isidro
Lima 27, Perú

Tel: +511 611-8686
Fax: +511 611-8689
E-mail: jarmoa@icao.int
Web: www.icao.int/sam

Roberto Arca
Oficial Regional ANS & FLS
Oficina Regional Sudamericana
Av. Víctor Andrés Belaúnde No.147
Centro Empresarial Real, Vía Principal No.102
Edificio Real 4, Piso 4, San Isidro
Lima 27, Perú

Tel: +511 611-8686
Fax: +511 611-8689
E-mail: rarca@icao.int
Web: www.icao.int/sam

Jorge Fernández
Asesor ATM/SAR
Oficina Regional Sudamericana
Av. Víctor Andrés Belaúnde No.147
Centro Empresarial Real, Vía Principal No.102
Edificio Real 4, Piso 4, San Isidro
Lima 27, Perú

Tel: +511 611-8686
Fax: +511 611-8689
E-mail: jfernandezd@icao.int
Web: www.icao.int/sam

Marcio Abreu
Especialista AIG
Oficina Regional Sudamericana
Av. Víctor Andrés Belaúnde No.147
Centro Empresarial Real, Vía Principal No.102
Edificio Real 4, Piso 4, San Isidro
Lima 27, Perú

Tel: +511 611-8686
Fax: +511 611-8689
E-mail: mabreu@icao.int
Web: www.icao.int/sam

Agenda Item 1: Declaration of Bogota: Follow up to the implementation of air navigation priorities

1.1 Under this agenda item, the Meeting reviewed WP/02 - *Follow-up to PBN implementation goals*, WP/03 - *Follow-up to ATFM implementation goals*, WP/04 - *Follow-up to AIM implementation goals*, WP/05- *Follow-up to AMHS interconnection implementation;* WP/06 - *Follow-up to AIDC interconnection implementation*, and IP/03 - *PBN training in the SAM Region*, all presented by the Secretariat.

PBN implementation

1.2 The Meeting took note of the progress made in the implementation of PBN en route and in the terminal area, SIDs and STARs, and PBN approach procedures in relation to the Declaration of Bogota goals. Information was also provided on progress made in fuel savings in 2014.

PBN en route

1.3 Regarding this implementation, the Meeting noted that 20% progress has been made in the implementation of RNAV routes in the upper airspace, achieving a total improvement of 60%. This means that the 60% goal established in the Declaration of Bogota has been achieved. **Table 1** shows the number of regional routes in the upper airspace, both conventional and PBN, as well as the percentage of PBN routes achieved.

Total ATS routes in upper airspace	Conventional routes	PBN routes	% PBN routes implemented	Declaration of Bogota indicator: % PBN routes
165	66	99	**60%**	**60%**

Table 1 – ATS routes in the upper airspace (conventional and PBN)

PBN in TMA

1.4 The Meeting was informed that the main South American TMAs are being completely redesigned through the application of PBN within the context of PBN workshops sponsored by Regional Project RLA/06/901. Since the GREPECAS/17 meeting, the four workshops covering the planning, design, validation, and implementation phases, respectively, have already been conducted.

1.5 The Meeting also highlighted the importance of having one or more leading operators participate in the various PBN implementation phases, because that helped in the collaborative decision-making process and to improve the results of the planning, design, and validation phases. This has been demonstrated in practice in the projects presented by Chile, Panama, and Peru.

1.6 The Meeting took note of the investment made in personnel training, especially in the PANS-OPS area, for instance the basic PANS-OPS and PBN course conducted in Ecuador, and the PANS-OPS PBN and RNP AR courses conducted in Argentina. It also took note of the Peruvian strategy of sending its experts to courses in ENAC, France.

1.7 The Meeting agreed on the importance of using Flight Operations Quality Assurance (FOQA) data as a good tool for design and, especially, for post-implementation assessment of a PBN airspace concept, since it provides real data on the benefits achieved.

1.8 PBN implementation in terminal areas continues at a good pace in Brazil, Chile, Panama, and Peru, and out of 34 candidate TMAs, PBN has already been implemented in 6 terminal areas, and 6 other areas are expected to be completed by 2016.

1.9 The Meeting recognised that, in order to make progress in this implementation, a greater commitment and support was required from air navigation authorities for timely completion of the corresponding tasks.

Implementation of SIDs, STARs, and PBN approach procedures

1.10 The Declaration of Bogota urges States to implement PBN SIDs and STARs at international aerodromes, with a view to achieving the established goals, based on CDO and CCO techniques. Furthermore, the Declaration calls on States to implement APV approach procedures to comply with ICAO Assembly Resolution A37/11. Information provided to date on the status of implementation of PBN SIDs, STARs, and IACs is shown in **Table 2**. The following aspects must be highlighted:

a) The information highlighted in yellow indicates the Declaration of Bogota goals and the share of each State in their attainment. Information in red shows the status for the SAM Region, which is the main indicator to consider, bearing in mind that the goal to be attained is of regional scope.

b) The APV or RNP AR or LNAV IAP column considers that the threshold has an APV procedure, whether through an APV IAC based on RNP APCH with VNAV or through an RNP APCH AR IAC. It is also considered that the threshold meets the requirements of the Declaration of Bogota, and that an LNAV procedure is in place in accordance with ICAO Assembly Resolution A37-11. However, it is expected that the States will implement APV procedures.

c) The information was provided by SAM States and their AIPs. Data from Colombia, Guyana, French Guiana, and Suriname was collected only from the respective AIPs, since no information had been received directly from these States to date.

d) RNAV SIDs and STARs with no indication of the navigation specification were considered as PBN SIDs and STARs.

e) Only airports that had completed the validation process were deemed to have implemented CDO and CCO, taking into account, *inter alia*, training of controllers, the required changes to letters of agreement, and operational procedures to prevent aircraft from unnecessarily levelling during climb or descent, etc.

Note: SAM States shall inform about the airports that have completed the aforementioned CDO and CCO implementation process.

f) Consideration was given to airports having at least one threshold with IFR operations, according to FASID Table AOP-1.

g) Consideration was given to thresholds with IFR operations according to FASID Table AOP-1.

ESTADO/ STATE	IAC							SID		STAR		SID O STAR PBN AIRPORT	CCO	CDO
	APV/LNAV													
	IAP APV	IAP RNPAR	IAP APV o RNP AR	IAP APV o RNP AIR PORT	IAP RNPAR "ONLY" AIRPORT	IAP LNAV	IAP APV o RNP AR o LNAV	SID PBN AIRPORT	SID PBN	STAR PBN AIRPORT	STAR PBN			
Argentina	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	31,25%	20,83%	31,25%	0,00%	0,00%
Bolivia	20,00%	0,00%	20,00%	33,33%	0,00%	40,00%	40,00%	33,33%	20,00%	0,00%	0,00%	33,33%	0,00%	0,00%
Brasil /Brazil	82,76%	5,17%	82,76%	85,19%	11,11%	89,66%	89,66%	85,19%	86,21%	33,33%	39,66%	85,19%	10,42%	10,42%
Chile	60,00%	30,00%	75,00%	75,00%	50,00%	85,00%	85,00%	75,00%	61,11%	87,50%	80,00%	87,50%	5,88%	5,88%
Colombia	0,00%	8,33%	8,33%	9,09%	9,09%	75,00%	75,00%	81,82%	83,33%	66,67%	66,67%	83,33%	0,00%	0,00%
Ecuador	0,00%	25,00%	25,00%	25,00%	25,00%	25,00%	25,00%	25,00%	25,00%	25,00%	25,00%	25,00%	0,00%	0,00%
Guyana Francesa / Fr. Gui.	0,00%	0,00%	0,00%	0,00%	0,00%	100,00%	100,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
Guyana	0,00%	0,00%	0,00%	0,00%	0,00%	75,00%	75,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
Panamá	28,57%	57,14%	57,14%	50,00%	40,00%	57,14%	71,43%	20,00%	28,57%	20,00%	28,57%	20,00%	0,00%	0,00%
Paraguay	100,00%	0,00%	100,00%	100,00%	0,00%	100,00%	100,00%	50,00%	50,00%	0,00%	0,00%	50,00%	0,00%	0,00%
Peru	0,00%	33,33%	33,33%	37,50%	37,50%	11,11%	44,44%	12,50%	22,22%	87,50%	77,78%	87,50%	12,50%	12,50%
Suriname	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
Uruguay	0,00%	0,00%	0,00%	0,00%	0,00%	62,50%	62,50%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
Venezuela	100,00%	0,00%	100,00%	100,00%	0,00%	100,00%	100,00%	100,00%	100,00%	0,00%	0,00%	100,00%	0,00%	0,00%
Región SAM / SAM Region	43,53%	11,18%	50,00%	47,92%	14,43%	63,53%	65,88%	51,55%	51,79%	38,78%	37,06%	64.29%	4,52%	4,52%

Table 2 - Status of implementation of PBN SIDs, STARs, and IACs

1.11 The Meeting took note of the progress made in the implementation of SIDs/ STARs since GREPECAS/17 to date, 11% for SIDs and 5% for STARs. Currently, the total for PBN SIDs/ STARs is 64.29%, which exceeds the 60% goal established in the Declaration of Bogota for this implementation.

1.12 Progress made since GREPECAS/17 in the application of CDO and CCO operational amounts to 4.52%, which represents only 10% of the Declaration of Bogota goal (40%).

1.13 In this sense, the Meeting recognised the need to take into account the complexities of implementing the CDO/CCO operational techniques in PBN SID and STAR design. In this sense, it was noted that, in very complex terminals, these implementations have limitations that do not always permit their use.

1.14 Regarding the foregoing, the Meeting stated that the goal established primarily in the Declaration of Bogota on the application of these techniques following all the validation requirements would probably not be met, and that implementation would be better in less complex terminals. The Meeting estimated that no more than 30% implementation would be achieved by late 2016.

1.15 Regarding PBN approaches (APV or RNP AR or LNAV) contemplated in Assembly Resolution A 37/11, the Meeting analysed the status of implementation of 65.88% of PBN approaches and the participants expressed their trust in achieving the goal of the Declaration by the end of 2016.

Reduction of CO2 emissions

1.16 The Meeting took note of emission reductions resulting from the implementation of Stage 1 of Version 3. The annual goal of 40,000 tonnes of CO2 savings established in the Declaration of Bogota was exceeded in 2014. The South American Region has achieved 51,132 tonnes of CO2 savings.

1.17 The Secretariat reported that, according to the IFSET tool, 2,133 tonnes of fuel had been saved so far in 2015, equivalent to 6,738 tonnes of CO2 savings. In this regard, the States were urged to report savings obtained in 2015 in order to complete the annual information on the goal established in the Declaration of Bogota.

ATFM implementation

1.18 Regarding this implementation, the Meeting recognised that progress had not been as expected, resulting in restrictions that not only had a severe impact on capacity but also generated a safety risk, especially in those transcontinental flows on which measures were applied, and affected flight and fuel planning.

1.19 In this regard, the Secretariat noted that the appropriate solution to avoid these situations was to implement at least one Flow Control Position or one Flow Control Unit--depending on the level of complexity--at each Area Control Centre (ACC). Initially, these positions or units would only provide services during a selective schedule, taking into account peak traffic hours. Additionally, a supervisor could cover a Flow Management Position during periods of less traffic.

1.20 This implementation is urgently required in order to establish a strategic ATFM plan that will give users operational predictability and timely connectivity, since the absence of ATFM units affects all hubs in the Region and causes unnecessary congestion in parking aprons, resulting in significant losses for airlines.

1.21 Regarding the status of implementation of ATFM, although 85% of the States in the Region have performed runway and ATC sector capacity calculations in preparation for implementation, only 42% of the States in the Region have implemented ATFM, as shown in the following table:

Percentage of States that have implemented ATFM in Flow Management Units (FMUs) or Positions (FMPs)

September 2015	ARG	BOL	BRA	CHI	COL	FGY	ECU	GUY	PAN	PAR	PER	SUR	URU	VEN
42%	NO	NO	Y	Y	Y	NO	NO	NO	NO	Y	NO	NO	Y	Y

1.22 The Meeting recalled that, at its third meeting, the GREPECAS Programmes and Projects Review Committee approved Conclusion PPRC/3-5: "*Actions for ATFM implementation in the SAM Region*", encouraging SAM States to replicate the training received, avoid adopting ATFM measures in those FIRs where ATFM management units or positions have not been implemented, and introduce the applicable ATFM procedures in their letters of operational agreement. **Appendix A** to this part of the report contains information provided by the States on their plans concerning this conclusion.

Implementation of quality in AIM

1.23 The Meeting reviewed the progress made by the Project for the implementation of quality in aeronautical information management (AIM) units. The AIM QMS project has made progress in pre-certification activities. In this sense, **Uruguay** completed quality certification under ISO 9001:2008 on 31 August 2015, **Peru** foresees its certification by 29 October 2015, **Panama** foresees to complete the process and obtain certification in December 2015, and **Argentina** foresees its certification in February 2016.

1.24 **Colombia** and **Venezuela** still cannot certify their AIM systems, and the most disquieting delay in quality implementation corresponds to the systems in **Bolivia, Guyana,** and **Suriname**.

1.25 Regarding the above, **Bolivia** reported at the SAM/AIM/8 meeting that the civil aviation authority of Bolivia had requested the top management of the service provider, AASANA, to assign higher priority and take urgent action to further the implementation and subsequent certification of quality systems in AIM units.

1.26 In order to proceed with the AIS-to-AIM Transition Plan, those States that have not yet completed their AIM QMS certification and that are below 80% implementation, must be requested to submit an Action Plan. The experts responsible for implementation in AIM units must provide a detailed description of the tasks included in this Action Plan.

1.27 The main articulating factor for certification of quality management systems in the States is top management. Top management, when involved in the quality certification of systems and their processes, can help remove managerial barriers that delay implementation.

1.28 The Declaration of Bogota secures the commitment of top management to quality certification of AIM processes. This commitment must be replicated nationwide in order to achieve certification within the established deadline.

1.29 The latest information on the status of quality implementation in shown in the following table:

STATE	% OF IMPLEMENTATION September 2015	IMPLEMENTATION DATE	% PROGRESS	REMARKS
Argentina	80%	FEB/2016	10%	
Bolivia	30%	TBD	0%	The provider (AASANA) has trained two experts for quality implementation
Brazil	**CERTIFIED**	----------	----------	
Chile	**CERTIFIED**	----------	----------	
Colombia	90%	FEB/MAR/2016/	0%	15/09/2015
Ecuador	**CERTIFIED**	----------	----------	
French Guiana	**CERTIFIED**	----------	----------	
Guyana	25%	DEC/2015	25%	No progress made.
Panama	70%	JAN/FEB 2016	20%	15/09/2015
Paraguay	**CERTIFIED**	----------	----------	
Peru	100%	OCT/2015	20%	Internal audit conducted.
Suriname	45%	AUG/2014	0%	No progress made.
Uruguay	**CERTIFIED**	AUG/2015	--------	
Venezuela	70%	NOV/2014	0%	No progress made.

Supplementary AIM activities concerning the second transition phase

Status of e-TOD implementation

1.30 The Meeting took note that some progress had been made in parallel in e-TOD implementation, in accordance with Annex 15 provisions, as part of electronic provision of data in the digital phase of AIM.

1.31 The status of implementation in the Region of electronic terrain and obstacle data concerning the different areas specified in Annex 15 is described in WP/04 of this Meeting.

1.32 The delegate of IATA noted how important it would be for safety and for emergency procedure planning by the airlines that States could make available the obstacle databases to operators in order to plan such procedures based on updated data.

AMHS interconnection

1.33 The Meeting was informed that since the RACC/13 meeting, none of the AMHS interconnections foreseen in the Declaration of Bogota had been implemented. Out of the 26 interconnections that should be implemented by the end of 2016, only the following had been completed: Peru-Colombia, Peru–Ecuador, Guyana-Suriname, and Argentina-Paraguay, which were completed prior to the Declaration of Bogota between 2010 and 2013.

1.34 The Meeting was also informed that in 2014, AMHS interconnection trials were conducted between Brazil-Peru, Brazil-Argentina, and Brazil-Paraguay. The results of initial trials between Brazil-Peru and Brazil-Argentina were positive, but their completion and commissioning were

delayed because of activities associated to the organisation of the FIFA world cup in Brazil, the reconstruction of AMHS architecture, the installation of the digital network REDDIG II, as well as problems with AMHS circuits during the final operating phase of REDDIG II, which were resolved after two months by the installing company.

1.35 The Meeting noted that operational implementation trials had been resumed between Brazil and Peru in early September 2015. In this sense, Brazil informed that, since trials were still in progress, the respective results would be presented at the SAM/IG/16.

1.36 Although the situation was not considered favourable for the completion of all AMHS interconnections by the end of 2016, the Meeting considered that the goal established in the Declaration of Bogota was still valid, taking into account the dates indicated in **Appendix B** to this agenda item.

AIDC interconnection

1.37 The Meeting took note that to date, out of the 15 interconnections foreseen in the Declaration of Bogota, only the AIDC between the Lima ACC and the Guayaquil ACC was operating since early August 2015.

1.38 Regarding the other foreseen AIDC interconnections, the Meeting noted that the AIDC between the Lima ACC and the Bogota ACC, and between the Guayaquil ACC and the Bogota ACC were in the pre-operational phase since early May 2015, with operations expected for the last quarter of 2015.

1.39 The Meeting also noted that positive interconnection trials had been conducted between the Asunción ACC and the Ezeiza ACC, the Bogota ACC and the Panama ACC, and between the new Iquique ACC and the Lima ACC.

1.40 Regarding AIDC interconnection between Brazil and its adjacent States, the Meeting noted that coordination had started for the conduction of trials between the ATECH (Sagitario) AIDC system of Brazil and the INDRA Aircon 2100 automated system of Peru.

1.41 The Meeting was informed that the AIDC interconnections between Brazil and its adjacent States would be implemented by the second half of 2016. The AIDC interconnections between Venezuela and its adjacent States in the SAM Region would be implemented after 2016, since Venezuela was starting a modernisation process at the Maiquetía ACC that could end after 2016. Accordingly, the AIDC interconnections of Venezuela would be rescheduled for the period 2017-2019.

1.42 The Meeting felt that some air navigation implementation priorities foreseen for late 2016 would require an additional effort by the States in order to achieve the proposed goals. Accordingly, the Meeting urged the States to do their utmost to attain the implementation goals agreed in the Declaration of Bogota.

APPENDIX A

STRATEGIC PLANNING TABLE FOR THE DEVELOPMENT OF ATFM														
CONC. PPRC/3-5 action of compliance	**ARG**	**BOL**	**BRA**	**CHI**	**COL**	**ECU**	**FGY**	**GUY**	**PAN**	**PAR**	**PER**	**SUR**	**URU**	**VEN**
	Month/ Year	**Month/ Year**	**Month/ Year**	**Month/ Year**	**Month/ Year**	**Month/ Year**	**Month/ Year**	**Month/ Year**	**Month/ Year**	**Month/ Year**	**Month/ Year**	**Month/ Year**	**Month/ Year**	**Month/ Year**
1- Replica of ATFM courses to speccialized personnel	**11/2015**				**N/A**	**First Quarter /2015**			**04/2015 02/2016**	**11/2016**	**02/2016**		**OK**	
2- Bilateral Letters of Agreement with appropriate ATFM procedures without impacting on safety	**04/2016**					**2nd.Sem/ 2016**			**First Quarter /2016**	**10/2015**	**05/2016**			
3- Implementation of Flow Control Positions or Units (FMPs/FMUs)	**2nd Sem/2016 SABE**				**ACC unified**	**2016**			**06/2016**		**12/2015**		**OK**	

Note: If your State has already implemented ATFM, place only the date foreseen for compliance 2.

APPENDIX B

AMHS INTERCONNECTION REQUIREMENT AND DATE OF IMPLEMENTATION

STATE	AMHS INTERCONNECTION REQUIREMENT/	DATE OF IMPLEMENTATION/	REMARKS
Argentina	Bolivia	Mar 2016	
	Brazil	Dec 2015	Operational implementation pending.
	Chile	Dec 2015	
	Paraguay	Mar 2012	Implemented
	Peru	Nov 2015	
	Uruguay	Dec 2015	
Bolivia	Argentina	Mar 2016	
	Brazil	Apr 2016	
	Peru	May 2016	
Brazil	Argentina	Sep 2015	Operational implementation pending
	Bolivia	Apr 2016	
	Colombia	Dec 2015	
	Guyana	Mar 2016	
	French Guiana	TBD	AMHS implementation pending.
	Paraguay	Dec 2015	
	Peru	Nov 2015	
	Suriname	Mar 2016	
	Uruguay	Dec 2015	
	Venezuela	Dec 2015	Reschedule date of implementation
Chile	Argentina	Dec 2015	
	Peru	Dec 2015	
Colombia	Brazil	Dec 2015	
	Ecuador	Dec 2015	
	Panama	Dec 2015	
	Peru	Sep 2010	Implemented
	Venezuela	Jun 2016	
Ecuador	Colombia	Dec 2015	
	Peru	Jul 2012	Implemented
	Venezuela	May 2016	
French Guiana (France)	Brazil	TBD	AMHS implementation pending
	Venezuela	TBD	AMHS implementation pending
Guyana	Brazil	Mar 2016	

STATE	AMHS INTERCONNECTION REQUIREMENT/	DATE OF IMPLEMENTATION/	REMARKS
	Suriname	Jun 2011	Implemented
	Venezuela	Dec 2016	
Panama	Colombia	Dec 2015	
Paraguay	Argentina	Mar 2012	Implemented
	Brazil	Dec 2015	
Peru	Argentina	Nov 2015	
	Bolivia	May 2016	
	Brazil	Jul 2014	Operational implementation pending.
	Chile	Dec 2015	
	Colombia	Sep 2010	Implemented
	Ecuador	Jul 2012	Implemented
	Venezuela	Dec 2016	
Suriname	Brazil	Dec 2016	
	Guyana	Jun 2011	Implemented
	Venezuela	Jun 2016	
Uruguay	Argentina	Dec 2015	
	Brazil	Dec 2015	
Venezuela	Brazil	Dec 2015	
	Colombia	Jun 2016	
	Ecuador	May 2016	
	Guyana	Dec 2016	
	French Guiana	TBD	AMHS implementation pending.
	Peru	Jun 2016	
	Suriname	Jun 2016	

Agenda Item 2: Declaration of Bogota: Follow-up to the implementation of safety priorities

2.1 Under this agenda item, the Meeting reviewed WP/07 – *Follow-up to goals concerning safety, accidents, and runway excursions, WP/08 – Follow-up to goals concerning aerodrome certification,* and WP/09 – *Follow-up to goals concerning the implementation of the State Safety Programme (SSP) and the safety management system (SMS).*

2.2 Regarding WP/07, the Meeting noted that ICAO had incorporated in all of its processes methods to measure the performance of its various strategic objectives through the establishment of a set of indicators and metrics and performance dashboards for each Region.

2.3 The SAM performance dashboard allows States to manage safety based on measurements. This approach is based on the following essential safety principles: results-based activities, and the need to measure in order to manage.

2.4 Furthermore, the Global aviation safety plan (GASP) in its latest version, the conclusions and goals established at the First Meeting of Air Navigation and Safety Directors of the SAM Region (Lima, Peru, 21-22 October 2013), and the goals established in the Declaration of Bogota (RAAC/13, Bogotá, Colombia, 4-6 December 2013) provide clear guidelines and concrete goals for improving safety in the region.

2.5 Next, the Meeting took note of the results of the three first goals established in the Declaration of Bogota.

Safety oversight – Goal: Reach 80% of effective implementation (EI) in the SAM Region

2.6 From November 2011 to August 2015, ICAO has performed nine (9) USOAP CMA activities in South America as follows: six (6) ICAO coordinated validation missions (ICVM) to the following States: Colombia (2011); Ecuador and Suriname (2012); Argentina and Venezuela (2013), and Uruguay (2014); two (2) CMA audits, one in Bolivia (2013) and the other in Peru (2014), and one (1) *ex situ* activity in Brazil (2015).

2.7 During this period, SAM States improved their EI as follows: Colombia 16%, Ecuador 12.4%, Suriname 9.6%, Argentina 9.1%, Venezuela 10.9%, Peru 6.21%, Uruguay 16.66% and Brazil (1.72%). The only State that did not improve its EI was Bolivia, whose EI dropped from 72.08 to 67.99% (- 4.09%).

2.8 Based on the results obtained, the average EI for the SAM Region increased from 66.31% in 2011 to 72.08% in August 2015, that is **5.77%**, which represents an average improvement by activity of approximately 0.64%.

2.9 Taking into account that the SAM Region must improve its EI by 8% by December 2016 in order to meet the goal of the Declaration of Bogota, Panama, Ecuador, Brazil, Guyana, Paraguay, and Bolivia are required to improve their individual averages by **17.34%** during CMA activities scheduled for 2015 and 2016.

2.10 Likewise, Argentina, Venezuela, Colombia, Peru, Chile, Uruguay, and Suriname may request an ex situ activity to assist the SAM Region achieve the 80% goal, provided they have completed more than 50% of their corrective action plans (CAPs).

2.11 In order to check compliance with this goal, the Meeting agreed to create a task force to develop a working paper (WP) to be presented at the Fourteenth Meeting of Civil Aviation Authorities of the South American Region (RAAC/14) to be held in Santiago de Chile, on 28-30 October 2015, reporting on effective implementation (EI) achieved to date by SAM States and their projections for December 2016, including the analysis of the preliminary results of the Panama audit and its impact on EI, the implementation of the SSP and SMS, and the solution to the 91 protocol questions (PQs) on safety management that will be effective on 1 January 2016. The task force consisted of the representative of Chile as rapporteur, and the representatives of Peru, Paraguay, Bolivia, Colombia, and Venezuela as members. Brazil, through Mr. Daniel Vieira Soares, requested to participate as a member of the task force. The meeting agreed that the working paper should be sent to the Secretariat by 30 September 2015 to be circulated to SAM States prior to its submission to the RAAC/14 meeting.

2.12 **Appendix A** to this part of the report contains a detailed analysis of indicators, goals, and mitigation measures for improving safety oversight.

Accidents – Goal: Reduce the SAM accident rate gap by 50% with respect to the global accident rate

2.13 Taking into account the data obtained from the ICAO SPACE iSTARS 2.0 website, and using 2013 data as a basis, the following figure shows the evolution of the SAM accident rate for aircraft over 5 700 kg in scheduled commercial air transport operations since 2014. In 2014, the goal was to reduce the gap to 0.35; however, the goal was not achieved, since the gap that year was 0.5, 0.15 above the goal. The goal for 2015 is to reduce the gap down to 0.25. As of 31 August 2015, the gap was 1.7 in favour, since no accidents had occurred in the SAM Region until that date.

	2013	2014	2015
SAM rate	3.6	4.6	0
Global rate	2.9	4.1	1.7
Gap	0.7	**- 0.5**	**+ 1.7**
50% of the gap	**- 0.35**	**- 0.25**	
Results	Start of exercise	0.15 above goal	Goal exceeded by 31 August 2015

2.14 **Appendix B** to this part of the report contains a detailed analysis of indicators, goals, and mitigation measures for improving the aviation accident rate.

Runway excursions – Goal: Reduce the runway excursion rate by 20% with respect to the SAM average rate (2007-2012)

2.15 Performance indicators for runway excursions in the SAM Region were obtained from the ADREP application at the ICAO SPACE iSTARS 2.0 website. The information taken for the samples was for all type of operations with aircraft over 5 700 kg and for accidents occurred between 2007 and 31 August 2015, by State of occurrence.

2.16 The average runway excursion rate between 2007 and 2012 was 2.24 accidents per million departures. Upon deducting 20% from the rate of 2.24 %, the goal for the SAM Region is adjusted to a rate of 1.8 accidents per million departures.

2.17 Upon analysing the information from indicators for the SAM Region, a reduction of accidents is observed between 2007 and 31 August 2015, obtaining a rate of 0 in 2012, 1.56 in 2013, 0.51 in 2014 and 0 until 31 August 2015. Accordingly, the SAM Region meets the runway excursion goal established in the Declaration of Bogota.

2.18 **Appendix C** to this part of the report contains a detailed analysis of indicators, goals, and mitigation measures to improve the runway excursion accident rate.

Aerodrome certification – Goal: 20% of international aerodromes certified

2.19 WP/08 analyses the challenges and measures taken for aerodrome certification. The goal established in the **Declaration of Bogota** is to duly certify 20% of international aerodromes in the South American Region (Doc 8733 – ICAO CAR/SAM Air Navigation Plan). By June 2015, the number of certified aerodromes increased from the eight (8) originally reported in 2013 to twelve (12). It is estimated that the 20% goal will be attained in the Region.

2.20 However, taking into account that ICAO has the aerodrome certification requirement since 2001, a work plan has been drafted to achieve 100% aerodromes certified in the Region. As **first step**, the set of Latin American Aeronautical Regulations for Aerodromes (LAR AGA) has been developed under the umbrella of the Regional Safety Oversight Cooperation System (SRVSOP) to provide the States with regulations adjusted to the regional reality. These regulations were approved by the SRVSOP General Board in their second edition: LAR 154 – Aerodrome design, LAR 153 – Operation of aerodromes, LAR 139 – Aerodrome certification. Likewise, the Aerodrome Inspector Manual (MIAGA) has been approved in is first edition, based on the principles of the Regional System and the LAR AGA set. The MIAGA is a tool to guide work and for training the State aerodrome inspector.

2.21 The recent introduction of PANS-Aerodromes by ICAO will permit the initial certification of aerodromes, which was not contemplated in the original certification SARPs, thus allowing civil aviation authorities to oversee aerodromes that have an initial certification, with a view to issuing a definitive certification. In this regard, the Sixth meeting of the AGA Panel (RPEAGA/06) **proposed a third amendment to the LAR AGA set** that would put it in an optimum position for its harmonisation/adoption by SRVSOP member States into their national regulations. It would include, *inter alia*:

a) Inclusion of the **latest amendments to Annex 14,** Vol. I (including amendment 12) into the **LAR AGA set**.

b) New **LAR PANS Aerodromes**, which introduces the concept of initial certification of aerodromes with continuous oversight, the principle of compatibility, and for those existing airports that have non-conformities with ICAO SARPs, compliance alternatives that ensure safety.

c) New **LAR 155 – Heliports**. For the first time in the Region, Uruguay has given international status to a heliport. In this regard, the SRVSOP Technical Committee deemed it advisable to propose the approval of a heliport design and operation document in order to comply with ICAO SARPs related to international heliports.

d) **Harmonisation strategy**. In order to assist member States in the process of adoption/harmonisation of the LAR AGA set, the Technical Committee has developed a proposal of a specific strategy for aerodromes, for use by the States that deem it advisable.

2.22 As **second step**, a regional bank of State aerodrome inspectors with the proper training in their specialty to conduct oversight activities with multinational groups is being created. It is felt that, in order to ensure a sustainable solution, the best strategy is for them to have the proper training in their specialty. This group of LAR AGA State inspectors would be capable of assisting the States that do not have the necessary number of trained inspectors for aerodrome certification and continuous oversight activities.

2.23 In this regard, taking into account that the goal of 20% of aerodromes certified would be reached by the end of 2016, in accordance with the Declaration of Bogota, and with aerodrome regulations harmonised/adopted through the LAR AGA set (third amendment), and duly trained LAR AGA inspectors, it is expected that during the next **triennium 2017-2019, 100% of international aerodromes of the Region will obtain at least initial certification** (**Appendix D**), as defined in the PANS Aerodromes.

Implementation of the State safety programme (SSP) and the safety management system (SMS) – Goal:

- ***Achieve 67% implementation of the SSP***
- ***Achieve 100% implementation of the SMS of service providers***

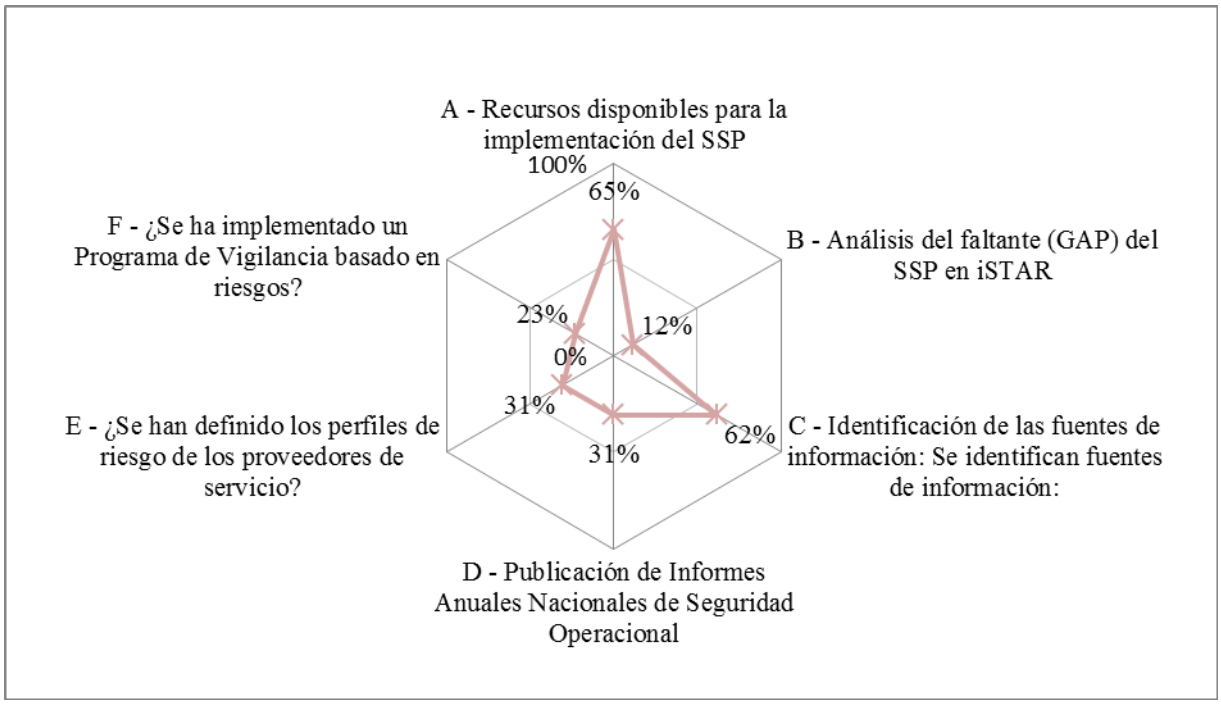
2.24 The Meeting went on to review WP/09 on the status of SSP and SMS implementation in the Region. It recalled that the Meeting of Air Navigation and Safety Directors of the SAM Region (Lima, 21-22 October 2013) agreed to measure such progress in a pragmatic way, consisting in the verification of progress in SSP and SMS implementation in accordance with the milestones specified in **Appendix E** to this part of the report; and this verification would be carried out during the annual meetings of SSP coordinators of SAM States. It should be noted that this type of measurement is based on the perception of the State regarding its progress, and that it has not been audited by USOAP.

2.25 Regarding SMS implementation, 2 milestones were established concerning the publication of standards and the incorporation of SMS evaluation into the State safety oversight plan; 83% in this case.

2.26 Regarding the above, SSP implementation has 6 milestones and, according to the Fourth Annual Meeting of National Safety Programme Coordinators (Lima, 16-18 March 2015), a regional average of 42%[1] has been achieved, with the following distribution:

Graph on the status of SSP implementation in the SAM Region

[1] Note that this measurement is based on the State perception and that it has not been audited by USOAP.



2.27 In this regard, it was noted that apparently some of the answers given at the Meeting of National Safety Programme Coordinators needed to be compared with actual implementation, since some aspects were not consistent with the real situation. Accordingly, the Meeting agreed on the need to provide responsible answers to these surveys, answering as accurately as possible.

2.28 It was also noted that those responsible for SSP in some States had taken on SMS oversight and acceptance functions, leaving safety inspectors aside, thus duplicating safety oversight duties and functions. Accordingly, Safety Directors were urged to get involved in SSP and SMS implementation, to internally train their safety inspectors in SMS evaluation and, if States needed assistance, they could request the support of SRVSOP or of the Regional Office as needed.

2.29 The Secretariat then proceeded to inform that, as of 2016, the USOAP protocol would have 91 questions on SMS and SSP implementation and, in that sense, States needed to prepare to demonstrate the implementation of these 91 protocol questions. In this regard and in order to help States prepare for the implementation of the 91 questions, the Meeting agreed that the Regional Office should circulate the 91 protocol questions to the States, asking them to report on the implementation of each, so as to know how ready the States are to respond to them and what would be the real progress in SSP implementation.

SAFETY OVERSIGHT

1. Safety performance indicators

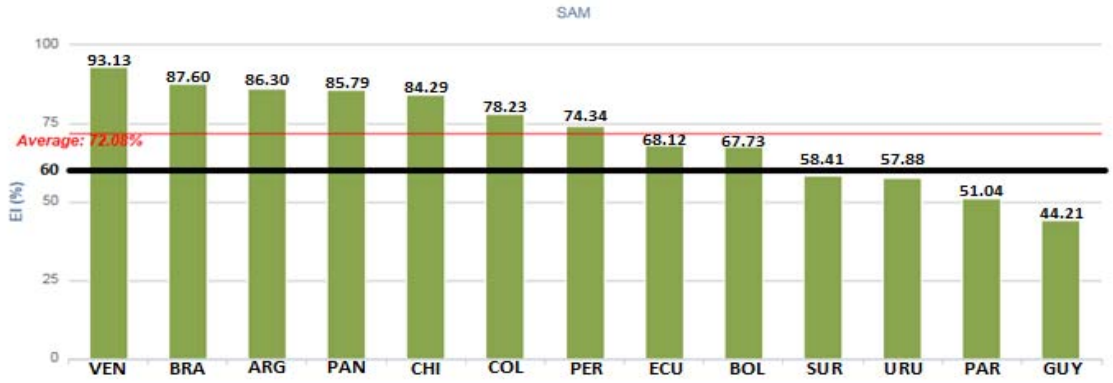
1.1 Once the transition period of the continuous monitoring approach (CMA) of the Universal safety oversight audit programme (USOAP) started in 2011, the average effective implementation (EI) of the SAM Region increased by **5.77%**, from 66.31% to **72.08%**, in nine (09) activities of the USOAP CMA, which represents an average improvement of approximately **0.64%** per State.

1.2 Between November 2011 and August 2015, the following States were the object of a USOAP CMA activity:

- ✓ **ICAO coordinated validation mission (ICVM):** Colombia in 2011; Ecuador and Suriname in 2012; Argentina and Venezuela in 2013; and Uruguay in 2014.
- ✓ **CMA audits:** Bolivia in 2013; and Peru in 2014.
- ✓ **Off-site activity:** Brazil in 2015

1.3 According to Table A-1 – Average effective implementation (EI) in the SAM Region (updated in August 2015), seven (7) States (Venezuela, Brazil, Argentina, Panama, Chile, Colombia, and Peru) are above the average for the Region (72.08%), two (2) States (Ecuador and Bolivia) are very close to reach the average, and four (4) States (Suriname, Uruguay, Paraguay, and Guyana) are below the aforementioned average.

Table A-1 – Average effective implementation (EI) in the SAM Region



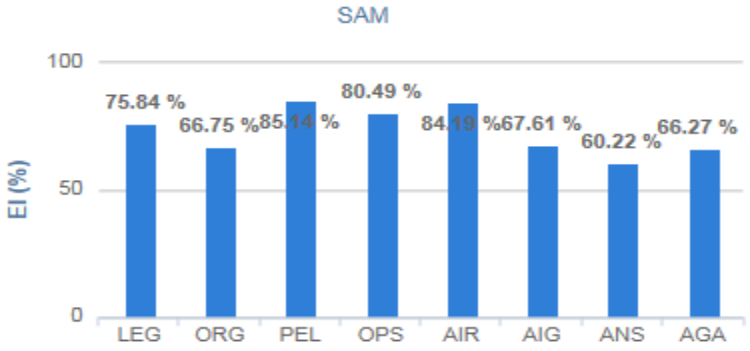
1.4 Following the activities carried out during the period 2011-2015, SAM States improved their EI as follows: Colombia **16%**, Ecuador **12.4%**, Suriname **9.6%**, Argentina **9.1%**, Venezuela **10.9%**, Peru **6.21%**, Uruguay **16.66%**, and Brazil **1.72%**. The only State that made no improvement was Bolivia, whose EI dropped from 72.08 to 67.99% (**- 4.09%**).

1.5 In order to improve the overall average effective implementation (EI) of the SAM Region, Ecuador, Bolivia, Suriname, Paraguay, Guyana, and Uruguay need to advance in the solution of the findings from the latest ICAO USOAP CMA activities or from the last audit cycle based on the comprehensive systems approach (CSA). The Regional Office will continue supporting States through the provision of direct and continuous advice for the drafting of their CAPs to handle USOAP CMA activities.

1.6 Table A-2 – Average effective implementation (EI) by audit area, shows that the LEG, PEL, OPS, and AIR areas are above the average for the Region, while ANS, AGA, ORG, and AIG are below average.

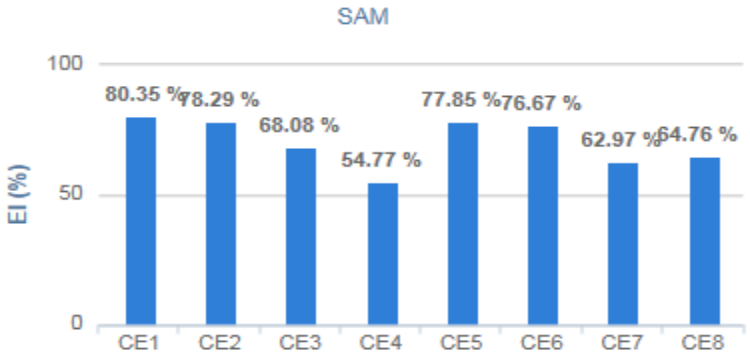
1.7 In order to improve effective implementation in audit areas, the States must make greater efforts in ANS (60.22%), AGA (66.27%), ORG (66.75%), and AIG (67.75%).

Table A-2 – Average effective implementation (EI) by audit area



1.8 Table A-3 – Average effective implementation (EI) by critical element (CE), shows that CEs 1, 2, 5, and 6 are above average (72.08%), while CEs 3, 4, 7, and 8 are below average, where CE-4 – Qualification and training of technical personnel, has an EI of 54.77% and requires the greatest improvement.

Table A-3 – Average effective implementation (EI) by critical element



1.9 In order to improve CE-4, States must implement an effective **competence definition and control** system. Competence definition involves issues such as the existence of a

job description manual containing the profile of each safety inspector position. Likewise, for each task performed by the inspectors, it is necessary to establish the **knowledge, attitude, experience,** and **skill** requirements for its effective performance. A safety inspector should not be assigned any unsupervised task if there is no documented evidence of his/her ability to perform such certification or oversight task.

2. Safety improvement proposals

2.1 Improving average effective implementation (EI) in the SAM Region

2.1.1 In order to achieve 80% of the goal established in the Declaration of Bogota, the following six States must improve their individual average by **17.34%**: Panama, Ecuador, Brazil, Guyana, Paraguay, and Bolivia. These States will receive a CMA activity in 2015 and 2016, respectively.

2.1.2 Likewise, Argentina, Venezuela, Colombia, Peru, Chile, Uruguay, and Suriname may request an off-site activity to help the SAM Region achieve its 80% goal, provided they have completed more than 50% of their corrective action plans (CAPs).

2.1.3 In addition to improving the CAPs, the following specific safety improvements are proposed for SAM States and members of the Regional Safety Oversight Cooperation System (SRVSOP), during the period **2016-2019**:

2.1.3.1 For SAM and SRVSOP States:

- ✓ achieve 80% harmonisation of PEL, OPS, AIR, AGA, ANS, and AIG LAR sets;
- ✓ harmonisation of guidance material for inspectors;
- ✓ harmonisation of guidance material for service providers; for example, advisory circulars (ACs), acceptable means of compliance (MAC), and explanatory and interpretative material (MEI);
- ✓ assistance to States that so require in the following areas:
  - USOAP CMA;
  - SSP/SMS;
  - certification;
  - oversight;
  - approvals;
  - training, etc.
- ✓ Effective implementation of the following oversight systems for air operators:
  - Apron safety inspection data exchange programme (IDISR);
  - Dangerous goods coordinated oversight programme (VCMP) (SRVSOP members);
  - Registration of the air operator certificate (AOC)

2.2 Improving effective implementation (EI) by audit area

2.2.1 ANS

- ✓ Period between January 2015 - December 2019:
  - ➢ Development of ANS LARs.
  - ➢ Development of ANS LAR guidance material.
  - ➢ Harmonisation of ANS regulations among SAM States.
  - ➢ Effective implementation of ANS requirements and procedures.
  - ➢ Implementation of SMS in ANS providers.

2.2.2 AGA (see WP/08)

2.3 Improving effective implementation (EI) by critical element

2.3.1 CE- 4 – Qualification and training of technical personnel

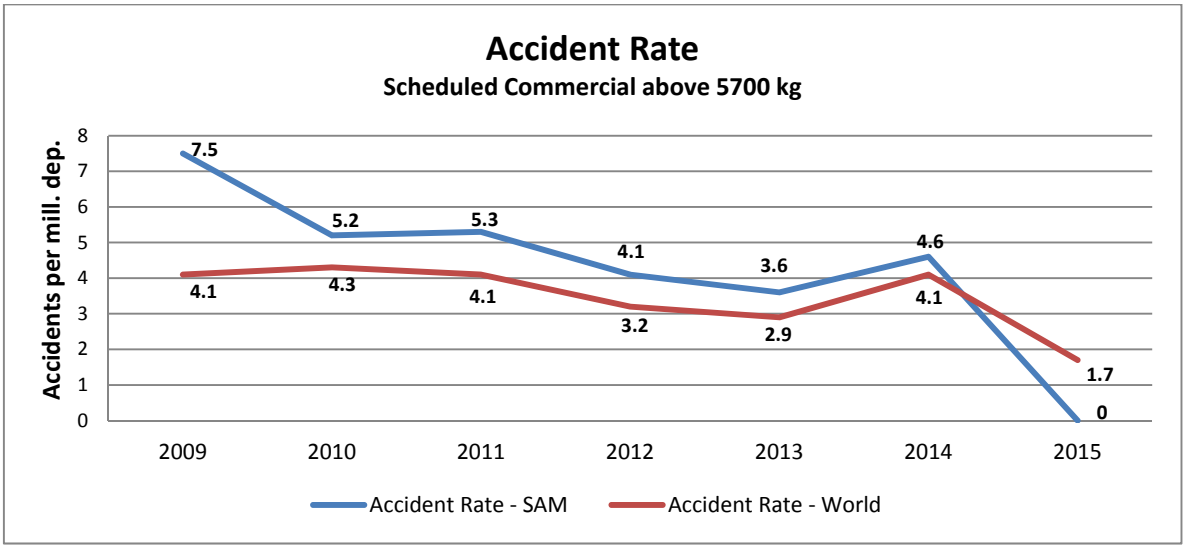
- ✓ Period between January 2016 - December 2019:
  - ➢ Standardisation of SAM inspector training programmes.
  - ➢ Support to SRVSOP through training courses for States upon request.
  - ➢ Development and effective implementation of a multinational training system using on-line applications on the website of the ICAO South American Regional Office and of the SRVSOP.

ACCIDENTS

1. Safety performance indicators

1.1 Table B-1a below shows that the accident rate in the Region has been gradually decreasing up until 2013. However, there was a slight increase in said rate in 2014 and a drastic drop in 2015, year in which no accidents have been recorded up until 31 August. The table also shows the difference between the SAM rate (blue line) and the global rate (red line).

Table B-1a – Accident rate



1.2 According to the goal established in the Declaration of Bogota, the SAM Region should have *reduced the accident rate gap by 50% with respect to the global accident rate* as of 2014.

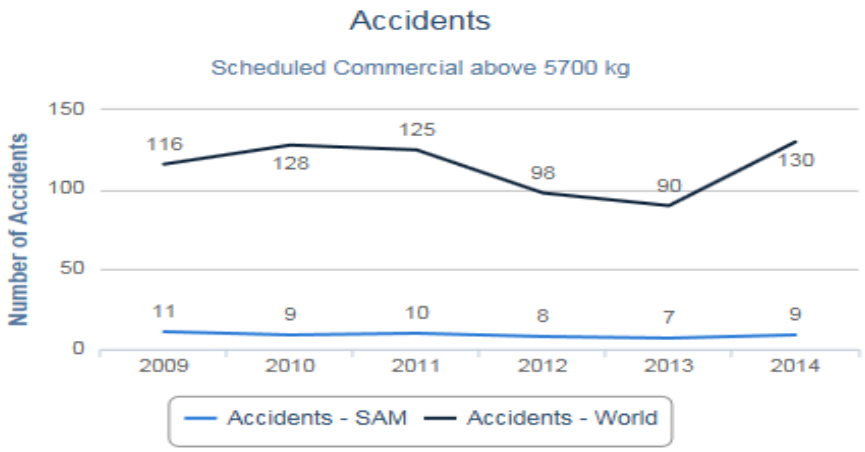
1.3 Taking into account the data obtained from the ICAO SPACE iSTARS 2.0 site, and using 2013 as the baseline year, the following figure shows that the accident rate in the SAM Region for aircraft above 5700 kg conducting scheduled commercial air transport operations had the following performance since 2014. In 2014, the goal was to reduce the gap to 0.35. However, the gap that year was 0.5, 0.15 above target. The goal for 2015 was to reduce the gap to 0.25. By 31 August 2015, the gap was 1.7 in favour, since no accidents had occurred in the SAM Region until that date.

	2013	**2014**	**2015**
SAM rate	3.6	4.6	**0**
Global rate	2.9	4.1	1.7
Gap	0.7	**- 0.5**	**+ 1.7**
50% of gap	**- 0.35**	**- 0.25**	
Results	Start of period	0.15 above target	Goal exceeded by 31 August 2015

1.4 The information contained in the previous tables refers to accidents occurred in scheduled commercial air transport operations using aircraft with a weight above 5700 kg.

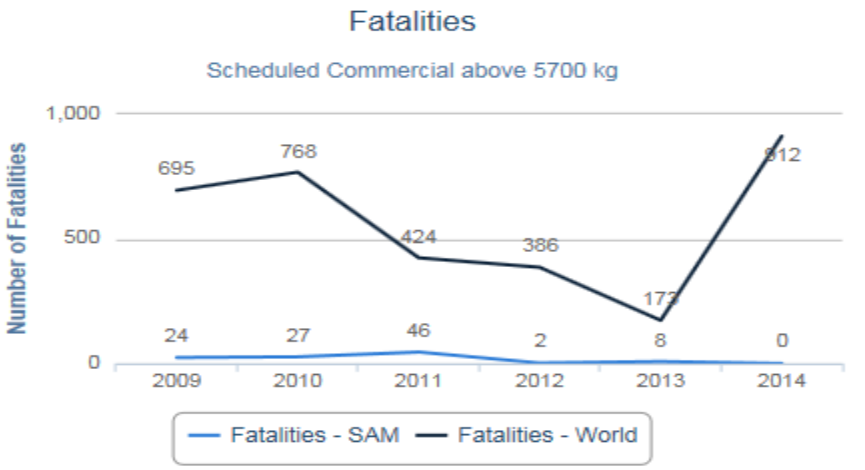
1.5 Table B-1b – Number of accidents, shows that the number of accidents in the SAM Region remained almost constant during the period 2009-2014. It also shows the difference between the SAM rate (blue line) and the global rate (red line).

Table B-1b – Number of accidents



1.6 Table B-1c – Number of fatalities, shows the number of fatalities per year in the SAM Region. This table shows that fatalities have been decreasing until reaching zero (0) in 2014. This table also shows the difference between the number of fatalities in the SAM Region (blue line) and the number of fatalities at global level (red line).

Table B-1c – Number of fatalities



2. Method for calculating safety performance goals

2.1 Method based on a retrospective risk analysis using safety improvements

2.1.1 This method is based on a retrospective risk analysis that assesses the effectiveness of the improvements proposed for each selected event or condition. This is achieved by assessing what chances would the improvement have had to prevent the event if it had been hypothetically applied before the occurrence of such event.

2.1.2 In this regard, the Commercial Aviation Safety Team (CAST), an association of the aviation industry of the United States government committed to reducing the mortality rate in commercial aviation in that country and all over the world, conducted a risk analysis of the accidents that had occurred in the SAM Region during the 2002-2012 period *(see Attachment 1 to this appendix)*, applying the following nine (9) safety enhancements (SE) of the Regional Aviation Safety Group – Pan America (RASG-PA): *RE/04, RE/09, CFIT/02, CFIT/04, LOC-I/06, LOC-I/07, LOC-I/9, RE/8, and RE/11 (see the RASG-PA safety enhancements in Attachment 2 to this appendix)*.

2.1.3 Based on this analysis and the application of weighting factors to both risks and the severity of events, the CAST determined that **18.9%** of all accidents that had occurred during the period 2002-2012 in the SAM Region could have been prevented.

2.1.4 Using the figure of 18.9%, it is possible to determine the number of accidents that could have been avoided during the period 2002 – 2012 if the 9 SE had been applied. Accordingly, 20% (18.9%) is applied to the average of 10 (10.7) accidents occurred during the last 11 yearss (2002-2012), obtained a result of 2 accidents less.

2.1.5 In the event all SAM States were to apply the 9 SE in a uniform manner, a reduction of 2 accidents from the current average of 10 accidents could be foreseen, leaving 8 accidents for the period 2014-2018. Regarding the number of departures, it is estimated that for the year 2016 (halfway through the period 2014-2018), there will be 2,150,000 departures in scheduled operations based on an annual growth of 3.1%. These figures give in an annual accident rate of **3.72** per million departures [8 x 1,000,000 ÷ 2,150,000 = 3.72], which would be the proposed performance goal for 2018 in case this methodology were to be accepted.

3. Proposed safety performance goals

3.1 Taking into account that the goal of the Declaration of Bogota is to be met in December 2016 and that the goal remains unchanged from year to year, it is suggested that the 50% reduction be applied to the gap between the SAM average rate and the global average rate of the last five (5) years for which information is available.

4. Main categories of mortal accidents in the SAM Region

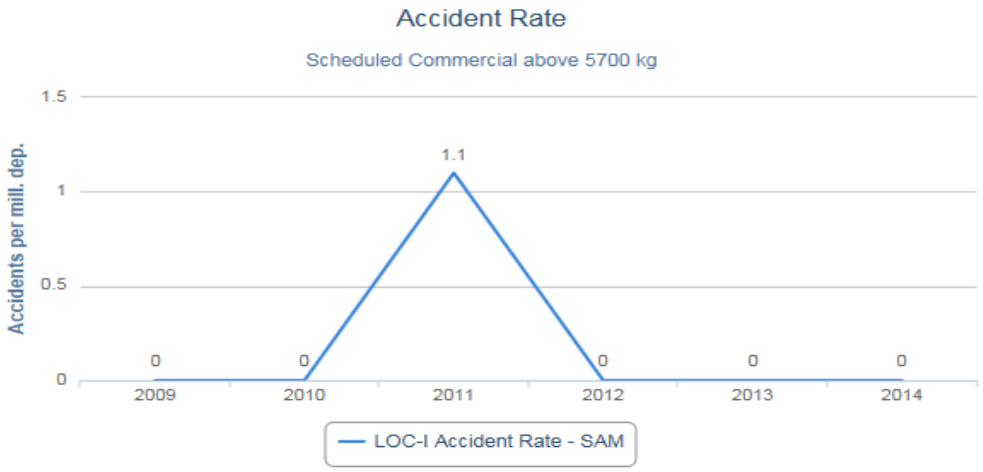
4.1 The following are the three main categories of mortal accidents to be taken into account in the Region:

- ✓ loss of control in flight (LOC-I);
- ✓ runway excursions (RE); and
- ✓ controlled flight into terrain (CFIT).

4.2 Loss of control in flight (LOC-I)

4.2.1 Table B-4a – Accident rate due to LOC – I, shows a linear projection of zero (0) accidents during the period 2009-2014, except in 2011, where two (2) accidents were recorded, resulting in an accident rate of 1.1 accidents per million departures, and causing 38 fatalities.

Table B-4a – Accident rate due to LOC-I

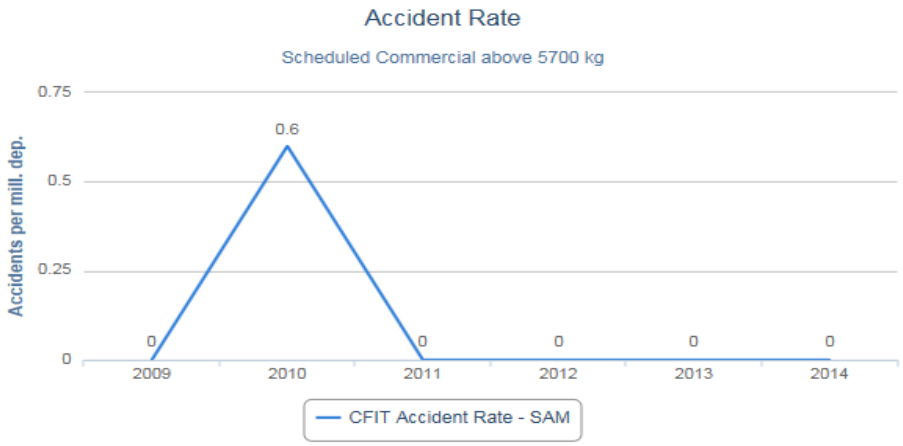


4.3 **Runway excursions (RE)** (see Appendix C to this working paper)

4.4 **Controlled flight into terrain (CFIT)**

4.4.1 Table B-4b shows that there were no accidents due to CFIT in 2009 or between 2011 and 2014. One (1) accident occurred in 2010, resulting in a rate of 0.6 accidents per million departures, with no fatalities.

Table B-4b – Accident rate due to CFIT



5. Safety improvement proposals

5.1 For the following categories: loss of control in flight (LOC-I), runway excursions (RE), and controlled flight into terrain (CFIT), the following safety improvements are proposed:

5.1.1 **Loss of control in flight (LOC-I)**

- ✓ Period 2017-2019:
  - ➢ Effective implementation of upset prevention and recovery training (UPRT) requirements in all SAM States. These requirements will permit mitigation of events related to loss of control in flight. The standards of Annex 1 and Annex 6, Part I, as well as LAR 121 and 135 requirements became effective on 13 November 2014.
  - ➢ Effective implementation of systems for the collection of reactive and proactive data, hazard identification, and management of risks related to LOC-I.
  - ➢ Effective implementation of ICAO's advanced qualification programme (AQP) or evidence-based training (EBT), as applicable.
  - ➢ Effective implementation of systems for predictive data collection, hazard identification, and management of risks related to LOC-I.
  - ➢ Implementation of an advanced oversight system that includes LOC-I reactive, proactive, and predictive processes.

5.1.2 **Runway excursions (RE).-** Performance indicators and goals for this category of mortal accidents, as well as their safety improvements, are described in detail in Appendix C to this working paper.

5.1.3 **Controlled flight into terrain (CFIT)**

- ✓ Period 2017-2019:
  - ➢ Continue with the effective implementation in all SAM States of the CFIT trianing aid that contains the ALAR tool kit of the Flight Safety Foundation (FSF).
  - ➢ Effective implementation of reactive and proactive systems for data collection, hazard identification, and management of risks related to CFIT.
  - ➢ Effective implementation of ICAO's advanced qualification programme (AQP) or evidence-based training (EBT), as applicable.
  - ➢ Effective implementation of predictive systems for data collection, hazard identification, and management of risks related to CFIT.
  - ➢ Implementation of an advanced oversight system that includes CFIT reactive, proactive, and predictive processes.

RUNWAY EXCURSIONS

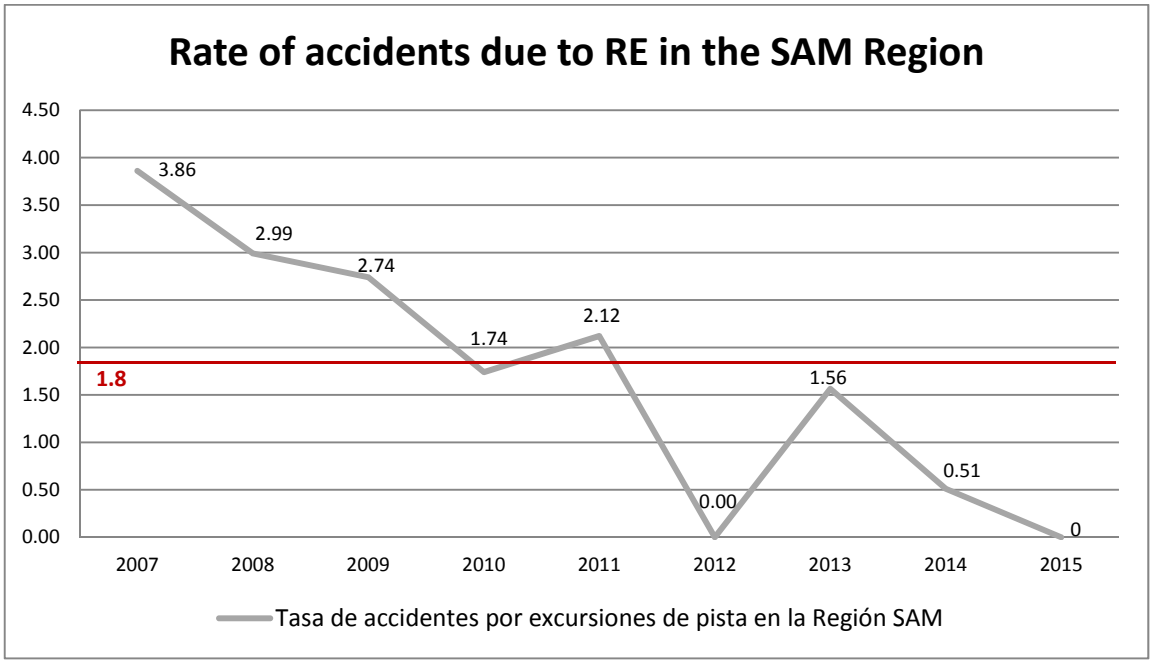
1. Safety performance indicators

1.1 The goal concerning runway excursions was established in the Declaration of Bogota as follows: *Reduce the rate of runway excursions by 20% with respect to the average rate for the SAM Region (2007-2012).*

1.2 With the data presented in Table C-1 – Rate of accidents due to runway excursions in the SAM Region, it was possible to calculate an average rate of **2.24** accidents per million departures during the period 2007-2012.

1.3 The projection of accidents due to runway excursions shows a gradual reduction of these accidents, except in 2011 and 2013, in which the rate had a slight increase. It may also be noted that in 2013 (1.56), 2014 (0.51) and up until 31 August 2015 (0), the accident rate remained below the calculated goal of **1.8** that is obtained by *reducing the runway excursion rate by 20% with respect to the average rate of the SAM Region (2007-2012)*, which is **2.24 [**2.24 – 0.44 (20% of 2.24) = 1.8].

Table C-1 – Rate of accidents due to runway excursions in the SAM Region



2. Safety performance goal

2.1 For the period 2017-2019, the following goal is proposed: Reduce the runway excursion rate by 50% below the average rate of the SAM Region for the period 2011-2015.

3. Proposed safety improvements to reduce accidents due to runway excursions

2.1 The following safety improvements are proposed in order to reduce the accident rate due to runway excursions:

- ✓ Period 2017-2019
  - ➢ Implementation of ICAO's runway safety tool kit.
  - ➢ Effective implementation of runway safety teams (RSTs) at international aerodromes.
  - ➢ Effective implementation of the flight data analysis programme (FDAP) in commercial air transport operators that have aircraft weighting over 27000 kg.
  - ➢ Effective implementation of ICAO's advanced qualification programme (AQP) or evidence-based training (EBT) (unstable approach scenarios), as applicable.
  - ➢ Effective implementation of an advanced oversight system for reactive, proactive, and predictive processes aimed at addressing hazards related to runway excursions.
  - ➢ Implementation of systems for the prevention of runway excursions in aircraft of commercial air operators.

PLAN FOR AERODROME CERTIFICATION

STATE	No. AERODROMES (Doc. 8733, Vol. II, FASID, Table AOP 1)	AERODROMES CERTIFICATION			RESPONSIBLE AUTHORITY
		Certified	Short Term 2016	Medium and Long Term 2019 - 2022[4]	
Argentina	**16**		1	15	ANAC
Bolivia	**4**[1]	3		1	DGAC
Brazil	**28**	4	4	20	ANAC
Chile	**8**		1	7	DGAC
Colombia	**11**		3	8	AEROCIVIL
French Guiana	**1**			1	CAA
Guyana	**2**	2			CAA
Ecuador	**4**	2		2	DGAC
Panama	**6**[2]			6	DGAC
Paraguay	**2**		1	1	DINAC
Peru	**8**	1	1	6	DGAC
Suriname	**2**		1	1	CAA
Uruguay	**2**		1	1	DINACIA
Venezuela	**7**[3]		1	6	INAC
TOTAL	**101**	**12**	**14**	**75**	

[1] SLTJ to be deleted from CAR/SAM ANP at the request of the CAA in the next amendment to CAR/SAM ANP.

[2] The Aeronautical Authority has requested the deletion of MPCH and inclusion of MPSM in the next amendment to CAR/SAM ANP.

[3] INAC Venezuela has requested the inclusion of SVBM, SVPR, SVSO and SVCS in the next amendment to CAR/SAM ANP.

[4] Initial Aerodromes certification as described in PANS Aerodromes.

MILESTONES FOR SSP IMPLEMENTATION

A. Resources available for SSP implementation.

Associate elements
a) Assignment of SSP responsible.
b) The SSP has enough resources (equipment and personnel) to carry out the tasks needed for data collection, analysis and other associate functions according to the size and complexity of the civil aviation systems.

B. SSP GAP analysis in iSTAR completed and updated in a continuous basis.

C. Information sources identification (reactive, proactive and predictive)

D. Publication of National Annual Safety Oversight Reports.

Associate elements
a) High level safety meetings are are carried out where analysis, decisions and follow-up of results are made based on the Safety Oversight Annual Report

E. Definition of **Service providers risk profiles**.

F. Risk-based oversight programme implemented.

MILESTONES FOR SMS IMPLEMENTATION

A. Publication of the SMS regulation for all operators (AGA, ATS, OPS and AIR).

B. Implementation in the Safety Oversight Plan of State the assessment of the service providers SMS by competent inspectors on SMS evaluation.

Agenda Item 3: Follow-up on the results of the Second Safety Conference

3.1 Under this agenda item, the meeting reviewed WP/10 – *Follow-up on the results of the Second Safety Conference,* presented by the Secretariat. In this regard, the Meeting took note that the First high-level safety conference (HLSC 2010, Montreal, 29 March – 1 April 2010) had issued a strong mandate to ICAO to develop a strategy for further reduction of the global accident rate through the exchange of safety information between member States and the air transport industry.

3.2 Likewise, the Second high-level safety conference (HLSC 2015, Montreal, 2-5 February 2015), which brought together the general directors of civil aviation and those responsible for making strategic safety decisions from 120 member States and 35 international organisations, addressed the following main topics: ***review of the safety situation, the future aviation safety management approach, and expediting greater regional cooperation.*** The results were as follows:

Review of the safety situation

The Meeting was informed that the Second high-level safety conference of 2015 had:

3.3 taken note of the measures adopted by ICAO in response to the recommendations of the 2010 HLSC, reviewed the level of achievement of GASP objectives, and decided to support ICAO in the implementation of current initiatives, encouraging it to work in partnership with other stakeholders for their completion.

3.4 taken note that the multidisciplinary meeting held in ICAO Headquarters, after learning about the events related to the disappearance of Malaysia Airlines flight MH370, had reached the conclusion that ***global flight tracking*** was urgently needed. Accordingly, two groups were established: the ICAO *ad hoc* working group, which developed an operational concept in support of the future development of the ***global aeronautical distress and safety system (GADSS),*** and an aircraft tracking task force (ATTF) lead by the industry, which identified short-term capabilities for normal tracking of flights using existing technologies.

3.5 examined specific air transport topics of global concern and matters related to conflict areas, and had agreed on the need to develop guidance on the conduction and sharing of risk assessments, and to have a centralised repository of available information on notices to airmen (NOTAMs), aeronautical information circulars (AICs), aeronautical information publication (AIP) supplements, and other types of operational information, aimed at supporting the conduction of comprehensive risk assessments of operations in conflict areas.

3.6 agreed that, despite recognising the significant progress made in PBN implementation, there was still work to do in this field, and States should accordingly improve their PBN oversight activities, taking advantage of ICAO resources in order to achieve uniform implementation.

Future aviation safety management approach

Under this topic, the Meeting took note that the Second high-level safety conference of 2015:

3.7 highlighted the need to maintain the eight (8) critical elements (CE) visible and intact in Annex 19 during integration with the SSP framework, and noted the importance of underlining their function as the main foundation of the SSP. The Conference also stated that the change should take place gradually, so as not to disturb the progress made by States in SSP implementation.

3.8 had broadly supported the need to clarify concepts related to types of information, sources that needed to be protected, the scope of such protection, and the levels and limits of protection desired. In this sense, the Conference firmly stated that new and improved provisions were urgently needed to protect certain accident and incident records, as well as other information required to maintain and improve safety and its relevant sources. The Conference also took note of the challenges involved in the application of new and improved safety protection provisions and, specifically, the challenge of adapting the existing legislative frameworks to some of the protection provisions foreseen.

3.9 upon discussing the aforementioned issues, the Conference agreed that ICAO and the aeronautical community should support the States in the implementation of the new provisions once they have been adopted by the Council, through the development of guidelines, tools, communication and training initiatives tailored to the concrete needs of each region.

3.10 recommended ICAO to develop a global information exchange framework, with a harmonised format and taxonomies, that could be used for different types of information, including the exchange of operational information, to be introduced gradually. The Conference agreed that ICAO should start a study to assess the need to improve the USOAP CMA on-line framework (OLF) so that it could serve as a more transparent data merge centre to supplement the work done by ICAO and its States, as well as the regional safety groups (RASG) and other working groups.

Expediting greater regional cooperation

On this issue, the Meeting was informed that the HLSC 2015:

3.11 had reviewed the measures adopted by ICAO to reinforce regional cooperation through various initiatives, and encouraged the drafting of a resource mobilisation strategy to strengthen such cooperation for the achievement of high-priority safety objectives. The conference reviewed the progress made by the Latin American Regional Safety Oversight Cooperation System (SRVSOP) and took note of the initiatives taken by South American States to create the AIG regional cooperation mechanism (ARCM). In this regard, it encouraged SAM States to support its establishment.

3.12 agreed to promote greater coordination and collaboration between the RASGs and the regional planning and implementation groups (PIRG) to ensure regional interoperability for safer and more efficient implementation of aviation system block upgrades (ASBU) and recommended that the RASGs and PIRGs update their respective procedural handbooks to include their coordination mechanism.

3.13 analysed efforts made to reduce duplication of activities for the certification and oversight of approved maintenance organisations (AMO). Although many States have signed bilateral agreements with a view to reducing such duplication, this continues to consume resources, not only of the OMAs, but also of the States and the industry. In this regard, the Conference agreed that ICAO, in collaboration with the States and the industry, should take the initiative to develop an international framework to reduce such duplication.

3.14 In summary, the Conference and ICAO agreed on furthering the following priorities:

- ✓ a global flight tracking standard;
- ✓ a comprehensive work programme for risk mitigation in the conflict area;
- ✓ development of a system for the exchange of critical safety information;
- ✓ strengthening of, and support to, States for the achievement of GASP objectives; and

- ✓ a centralised resource mobilisation strategy to improve assistance capability so that "no country is left behind".

Participation of the SAM Region at the HLSC 2015

3.15 Regarding participation of the SAM Region, it was noted that SAM States had had a notable participation at the HLSC 2015, where they presented several issues that were very well received by the meeting. The Conference:

- ✓ highlighted the progress made by the SRVSOP and the creation of the ARCM;
- ✓ endorsed the need to clearly define concepts related to types of information, sources that must be protected, scope of protection, and levels and limits of the protection desired;
- ✓ endorsed the need to have guidelines, tools, communication and training initiatives concerning the new provisions emerging from HLSC 2015; and
- ✓ considered the gradual integration of the 8 CEs and the SSP framework.

3.16 It should be noted that the 13 SAM States: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Panama, Paraguay, Peru, Uruguay, Venezuela, and Suriname, for the first time and in a unanimous and collaborative manner, endorsed the regional position and viewpoints, which represents a regional and global milestone in aviation. Likewise, the representatives of the SAM Region attending the HLSC 2015 duly coordinated with the representatives of Europe and Central America the necessary support to the position adopted by SAM States in their working papers. In this regard, the Meeting of Safety Directors recommended that, for future ICAO meetings in which the SAM Region is to participate, it should coordinate with the representatives of the other regions of the world in order to obtain their support to its working papers.

3.17 Accordingly, the Meeting encouraged SAM States to continue cooperating and addressing aeronautical issues jointly for the sake of South American aviation.

Impact of the main results on the safety priorities of the SAM Region

3.18 The Meeting took note that the results of the HLSC 2015 will allow SAM States to continue improving their safety oversight systems, generating a gradual increase in effective implementation (EI) levels in each State and a gradual reduction of the accident rate in the South American Region.

3.19 Although States face a huge challenge for the implementation of the aforementioned concepts and plans, safety will be significantly enhanced in the States following implementation. **Appendix A** to this part of the report analyses the impact of the results of the HLSC 2015 on the safety priorities of the SAM Region.

3.20 **Appendix B** to this part of the report contains the Declaration of Montreal on safety improvement planning, and **Appendix C** contains the conclusions and recommendations of HLSC 2015.

3.21 Following the presentation of the WP, the Meeting noted that the SAM Region had had an excellent participation but, despite having obtained the support of other regions, there was a lack of support by some States to the position set forth by the rapporteurs during the presentation of those WPs at the HLSC 2015. Therefore, this aspect had to be strengthened in future presentations by SAM States. Likewise, the Meeting recognised the need to follow on the results obtained at the HLSC 2015 in a joint and collaborative manner, as a normal practice that should be established in the SAM Region.

3.22 Regarding the integration of the eight (8) critical elements with the SSP framework, the Meeting recommended that the deadline be agreed by consensus among SAM States and, inasmuch as possible, select **5 November 2020** as the alternate date contemplated in the State letter on proposals of amendment to Annexes 19, 8 and 6, Parts I and III concerning safety management.

3.23 Finally, one State expressed its concern about participating in matters related to conflict areas, and that greater integration between security and safety should be pursued, since there were several converging issues.

IMPACT OF THE MAIN HLSC 2015 RESULTS ON THE SAFETY PRIORITIES OF THE SAM REGION

Main results of HLSC 2015 **Commitment by States – Montreal Declaration**	**Impact on the following safety goals of the SAM Region – Bogota Declaration**
Active participation in the activities of the RASGs (RASG-PA), RSOO (SRVSOP) and other regional frameworks (ARCM) that have been established to further GASP objectives	✓ Improved effective implementation (EI) by States ✓ Reduction of the average accident rate of the SAM Region ✓ Reduction of the rate of accidents caused by runway excursions ✓ Higher percentage of aerodromes certified ✓ Improved implementation of SSP and SMS
Expedite full implementation of regulatory PBN oversight	✓ Improved effective implementation (EI) by States ✓ Reduction of the average accident rate of the SAM Region ✓ Reduction of the rate of accidents caused by runway excursions ✓ Improved implementation of SSP and SMS
Prompt implementation of GADSS operational concepts, including normal tracking every 15 minutes, and tracking every minute under hazardous conditions	✓ Improved effective implementation (EI) by States ✓ Reduction of the average accident rate of the SAM Region ✓ Improved implementation of SSP and SMS
Promptly start the exchange of information on risk in conflict zones or their proximities	✓ Reduction of the average accident rate of the SAM Region ✓ Improved implementation of SSP and SMS
Apply risk management principles to SSP and SMS	✓ Improved effective implementation (EI) by States ✓ Reduction of the average accident rate of the SAM Region ✓ Reduction of the rate of accidents caused by runway excursions ✓ Higher percentage of aerodromes certified ✓ Improved implementation of SSP and SMS
Cooperation among States to facilitate effective implementation of the new medium and long	✓ Improved effective implementation (EI) by States

Main results of HLSC 2015 **Commitment by States – Montreal Declaration**	**Impact on the following safety goals of the SAM Region – Bogota Declaration**
term GASP objectives	✓ Reduction of the average accident rate of the SAM Region ✓ Reduction of the rate of accidents caused by runway excursions ✓ Higher percentage of aerodromes certified ✓ Improved implementation of SSP and SMS
Engage other ministries or organisations within their administration in the obtention of funds for sustainable development of air transport and support the inclusion of aviation-related contributions in the sustainable development objectives and related goals of the United Nations	✓ Improved effective implementation (EI) by States ✓ Reduction of the average accident rate of the SAM Region ✓ Reduction of the rate of accidents caused by runway excursions ✓ Higher percentage of aerodromes certified ✓ Improved implementation of SSP and SMS

MONTRÉAL DECLARATION
ON PLANNING FOR AVIATION SAFETY IMPROVEMENT

Whereas the Convention on International Civil Aviation and its Annexes provide the essential framework required to support the safe operation of a global aviation system;

Whereas aviation safety is a prerequisite for the sustainable development of air transport which is a catalyst for economic and social development;

Whereas Member States have a collective responsibility for aviation safety and its enhancement can only be possible through a cooperative, collaborative and coordinated effort among all stakeholders under the leadership of the International Civil Aviation Organization (ICAO);

Recognizing the efforts of the international community towards the implementation of Conclusions and Recommendation of the High-level Safety Conference held in 2010;

Recognizing the actions taken by ICAO and the role of the regional aviation safety groups (RASGs), Member States and aviation safety partners in identifying and attaining the objectives and priorities of the Global Aviation Safety Plan (GASP) endorsed by the 38th Session of the Assembly;

Recognizing that performance-based navigation (PBN) is the primary air navigation priority and that effective regulatory oversight is an essential requirement to achieve its safe implementation;

Recognizing that recent events showed the need for improvements in the timely identification and localization of aircraft in distress as well as the effective search and rescue efforts (SAR) and recovery operations;

Recognizing the complexities in safely integrating remotely piloted aircraft systems (RPAS) into national air navigation systems;

Recognizing that the recent event of the downing of a civil aircraft has demonstrated the urgent need to provide accurate and timely information to States and airlines regarding risks to civil aviation arising from conflict zones and to enhance existing mechanisms to share such information;

Recalling that mutual trust between States, as well as public confidence in the safety of air transportation, is contingent upon access to relevant and timely safety information;

Recognizing the role of aviation in public health emergencies and the importance of collaboration between the aviation and public health sectors in preparedness planning and response to public health events;

Recognizing the challenges faced by States in achieving a mature safety oversight system and implementing a State safety programme (SSP) to attain the GASP objectives;

Recalling that the safety framework must be fully utilized by all stakeholders and evolve into the implementation of proactive safety management practices to ensure its sustained effectiveness and efficiency in the changing regulatory, economic and technical environment of the 21st century;

Recognizing that the protection of certain accident and incident records, other information collected for the purposes of maintaining or improving safety and its related sources is essential to ensure

the continued availability of information in support of accident investigation and safety management activities;

Recognizing that sharing of safety information is essential for the evaluation and identification of risks associated with operational safety at the State, regional and global levels;

Recognizing that regional frameworks, including RASGs, Cooperative Development of Operational Safety and Continuing Airworthiness Programmes (COSCAPs), Regional Safety Oversight Organizations (RSOOs), Regional Accident and Incident Investigation Organizations (RAIOs), are effective mechanisms to support States in addressing safety deficiencies and enhancing aviation safety in a coordinated, cooperative and collaborative manner;

Recognizing that enhanced resource mobilization strategies can support States in establishing effective safety oversight systems due to insufficient resources;

The Directors General for Civil Aviation and heads of other relevant authorities, meeting in Montréal, Canada from 2 to 5 February 2015, on the occasion of the Second High-level Safety Conference:

1. *Commit to act upon the plans agreed during this Conference by*:

   a) actively participating in the activities of the RASGs, RSOOs and other regional frameworks established to facilitate the GASP objectives;

   b) making use of all available resources to expedite full implementation of PBN regulatory oversight;

   c) promptly implementing the Global Aeronautical Distress and Safety System (GADSS) concepts of operations, including normal tracking every fifteen minutes and distress tracking every minute;

   d) initiating without delay the sharing of information concerning risks to civil aviation arising from operations over or near conflict zones;

   e) applying safety risk management principles to the SSP in their States and ensuring implementation of such principles in the safety management systems across the aviation system;

   f) cooperating with each other to facilitate the effective implementation of the GASP new-, mid- and long-term objectives;

   g) approaching other Ministries and entities within their Governments to secure funding for the sustainable development of air transport, as well as to support the introduction of aviation-related inputs into the UN Sustainable Development Goals and related targets.

2. *The Conference*:

   a) *Calls upon* States to contribute technical expertise to the activities of the RASGs and to implement their safety initiatives while focusing on their priorities;

   b) *Urges* States and aviation safety partners to maintain the confidence of the public in the safe air transportation system by improving flight tracking, especially over oceanic and remote areas, and improving SAR procedures;

c) *Urges* States and ICAO, as a matter of priority, to publish, further develop and implement principles of global tracking, location of an accident site, retrieval of flight recordings and SAR procedures in accordance with the GADSS;

d) *Urges* ICAO to facilitate the sharing of information about risks to civil aviation arising from operations over or near conflict zones and States to share all available and relevant information on this matter;

e) *Urge* States to strengthen arrangements to address risk to civil aviation arising from conflict zones through robust risk assessments;

f) *Urges* States to ensure the safety of civil aircraft through civil military coordination as outlined in the ICAO circular on *Civil/Military Cooperation in Air Traffic Management* (Cir 330);

g) *Calls upon* States to assist in the development of procedures that facilitate improved public health event management and response in the aviation sector;

h) *Calls upon* States to take appropriate measures, based on their Universal Safety Oversight Audit Programme (USOAP) effective implementation, to progress the implementation of their SSP and indicate its progress to ICAO;

i) *Calls upon* States to further enhance SSP and safety management provisions to support its implementation consistent with the GASP objectives;

j) *Calls upon* States to refer to the ICAO guidance when developing or amending RPAS regulations and establish a formal means to educate users on the risks associated with their operation;

k) *Calls upon* States, ICAO and aviation safety partners to cooperate with each other to facilitate the resolution of safety issues in relation to the international operation of aircraft;

l) *Urges* States, supported by ICAO, to implement new and enhanced provisions on the protection of certain accident and incident records, and other information collected to maintain or improve safety and related sources;

m) *Calls upon* States, RASGs and other aviation stakeholders to support ICAO in the phased development of a global information sharing framework;

n) *Calls upon* States, RASGs, aviation safety partners and the industry to support the update of the GASP particularly as it relates to best practices in States and regions, sharing of safety information and development of safety roadmap(s);

o) *Calls upon* States, aviation safety partners and the industry to support the RASGs and RSOOs by reinforcing their role as strategic cooperative and coordinating frameworks to address deficiencies and focus on priorities of each region;

p) *Calls upon* States and relevant stakeholders to increase their participation and contributions to regional frameworks in addressing safety deficiencies and enhancing aviation safety;

q) *Calls upon* States and the industry to support ICAO in developing an international framework to reduce the duplication of certification and surveillance activities of approved maintenance organizations (AMOs).

r) *Calls upon* ICAO to:

i) continue assisting States in implementing safety-related Standards and Recommended Practices (SARPs) and an effective safety oversight system through additional guidance material, training and tools;

ii) continue assisting States in implementing PBN;

iii) finalize the GADSS concept for global tracking and lead the conduct of an implementation initiative using existing technologies;

iv) define and update related guidance material, including the review of Cir 330, on risk assessments of civil aircraft operations over or near conflict zones as well as develop and host a centralized repository of information available on conflict zones;

v) pursue its work in studying information from accident and incident investigations as well as information provided by aircraft manufacturers linked to unusual or extreme weather events;

vi) continue supporting States in achieving the GASP objectives by refining and harmonizing the identified safety performance indicators (SPIs) to facilitate monitoring and measurement;

vii) monitor the implementation of SSPs by Member States;

viii) expedite the development of provisions to enable a harmonized approach to the regulation of RPAS and provide a forum for States to share their experiences and best practices;

ix) assure expeditious progress towards the adoption of new and enhanced provisions on the protection of safety management information as well as accident and incident records and support States in their implementation;

x) assure appropriate means to adequately protect safety information to facilitate the development of a global information sharing framework using a phased approach;

xi) support the implementation of the GASP through the development of safety roadmap(s) and its stable evolution using a data-driven approach;

xii) lead the coordination and facilitation for donors and partners by establishing an aviation safety implementation assistance partners group for the provision of assistance to States;

xiii) develop a resource mobilization strategy to enhance implementation assistance capacity and participate in the development of the United Nations Sustainable Development Goals;

xiv) lead the alignment and integration of regional frameworks, including RASGs and RSOOs, towards attaining the objectives of the GASP and regional targets; and

xv) exercise its role by fostering further development of RSOOs to ensure a harmonized framework and cooperation between States and other stakeholders.

In view of the above, the Directors General of Civil Aviation, heads of other relevant authorities and the conference have approved conclusions and recommendations to be acted upon by all involved.

— — — — — — — —

CONCLUSIONS AND RECOMMENDATIONS

THEME 1: REVIEWING THE CURRENT SITUATION

Topic 1.1: Achievements and remaining work
HLSC/15-WPs/1, 16, 17, 18, 19, 20, 28 Revised, 30, 32, 35 Revised, 83, 85, 88 Revised, 100, 101 Revised
HLSC/15-IPs/6, 8, 9, 13, 26, 27

1. **CONCLUSION 1/1**

1.1 The conference agreed on the following conclusions:

a) *Progress made since the High-level Safety Conference held in 2010 (HLSC 2010)*:

1) Significant progress was noted in implementing the recommendations of the HLSC 2010 and attaining the Global Aviation Safety Plan (GASP) objectives; and

2) Additional effort is needed to effectively implement the on-going initiatives of the HLSC 2010 and to fully achieve the GASP objectives.

b) *Supporting the activities of Regional Aviation Safety Groups (RASGs)*:

[The conclusions related to this issue are addressed under Topic 3.1 of the conference, *Effective and efficient regional collaborations*.]

c) *Regulatory oversight for the effective implementation of performance-based navigation (PBN)*:

1) Given that the lack of proper regulatory oversight has contributed to the delay in implementing Assembly Resolution A37-11 — *Performance-based navigation global goals*, priority should now be on areas where maximum safety benefits can be gained.

2. **RECOMMENDATION 1/1**

2.1 The conference agreed on the following recommendations:

a) *Progress made since the High-level Safety Conference held in 2010 (HLSC 2010)*:

1) ICAO, States and aviation safety partners should continue working on the on-going initiatives resulting from the recommendations of HLSC 2010;

2) States should encourage air operators to effectively use safety management system (SMS) processes before implementing a Fatigue Risk Management System (FRMS) in order to gain optimum safety and efficiency of its benefits; and

3) ICAO should make available safety-related documentation in all ICAO languages using consistent terminology.

b) *Supporting the activities of Regional Aviation Safety Groups (RASGs)*:

[The recommendations related to this issue are addressed under Topic 3.1 of the conference, *Effective and efficient regional collaborations*.]

c) *Regulatory oversight for the effective implementation of performance-based navigation (PBN)*:

1) States should expedite full implementation of performance-based navigation (PBN) regulatory oversight by making full use of all available resources to improve the effectiveness of their PBN oversight function;

2) States should proceed with the implementation of Assembly Resolution A37-11 — *Performance-based navigation global goals* with emphasis on areas where maximum safety benefits can be gained; and

3) ICAO should develop a clear overview of the different regulatory oversight requirements, functionalities and activities necessary for an effective PBN implementation.

Topic 1.2: Emerging safety issues
HLSC/15-WPs/2, 3, 9, 10, 11, 12, 13, 15, 21, 33, 36, 48 Revised, 49, 50, 53, 64, 65, 67, 74, 81, 82, 84, 91, 97, 99, 102 Revised
HLSC/15-IPs/18, 19, 24, 30, 31, 32, 40

1. **CONCLUSION 1/2**

1.1 The conference agreed on the following conclusions:

a) *Global flight tracking*

1) Recent events, such as the accident to Flight AF447 and the disappearance of Flight MH370, have shown that there is a need for provisions requiring operators to determine the position of an aircraft at any time in any location; and

2) States, air navigation authorities and the industry should begin voluntary implementation of global tracking using available technologies as a matter of urgency.

b) *Conflict zones*

1) The tragic loss of Flight MH17 highlights the necessity to provide accurate and timely information to States and airlines regarding risks to civil aviation arising from conflict zones as a matter of urgency; and

2) there is an urgent need to utilize and enhance existing mechanisms for the purpose of sharing critical information related to airspace use restrictions that are associated with conflict zones to ensure robust risk assessments.

c) *Civil/military coordination*

1) States should ensure the safety of civil aircraft through civil/military coordination as outlined in the ICAO circular on *Civil/Military Cooperation in Air Traffic Management* (Cir 330) and should update that circular on a regular basis.

d) *Public health*

1) The Ebola virus disease outbreak has demonstrated the ongoing value of the Collaborative Arrangement for the Prevention and Management of Public Health Events in Civil Aviation (CAPSCA) programme and there is a need to find resources to ensure its sustainability; and

2) States may utilize expertise already available within their regulatory authority to facilitate improved management of public health events that impact the aviation sector.

e) *Extreme meteorological conditions*

1) There is a need for further analysis of information from accident and incident investigations to determine whether enhancements to ICAO provisions are required to further mitigate risks associated with extreme meteorological conditions.

f) *Duration of CVR recordings*

1) States should support the proposed amendments from the Flight Recorder Panel (FLIRECP) concerning extended cockpit voice recorder (CVR) recording duration for newly manufactured large aeroplanes to 25 hours; and

2) ICAO should ensure that this extended CVR recording duration is accompanied by the relevant safeguards regarding the possible use of CVRs, limiting it to the purposes of maintaining or improving aviation safety.

2. RECOMMENDATION 1/2

2.1 The conference agreed on the following recommendations:

a) *Global flight tracking*

1) ICAO should expeditiously publish and use the Global Aeronautical Distress and Safety System (GADSS) for the implementation of normal, abnormal and distress flight tracking, search and rescue (SAR) activities and retrieval of cockpit voice recorders (CVRs) and flight data recorders (FDRs) data;

2) ICAO should continue developing performance-based provisions for normal aircraft tracking, which provide industry with viable options, as a matter of

urgency, and urge industry to start implementing global tracking, on a voluntary basis, through the use of available technologies;

3) ICAO should lead a global aircraft tracking implementation initiative in a multinational context designed to demonstrate best use of equipment in use today and integrate the outcome into guidance material;

4) ICAO should support regional SAR training exercises related to abnormal flight behaviour and share the outcomes with the international community;

5) ICAO should review the interaction between Annex 12 — *Search and Rescue* and Annex 13 — *Aircraft Accident and Incident Investigation* and clarify the relevant provisions when an aircraft remains missing at the end of the search and rescue phase and the search continues to locate the aircraft for investigation purposes; and

6) ICAO should encourage States and the International Telecommunication Union (ITU) to discuss allocation requirements at the World Radio Communication Conference in 2015 (WRC-15) to provide the necessary spectrum allocations for global air traffic services surveillance as a matter of urgency.

b) *Conflict zones*

1) ICAO and States should work to implement the strategy developed by the Task Force on Risk to Civil Aviation arising from Conflict Zones (TF-RCZ) as the basis for strengthening arrangements to address risk to civil aviation arising from conflict zones;

2) ICAO should establish, as matter of urgency, a simple centralized web-based repository to make information available which supports the assessment of risks over or near conflict zones. The source of this information should be clearly identified in the repository;

3) ICAO should review relevant SARPs and guidance material on risk assessments for flights over or near conflict zones to support the highest level of safety to civil aviation;

4) ICAO should task the Accident Investigation Panel (AIGP) to review relevant provisions in Annex 13 — *Aircraft Accident and Incident Investigation* with due consideration to the following scenarios:

i) the State of Occurrence does not conduct an investigation called for in Annex 13 and does not intend to delegate the investigation to another State;

ii) the Final Report is not issued within a reasonable timeframe; and

iii) extent of participation in an investigation of States that have suffered fatalities or serious injuries to their citizens;

5) States should support the ICAO information exchange framework by making all relevant information on the risks associated with operations over or near conflict zones available, as a matter of urgency.

c) *Extreme meteorological conditions*

1) ICAO should pursue its work in studying data and information from accident and incident investigations as well as data and information provided by aircraft manufacturers, linked to unusual/extreme weather events; and

2) ICAO, based on the study results, should evaluate the need for improved ICAO airworthiness, operations and detection equipment carriage related provisions in order to further mitigate changing meteorological risks and take appropriate action.

d) *Civil/military cooperation*

1) ICAO should support States in ensuring the safety of civil aircraft through civil military coordination as outlined in the ICAO circular on *Civil/Military Cooperation in Air Traffic Management* (Cir 330) and should update that circular on a regular basis.

e) *Public health*

1) ICAO should sustain the Collaborative Arrangement for the Prevention and Management of Public Health Events in Civil Aviation (CAPSCA) programme to assist States prepare for and respond rapidly to any new public health event;

2) States should engage in supporting the CAPSCA programme and contribute to it financially and/or in kind; and

3) States should, where feasible, utilize expertise in the medical department of their regulatory authority, in addition to other public health experts, to improve public health event management and response in the aviation sector.

f) *General*

1) ICAO should provide updated information on the progress and implementation of all above-mentioned subjects in a report to be presented at the 39th Session of the Assembly.

THEME 2: FUTURE APPROACH TO MANAGE AVIATION SAFETY

Topic 2.1: State safety programme
HLSC/15-WPs/8, 22, 24, 27, 31, 35 Revised, 37, 44, 47, 51, 56, 57, 60, 61, 62, 63, 69, 71, 72, 73, 75, 76, 77, 79, 87, 88 Revised, 89, 90, 98, 103
HLSC/15-IPs/1, 2, 4, 5, 7, 10, 11, 12, 15, 20, 21, 25, 29, 33, 35, 39

1. CONCLUSION 2/1

1.1 The conference agreed on the following conclusions:

a) *Strategies for managing aviation safety*

1) A risk-based approach is an effective means for States to manage new and existing aviation activities;

2) Additional guidance material is needed for States to develop performance-based regulations; and

3) New or enhanced ICAO provisions, as well as collaboration between States, are required to ensure the safe integration of remotely piloted aircraft system (RPAS).

b) *Implementing State safety programme (SSP)*

1) The implementation of the State safety oversight system and State safety programme (SSP) should be monitored to determine the progress attained towards the Global Aviation Safety Plan (GASP) objectives;

2) Additional guidance and sharing of experiences are necessary for States to further develop and implement SSPs; and

3) Safety performance indicators (SPIs) are needed to enable States to monitor and measure performance.

c) *Enhancing State safety programme (SSP) provisions*

1) The adoption of Annex 19 — *Safety Management* has facilitated the consolidation of overarching safety management Standards and Recommended Practices (SARPs) that will enable their further evolution; and

2) Enhancements to State safety programme (SSP) provisions should support States' efforts to meet the Global Aviation Safety Plan (GASP) objectives, incorporating the integration of the eight critical elements of a safety oversight system with the SSP framework in a way that allows States to gain the maturity needed at each step to achieve sustainable improved performance.

2. RECOMMENDATION 2/1

2.1 The conference agreed on the following recommendations:

a) *Strategies for managing aviation safety*

1) ICAO should assess the feasibility and benefits of expanding safety management system (SMS) applicability to additional aviation activities;

2) ICAO should establish a coordination mechanism to assist States in resolving safety issues related to foreign aircraft operators;

3) ICAO should develop guidance material to facilitate the establishment of performance-based regulations;

4) ICAO should expedite the development of provisions to be used by States to regulate remotely piloted aircraft system (RPAS) operations within their airspace and to educate users regarding the risks associated with their operations;

5) States should address the risks of non-regulated use of remotely piloted aircraft (RPA) in the vicinity of aerodromes to international flights; and

6) ICAO should provide supporting material to assist States in the mitigation of risks posed to international flights from RPA operating in the vicinity of aerodromes.

b) *Implementing State safety programme (SSP)*

1) States should use the ICAO State safety programme (SSP) gap analysis tool and Universal Safety Oversight Audit Programme (USOAP) self-assessment to facilitate the monitoring and implementation of SSP;

2) ICAO should develop guidance and mechanisms for sharing best practices to support SSP implementation; and

3) ICAO should improve and harmonize the defined safety performance indicators (SPIs) taking into account those currently in use.

c) *Enhancing State safety programme (SSP) provisions*

1) ICAO, in considering the integration of the eight critical elements of a State safety oversight system and the eleven elements of the State safety programme (SSP) framework, should ensure that the eight critical elements remain visible and that their role as the foundation of the SSP is emphasized; and

2) ICAO should harmonize the safety data collection provisions.

Topic 2.2: Safety information protection
HLSC/15-WPs/4, 25, 38, 46, 54, 78, 80, 88 Revised, 93, 104
HLSC/15-IPs/28, 39

1. CONCLUSION 2/2

1.1 The conference agreed on the following conclusions:

a) Accident investigation authorities gather and generate records during the course of investigations instituted with the objective of determining causes of and/or contributing factors to aviation accidents or incidents to prevent their recurrence. Safeguarding accident investigation authorities' continued access to essential information during the course of an investigation relies on States' ability to implement appropriate protection for accident and incident records;

b) Proactive mechanisms designed to manage aviation safety rely on the collection, analysis and exchange of safety information for the timely identification and subsequent mitigation of risks and hazards that may result in an accident or an incident. The success of this proactive approach to manage aviation safety depends on the appropriate protection of safety information and related sources to encourage meaningful reporting;

c) The protection of certain accident and incident records, other information collected for the purposes of maintaining or improving safety and its related sources is an enabler for safety improvement and should be introduced at a legislative level;

d) Multidisciplinary groups of experts have contributed towards the development of proposals to enhance ICAO provisions on the protection of certain accident and incident records and other information collected for the purposes of maintaining or improving safety and its related sources;

e) Consistency and coherence in the proposals for relevant Annexes, to be achieved by reconciling the work of relevant groups of experts, the comments from States and the inputs provided during the conference, is fundamental for the development, adoption and efficient implementation of new or enhanced provisions on this topic. Further, there is a need to clearly define the types of information and sources to be protected as well as the scope, levels and limits of protection sought; and

f) Expeditious progress in ICAO's work to adopt new and enhanced provisions on the protection of certain accident and incident records and information collected for the purpose of maintaining or improving safety in addition to assistance to States in implementing these new protective frameworks is critical for the improvement of aviation safety.

2. RECOMMENDATION 2/2

2.1 The conference agreed on the following recommendations:

a) That ICAO ensure meaningful and expeditious progress towards the adoption of new and enhanced provisions on the protection of certain accident and incident records,

other information collected for the purposes of maintaining or improving safety and its related sources, while ensuring consistency, coherence and clarity in the proposals and taking into consideration the necessary timeframes for States to enact or amend relevant legislation(s);

b) That States undertake the necessary legal adjustments to efficiently implement new and enhanced protective frameworks to facilitate safety management and accident investigation activities; and

c) That ICAO support States in implementing new and enhanced provisions through a strategy comprised of supporting guidance material, tools and seminars tailored to the needs of each region aiming at building trust, cooperation, accountability and a common understanding among aviation safety professionals, accident investigation authorities, regulators, law enforcement officers and the judiciary in the context of an open reporting culture.

Topic 2.3: Safety information sharing
HLSC/15-WPs/5, 15, 26, 27, 34, 39, 59, 70, 86, 88 Revised, 95, 105
HLSC/15-IPs/16, 38

1. **CONCLUSION 2/3**

1.1 The conference agreed on the following conclusions:

a) The exchange of information is a fundamental tenet of a safe air transportation system and is acknowledged as an enabler to achieve the objectives of the Global Aviation Safety Plan (GASP);

b) Safety initiatives rely on a clear understanding of how safety information is defined and protected;

c) Appropriate tools, systems and legal frameworks need to be available to enable States and organizations to use the shared safety information;

d) Further development of global safety initiatives and implementation strategies should be built on the collection, analysis and sharing of information between States and aviation stakeholders;

e) A phased approach is essential for the development of the global information sharing framework; and

f) There is a recognition of the benefits of making available at a global level safety information collected through regional safety exchange mechanisms.

2. **RECOMMENDATION 2/3**

2.1 The conference agreed on the following recommendations:

a) that ICAO facilitate a phased approach towards the development of the global framework for the exchange of information pertaining to the identification of systemic safety issues and other types of information in the interest of safety;

b) that ICAO launch a study to assess the need to endorse the Universal Safety Oversight Audit Programme – Continuous Monitoring Approach (USOAP-CMA) online framework to a more transparent data fusion centre that would complement the work conducted by ICAO and Member States through the USOAP-CMA, Electronic Filing of Differences (EFOD), Regional Aviation Safety Group (RASG) and other working groups;

c) that ICAO consider the development of a mechanism for the evaluation of the adherence to the Code of Conduct on the Sharing and Use of Safety Information;

d) that States should develop methods for the collection and sharing of operational safety data, as well as a standardized safety risk management methodology in order to promote harmonization of continuing airworthiness processes; and

e) that ICAO establish a database for safety recommendations of global concern and expedite appropriate actions to make it available on an appropriate ICAO website.

Topic 2.4: Evolution of the Global Aviation Safety Plan
HLSC/15-WPs/6, 14, 40, 45, 52, 55, 56, 58, 61, 69, 88 Revised, 92, 106
HLSC/15-IPs/34, 36

1. **CONCLUSION 2/4**

1.1 The conference agreed on the following conclusions:

a) *Updating the 2014 – 2016 Global Aviation Safety Plan (GASP)*

1) Safety roadmap(s) will assist States and regions in the implementation of the GASP; and

2) The update of the GASP requires a collaborative effort of all stakeholders to promote its continuous and stable evolution.

2. **RECOMMENDATION 2/4**

2.1 The conference agreed on the following recommendations:

a) *Updating the 2014 – 2016 Global Aviation Safety Plan (GASP)*

1) ICAO, in collaboration with States, Regional Aviation Safety Groups (RASGs), aviation safety partners and the industry, should develop safety roadmap(s) in support of the GASP; and

2) ICAO, in collaboration with States, RASGs, aviation safety partners and the industry, should develop methods to identify future safety objectives and priorities to update the GASP while taking into account operational safety data and the necessary continuity and stability of the strategic document.

THEME 3: FACILITATING INCREASED REGIONAL COOPERATION

Topic 3.1: Effective and efficient regional collaboration

HLSC/15-WPs/7, 23, 26, 29, 41, 42, 43, 66, 68, 94, 96, 107
HLSC/15-IPs/3, 7, 9, 14, 17, 22, 23, 33, 37, 38

1. **CONCLUSION 3/1**

1.1 The conference agreed on the following conclusions:

a) *Regional collaboration to improve safety in States*

1) Aviation safety partners including donor States, international organizations, industry and financial institutions are encouraged to support ICAO's efforts to assist States to improve aviation safety by enhancing regional coordination, cooperation and collaboration;

2) There is a need for ICAO to develop a resource mobilization strategy to enhance implementation assistance capacity;

3) It is encouraged that ICAO participate in the development of the United Nations Sustainable Development Goals; and

4) voluntary contributions to the Human Resources Development Fund (HRDF) are encouraged.

b) *Regional Safety Oversight Organizations (RSOOs)*

1) A harmonized and common framework and cooperation between States, safety partners and donors is essential to facilitate the establishment and sustainable evolution of Regional Safety Oversight Organizations (RSOOs);

2) The role of ICAO is key in the provision of guidance, review and sharing of information and best practices on RSOOs, in order to eliminate inefficiencies and increase effectiveness, and support States with the global safety objectives; and

3) Regional Safety Oversight Organisations (RSOOs) are a growing reality in the modern aviation world and deserve special attention from ICAO, States and safety partners; RSOOs in developing regions should receive additional support.

c) *Certification and surveillance activities of approved maintenance organizations (AMOs)*

1) ICAO should, in collaboration with States and industry, develop an international framework and regional initiative to facilitate reducing duplication of certification and surveillance activities of approved maintenance organizations (AMOs).

2. RECOMMENDATION 3/1

2.1 The conference agreed on the following recommendations:

a) *Regional collaboration to improve safety in States*

1) Aviation safety partners, including donor States, international organizations, industry and financial institutions, assist States to improve aviation safety by enhancing regional coordination, cooperation and collaboration under ICAO's safety policies, strategy, framework and mechanisms;

2) ICAO lead the coordination and facilitation for donors and partners on the provision of aviation safety implementation assistance in States;

3) ICAO consider establishing an aviation safety implementation assistance partners group, built upon the existing Safety Collaborative Assistance Network (SCAN), with the objectives of assistance information sharing, collaboration, resource mobilization, and agreeing on outcome indicators and targets;

4) ICAO develop a resource mobilization strategy and implementation plan to increase resources, assistance activities and implementation assistance capacity;

5) ICAO lead the alignment of and coordination between regional initiatives to improve safety, implement the Global Aviation Safety Plan (GASP) objectives, and achieve the regional safety targets, involving the Regional Aviation Safety Groups (RASGs), Planning and Implementation Regional Groups (PIRGs), Cooperative Development of Operational Safety and Continuing Airworthiness Programmes (COSCAPs), Regional Safety Oversight Organizations (RSOOs), Regional Accident and Incident Investigation Organizations (RAIOs), regional Civil Aviation Commissions (CACs) and Aviation Training Organizations (ATOs), avoiding duplication as well as gaps;

6) Each region to establish and enhance mechanisms for Planning and Implementation Regional Group-Regional Aviation Safety Group (PIRG-RASG) coordination and include this in the respective procedural handbooks/manuals;

7) States, international organizations and industry increase their participation in and contributions to the ICAO and partner regional safety mechanisms;

8) States, international organizations and industry continue their support to the activities of the Regional Aviation Safety Groups (RASGs) by increasing their level of participation and contribution of resources, including technical experts, and promoting further implementation of RASGs' safety initiatives;

9) ICAO participate in the development of the United Nations Sustainable Development Goals; and

10) States, international and regional organizations and industry increase contributions to the ICAO Voluntary Funds including the Safety Fund (SAFE) and Human Resources Development Fund (HRDF).

b) *Regional Safety Oversight Organizations (RSOOs)*

1) ICAO be provided voluntary in-kind contributions of resources for the work programme to support Regional Safety Oversight Organizations (RSOOs) by:

i) Undertaking a study, possibly supported by the establishment of a working group, to consider ways to integrate functions and increase the powers of RSOOs in relation to the ICAO regional safety framework, possible sustainable funding mechanisms, mergers and agreements between RSOOs, evolve Cooperative Development of Operational Safety and Continuing Airworthiness Programme (COSCAPs) into RSOOs, and report the results to the 39th Session of the ICAO Assembly;

ii) Enhancing the guidance provided in the ICAO *Safety Oversight Manual*, (Doc 9734), Part B — *The Establishment and Management of a Regional Safety Oversight Organization*; and

iii) Stakeholders and development partners should extend their support for international cooperation projects to cover the activities and work programmes of RSOOs.

c) *Certification and surveillance activities of approved maintenance organizations (AMOs)*

1) ICAO be provided voluntary in-kind contributions of resources for the work programme to support States by undertaking a study, possibly supported by the establishment of a working group, to consider the development of a global framework and regional initiatives to reduce duplication of certification and surveillance activities of approved maintenance organizations (AMOs), and report the results to the 39th Session of the ICAO Assembly.

— END —

Agenda Item 4: Follow-up to the State-industry collaborative process in the transition from the existing air navigation support systems to those specified in the ASBUs

4.1 Under this agenda item, the Meeting reviewed WP/11 - *Status of the project on the State-industry collaborative process in the transition from the existing air navigation support systems to those specified in the ASBUs*, presented by the Secretariat.

4.2 The Meeting, as a follow-up to activities under the project *on the State-industry collaborative process for the transition from the existing air navigation support systems to those specified in the ASBUs* approved by GREPECAS through its fast-track procedure, took note that it would not be possible to carry out the project at regional level, but rather as a collaborative process between a SAM or CAR State, to be determined.

4.3 In this sense, the Meeting took note that the Third Meeting of the GREPECAS Programmes and Projects Review Committee (PPRC/3) held in Mexico City, on 21-23 July 2015, felt that the project should be amended so that the State-industry collaborative process for the transition from the existing systems to those specified in the ASBUs could be geared to a single CAR/SAM State, to be determined, and its results regionally shared for the benefit of everybody.

4.4 The representative of IATA, the body in charge of the project amendment process, stated that the amended project document, together with information on the selected State, would be submitted to the Sixteenth Workshop/Meeting of the SAM Implementation Group (SAM/IG/16) to be held in Lima on 19-23 October 2015.

Agenda Item 5: 2017-2019 safety and air navigation implementation priorities

5.1 Under this agenda item, the Meeting reviewed WP/12 - *2017-2019 Air navigation implementation priorities*, WP/13 - *2017-2019 safety implementation priorities*, presented by the Secretariat, and WP/15 *Optimisation and harmonisation of longitudinal separation at South American FIR boundaries*, presented by IATA.

2017-2019 Safety implementation priorities

5.2 On this issue, the Meeting took note of the safety implementation priorities for the period 2017-2019, taking into account the status of implementation of the priorities specified in the Declaration of Bogota for the end of 2016, as well as the new safety priorities in response to regional and global requirements.

5.3 Taking into account that some of the safety implementation priorities foreseen for the end of 2016 might not meet their goals, the Meeting reviewed the table showing the status of safety priorities, as well as their prevalence in terms of improved effective implementation (EI), reduction of total accident and runway excursion rates, promotion of international aerodrome certification and implementation of the State safety programme (SSP) and safety management system (SMS) in the SAM Region, taking into account global traffic growth trends, which although generating economic growth, entails a risk factor that should be considered in safety planning.

5.4 Following the presentation of the WP, the Meeting recognised the need to conduct a detailed analysis of the results obtained in 2014 and 2015 in relation to the goals of the Declaration of Bogota, based on data collected during the aforementioned years. The Meeting expressed some concern regarding effective implementation (EI), taking into account the possible impact of the application of the 91 safety management protocol questions (PQs) as of 1 January 2016. The Meeting also noted that the EI goal largely depended on the commitment of all States to improve their EI. Accordingly, the Region should seek the commitment of all of them in order to achieve such goal in a collaborative manner. The Meeting noted that another aspect to consider in this analysis was the preliminary result of the audit in Panama.

5.5 Likewise, the Meeting endorsed the need to find ways to help States with low levels of EI to improve their standards and thus improve regional EI. The Meeting then urged States with low levels of EI to request the support of the ICAO South American Office and the SRVSOP in the resolution of findings identified during USOAP continuous monitoring approach (CMA) activities. In this regard, the representative of Panama informed that Panama would request technical assistance to resolve the findings identified during the CMA audit that ICAO conducted in that country from 24 August to 3 September 2015.

5.6 Finally, the Meeting noted that all States should do their utmost to significantly improve EI, to which end the States should request the South American Regional Office to conduct ICAO coordinated validation missions (ICVM), on request, and off-site missions that would not entail any cost for the States. These USOAP CMA activities would help improve the EI of the States and of the Region, and serve as an exercise for audits to be scheduled starting in 2017.

5.7 In order to analyse the proposed new goals for the period 2017-2019, the Meeting agreed to establish a task force to draft a working paper (WP) that would be submitted to the RAAC/14 meeting (Santiago de Chile, 28-30 October 2015). This working paper would present the proposed goals, indicating that these would require further analysis and that they would be delivered to civil aviation authorities for their approval, using the fast-track mechanism. The task force was made up by the

representative of Bolivia, as rapporteur, and representatives of Chile, Peru, Paraguay, Uruguay, Colombia, and Venezuela, as members of the group. Brazil, through Mr. Daniel Vieira Soares, requested to participate as member of the task force. The ANS representatives of Argentina and Brazil also requested to participate in the task force, but only for analysing that specific area. The Meeting agreed that the working paper should be sent to the Secretariat by 30 September 2015 for its circulation to SAM States before its presentation at the RAAC/14 meeting.

5.8 **Appendix A** to this part of the report shows the status of safety priorities, and **Appendix B** to this part of the report contains the primary safety activities for the period 2017-2019 based on the goals of the Declaration of Bogota, which respond to regional and global safety requirements, ICAO strategic objectives, and the post-2015 sustainable development objectives established by the United Nations for the next 15 years.

Air navigation implementation priorities for the period 2017 -2019

5.9 The Meeting felt that the priorities set forth in the Declaration of Bogota responded to the requirements of the Region for the period 2014-2016, and that they did not reflect all of the air navigation requirements of the Global Plan and the SAM Regional performance-based air navigation implementation plan (PBIP) for the achievement of integration, interoperability, and harmonisation of systems in support of the "single sky" concept for international civil aviation.

5.10 The Meeting noted that global and regional air navigation planning aimed at keeping pace with global air traffic volume, which has been doubling every 15 years since 1977, a trend that is expected to continue in the coming years.

5.11 The global and regional plans define the means and goals that will allow States and stakeholders anticipate air traffic growth and manage it efficiently, while maintaining or actively improving safety. Such objectives are based on broad consultations with the stakeholders and serve as the basis for harmonised measures at global, regional and national level.

5.12 In this regard, the Meeting analysed a list of air navigation implementation activities in the areas of ATM, CNS, AIM, MET and AGA, planned for the period 2017 2019. This list responds to global air navigation requirements, ICAO strategic objectives, and the post-2015 sustainable development objectives established by the United Nations for the next 15 years. The list is shown in Appendix B to WP/12.

5.13 After analysing the list, the Meeting considered that the following implementation activities required the following action:

ATM area

***ASBU module B0 APTA Optimisation of approach procedures, including vertical guidance (period 2017 2019*)**

5.14 APV with Baro VNAV (LNAV/VNAV or RNP-AR) instrument approach procedures, in accordance with Resolution A-37-11, would be 100% implemented by the end of 2016. Accordingly, these implementations would no longer be considered after 2016.

ASBU module B0-CCO and B0-CDO Improved efficiency and flexibility in climb and descent profiles applying continuous climb operations (CCO) and continuous descent operations (CDO) (period 2017-2019)

5.15 The metrics of this module will be reviewed and analysed at the SAMIG/16 meeting.

ASBU module B0 FRTO Improved operations through enhanced en-route paths

5.16 The metrics of this module will be reviewed and analysed at the SAMIG/16 meeting.

CNS area

***ASBU module B0 – FICE: Increased interoperability, efficiency and capacity through ground-ground integration* (period 2017-2019)**

5.17 This ASBU module considers the new AMHS interconnections that were not contemplated for the period 2014-2016 and which correspond to the implementation of AMHS interconnections with French Guiana (2) and the inter-regional AMHS interconnections (11). Inter-regional interconnections would be Argentina (1), Brazil (3), Chile (1), Guyana (1), Peru (1) and Venezuela (4). The distribution for the period 2017-2017 is shown in **Appendix C** to this agenda item.

5.18 Regarding the implementation of AIDC for the period 2017-2019, consideration was given to AIDC implementations with Bolivia, Guyana, French Guiana, and Suriname that had not been contemplated for the period 2014-2016 because these States did not have AIDC in their automated systems. Likewise, the AIDC interconnections of Venezuela with adjacent States that had not been included in the period 2014-2016 because of the reasons stated under agenda item 1 of this Meeting were also considered for the period 2017-2019.

5.19 In this regard, the number of AIDC interconnections considered for the period 2017-2019 is 12 at intra-regional level (of these, 2 AIDC interconnections foreseen for the period 2014-2016) and 9 inter-regional interconnections distributed as follows: Colombia (3), Ecuador (1), Panama (1), and Venezuela (4). The distribution for the period 2017-2019 is shown in Appendix C to this agenda item.

ASBU module B0 – SUR: Initial capability for ground-based surveillance, B0-SURF: Safety and efficiency of surface operations (A-SMGCS Level 1-2), B0 – TBO: Improved safety and efficiency through the initial application of data link en-route and navigation infrastructure in support of B0 modules APTA, B0 CCO and BO CDO

5.20 All the metrics corresponding to these modules will be reviewed and analysed at the SAM IG/16 meeting.

5.21 Following the review of air navigation activities for the period 2017-2019, the Meeting approved the activities contemplated in Appendix C to this agenda item.

STATUS OF IMPLEMENTATION OF SAFETY PRIORITIES FOR THE PERIOD 2014-2016

Indicators		SAM	
		Current value 2015	**Goal December 2016**
1. Safety oversight	% effective implementation (EI)	72.08%	80%
2. Accidents	Reduce the gap in the accident rate in the SAM Region by 50% with respect to the global accident rate	0	50% of the 2015 GAP
3. Runway excursions	Reduce the rate of runway excursions by 20% with respect to the average rate of the SAM Region (2007-2012)	0	1.8*
4. Aerodrome certification	% of international aerodromes certified	12%	20%
5. Implementation of SSP and SMS	% of SSP implementation	42%	67%
	% of SMS implementation	83%	100%

*Accident rate = Number of accidents per million departures

SAFETY IMPLEMENTATION PLAN 2017- 2019

INDICATOR	SCOPE	PROPOSED GOALS	% / Dates	CURRENT STATUS
1. Safety oversight	All States	Reach 84.5% effective implementation (EI) in the SAM Region by 2019, with the following annual percentages	**81.5 %** by 2017 **83.0 %** by 2018 **84.5 %** by 2019	72.08%
2. Accidents	All States	Reduce the accident rate 25% below the 2011-2015 global average accident rate, which was 3.2 until August 2015. 3.2 – 0.8 (25% of 3.2) = **2.4**	25% below the 2011-2015 global average rate by 2017-2019	0%: Aug-2015 2011-Aug 2015 3.5*: SAM average 3.2*: global average
3. Runway excursions	All States	Reduce the rate of runway excursions by 50% below the average rate of the SAM Region for the period 2011-2015, which was 0.84 until August 2015. 0.84 – 0.42 (50% of .84%) = **0.42**	50% below the 2011-2015 global average rate by 2017-2019	0.84*: SAM average (2011-Aug 2015)
4. Aerodrome certification	All States	Reach 100% aerodromes certified or initially certified in the SAM Region by the end of 2019	100% by 2019	12% (June 2015)
5. Implementation of SSP and SMS	All States	Reach 100% of SSP implementation	100% by 2019	42%
		Reach 100% of SMS implementation	100% by 2019	83%

*Accident rate = Number of accidents per million departures

AIR NAVIGATION IMPLEMENTATION PLAN - PERIOD 2017- 2019

ATM AREA

B0 – NOPS: Improve traffic flows through the implementation of ATFM				
ELEMENTS	**SCOPE**	**INDICATORS/ METRICS**	**GOALS: %/ Date**	**STATUS**
8- Implementation of regional ATFM	All States	Indicator: % of ACC FMUs/FMPs interconnected in a network. Metrics: Number of ACC FMUs/FMPs interconnected in a network.	50% by 2017 100% by 2018	XX %

CNS AREA

B0 – FICE: Increased interoperability, efficiency and capacity through ground-ground integration						
ELEMENTS	**SCOPE**	**INDICATORS / METRICS**	**GOALS: %/ Date**			**STATUS**
			2017	***2018***	***2019***	
AMHS implementation/ interconnection	All States	Indicator: % of AMHS systems interconnected Support metrics: Number of AMHS systems interconnected **13 AMHS systems interconnected by the end of 2019**	5	5	2	26 AMHS interconnections implemented by the end of 2016
Implementation of AIDC interconnections between adjacent ACCs	All States	Indicator: % of interconnections implemented between adjacent ACCs Support metrics: Number of AIDC interconnections implemented between adjacent ACCs **Implementation of 26 AIDCs by the end of 2019**	13	6	7	
Implementation of domestic IP networks	All States	Indicator: % of States that have implemented domestic IP networks Support metrics: Number of domestic IP networks implemented **7 States implemented by the end of 2019**	3	2	2	

AIM AREA

B0 – DATM: Service improvement through digital aeronautical information management 2017-2019				
ELEMENTS	**SCOPE**	**INDICATORS/ METRICS**	**GOALS: %/ Date**	**STATUS**
1 - AIXM	All States	Indicator: % of States that have implemented AIXM on an AIS database. Metrics: Number of States that have implemented AIXM on an AIS database.	2016 trials (4 States: ARG, BRA, PAN, URU) 28% by 2017 49% by 2018 100% by 2019	XX% (X States)
2 – Electronic AIP	All States	Indicator: % of States that have implemented an IAID to manage the production of the electronic AIP (eAIP). Metrics: Number of States that have implemented an IAID to manage the production of the electronic AIP (eAIP).	26% by 2017 56% by 2018 100% by 2019	XX% (X States)
3 – Electronic terrain and obstacle data (e-TOD)	All States	Indicator: % of States that have implemented the terrain data set Metrics: Number of States that have implemented the terrain data set Indicator: % of States that have implemented the obstacle data set Metrics: Number of States that have implemented the obstacle data set	**Area 1**: Terrain: 100% by 2016 Obstacles: 28% by 2016 49% by 2017 100% by 2018	**Area 1**: Terrain: XX% (XX States) Obstacles: XX% (XX States)

B0 – DATM: Service improvement through digital aeronautical information management 2017-2019				
ELEMENTS	**SCOPE**	**INDICATORS/ METRICS**	**GOALS: %/ Date**	**STATUS**
(cont.) 3 – Electronic terrain and obstacle data (e-TOD)	All States	Indicator: % of States that have implemented the data set for terrain and obstacles that penetrate the terrain and obstacle data collection surface. Metrics: Number of States that have implemented the data set for terrain and obstacles that penetrate the terrain and obstacle data collection surface.	**AREA 2b, 2c, and 2d** Terrain: 100% by 2017 Obstacles: 100% by 2017	**AREA 2b, 2c, and 2d** Terrain: XX% (XX States) Obstacles: XX% (XX States)
4 – Digital NOTAM	All States	Indicator: % of States that have included the digital NOTAM in their National AIS-to-AIM Transition Plan. Metrics: Number of States that have included the digital NOTAM in their National AIS-to-AIM Transition Plan.	28% by 2017 56% by 2018 100% by 2019	XX% (XX States)
5- Integrated aeronautical information databases (IAID).	All States	Indicator: % of States that have developed integrated aeronautical information databases (IAID). Metrics: Number of States that have developed integrated aeronautical information databases (IAID).	28% by 2017 56% by 2018 100% by 2019	XX% (XX States)

MET AREA

B0 – AMET: Meteorological information supporting enhanced operational efficiency and safety						
ELEMENTS	**SCOPE**	**INDICATORS / METRICS**	**GOALS: %/ Date**			**STATUS**
			2017	***2018***	***2019***	
MET/QMS in accordance with ISO 9001:2015	All States	Indicator: % of States that have implemented MET QMS (100% by the end of 2018) Support metrics: Number of States that have implemented MET QMS	10	12	14	All States should update their MET/QMS documentation to align it with ISO 9001. Currently, 7 States have implemented and certified the MET/QMS in their aeronautical meteorological services.
Implementation of SIGMET messages in graphical format	All States	Indicator: % of international aerodromes/MWOs that have implemented graphical procedures. Support metrics: Number of international aerodromes/MWOs that have implemented graphical SIGMET procedures.	6	8	12	Currently, 3 States have implemented SIGMET messages in graphical format.
Implementation of the IAVW procedure	All States	Indicator: % of international aerodromes/MWOs that have implemented IAVW procedures. Support metrics: Number of international aerodromes/ MWOs that have implemented IAVW procedures	7	9	12	

B0 – AMET: Meteorological information supporting enhanced operational efficiency and safety						
ELEMENTS	**SCOPE**	**INDICATORS / METRICS**	**GOALS: %/ Date**			**STATUS**
			2017	***2018***	***2019***	
Implementation of OPMET messages in XML/GML format	All States	Indicator: % of States that have implemented OPMET messages in XML/GML format. Support metrics: Number of States that have implemented OPMET messages in XML/GML format.	4	6	9	
Implementation of tropical cyclone watch procedures	States requiring this procedure	Indicator: % of international aerodromes/MWOs that have tropical cyclone watch services Support metrics: Number of international aerodromes/ MWOs that have tropical cyclone watch services	2	3	4	Only Colombia, Guyana, French Guiana, Panama, Suriname, and Venezuela could be affected by tropical cyclones in the SAM Region.
Implementation of surveillance procedures concerning the release of radioactive material	All States	Indicator: Percentage of Meteorological Watch Offices (MWOs) that have implemented surveillance procedures concerning the release of radioactive material Support metrics: Number of MWOs that have operational cooperation agreements with ACCs for the transmission of reports on the release of radioactive material	2	4	7	
Implementation of wind shear warning and alert procedures	All States	Indicator: Percentage of international aerodromes /AMOs that have implemented wind shear warning and alert procedures Support metrics: Number of international aerodromes /AMOs that have implemented wind shear warning and alert procedures.	6	9	12	

AGA AREA

B0 – A-CDM: Optimized airport operations through Airport-CDM						
ELEMENTS	**SCOPE**	**INDICATORS / METRICS**	**GOALS: %**			**STATUS**
			2017	***2018***	***2019***	
Standard calculation of airport capacity	All States	Indicator: % of aerodromes registered in the CAR/SAM Air Navigation Plan with airport capacity (runway/taxiways/ apron) calculated using the same methodology in the region. Support metrics: Number of aerodromes with airport capacity (runway/taxiways/ apron) calculated using the same methodology in the region.	3	7	10	0%
Implementation of A-CDM	All States	Indicator: % of aerodromes registered in the CAR/SAM Air Navigation Plan that have started A-CDM implementation Support metrics: Number of aerodromes that have implemented A-CDM	3	7	10	1%

Agenda Item 6 Other business

6.1 Under this agenda item, the Meeting analysed the following paper:

WP/14 – *Volcanic Ash Contingency Plan for the South American Region (VACP/SAM)* (Presented by the Secretariat)

6.2 The Meeting took note that on 22-26 June 2015, the MET/ATM/AIM meeting was held at the ICAO Lima Regional Office to review the *Volcanic Ash Contingency Plan for the South American Region* (VACP/SAM).

6.3 The Meeting considered that Annex 3 established the responsibility of meteorological units for the monitoring of conditions related to a volcanic eruption or the presence of volcanic ash clouds, and for advising ATS units or users with regard to the movement and forecasting of volcanic ash clouds originating from a volcanic eruption that may have invaded the FIR under their responsibility. It also noted that Annex 15 established that information on a change in volcanic activity that is of significance for operations, when reported through an ASHTAM, should contain the data in the order indicated in the ASHTAM format shown in Appendix 3.

6.4 The Meeting took note that in 2011, as a result of the eruptions of volcanoes Chaitén and Cordon Caulle, the SAM/IG/8 meeting recommended having a Volcanic Ash Contingency Plan for South America and that, under the auspices of Project RLA/06/901 the Secretariat had drafted the aforementioned Plan in September 2011.

6.5 The Secretariat noted that the Plan prepared by the Regional Office had not been circulated because the ICAO Council, following the events related to volcano Eyjafjallajökull in Iceland in April 2010, had created an international volcanic ash task force (IVATF) to channel, direct, and lead all efforts conducted by ICAO in relation to volcanic ash, both at regional and global level, and because the third meeting of this special group had issued Recommendation 3/9 requesting the distribution of the Volcanic Ash Contingency Plan template to Regional Offices. This template was sent in 2012 to the Lima Regional Office.

6.6 The Meeting noted that the SAM Regional Office, with a view to complying with IVATF Recommendation 3/9, had organised the ATM/AIM/MET meeting, dealing with the alignment of the Volcanic Ash Contingency Plan for the South American Region with the template recommended by the IVATF. The attending State delegates drafted the Regional Volcanic Ash Contingency Plan, which is available in Spanish on the ICAO South American Regional Office website: **http://www.icao.int/SAM/Documents/2015-ATMMETAIMVA/ATMMETAIM_VA_Cuestion1%20APNaPlan_VACP_SAM_2015.pdf** and appears in **Appendix A** to this part of the Report.

6.7 The Meeting took note that the Secretariat had circulated the Volcanic Ash Contingency Plan to the States for approval, together with the list of points of contact in the different areas involved for its completion, in addition to the list of volcano observatories in each State.

6.8 The Secretariat has underlined the importance for States to use this document as a guide for drafting their National Volcanic Ash Contingency Plans.

Automated delivery of the Flight Plan (FPL) to ATCs

6.9 Regarding this item, IATA noted that, for the purpose of optimising the automated systems implemented in the Region, it was very important that they could accept flight plans sent from airline dispatch headquarters or local dispatchers in an automated manner, from system to system, thus avoiding the displacement of dispatchers to ARO offices to meet that requirement.

6.10 The Meeting supported this initiative and the Secretariat stated that airlines should also use appropriate procedures to avoid sending multiple flight plans that could block the automated flight plan management systems, resulting in the issuance of multiple flight progress strips for the same flight. Furthermore, it was important to train dispatchers on the proper way of completing flight plans, with no errors, in order to avoid correcting each flight plan, which would increase the workload of flight data positions of ATC automated systems.

APPENDIX A

ICAO SOUTH AMERICAN REGION VOLCANIC ASH CONTINGENCY PLAN (VACP/SAM)

DRAFT

INTERNATIONAL CIVIL AVIATION ORGANIZATION

SOUTH AMERICAN REGIONAL OFFICE

ICAO SOUTH AMERICAN REGION VOLCANIC ASH CONTINGENCY PLAN (VACP/SAM)

Version 1.1 (First Edition)
June 2015

PAGE LEFT BLANK INTENTIONALLY

TABLE OF CONTENTS

FOREWORD

The ICAO SAM Volcanic Ash Contingency Plan (VACP/SAM) is published by the ICAO South American Regional Office on behalf of the ICAO South American Region Implementation Group (SAMIG). This Plan takes into account the different aspects and actions that States should consider when volcanic activity affects one or more of their Flight Information Regions (FIRs). The purpose of this plan is to show a general scheme of action for these contingencies through recommendations, procedures, examples, etc., contained herein, in order to contribute to the safe and orderly air traffic flow in the SAM Region.

On behalf of the SAMIG, the Regional Office will publish the revised VACP/SAM versions that may be necessary to keep the document duly up to date.

Copies of the VACP/SAM may be requested to:

ICAO SAM OFFICE IN LIMA, PERU

E-mail	:	mail@lima.icao.int
Web site	:	www.lima.icao.int
Phone:	:	+511 6118686
Fax	:	+511 6118689
Mail	:	Apartado Postal 4127, Lima 100, Perú
E-mail points of contact	:	***rarca@icao.int*** ***jarmoa@icao.int***

This edition (*Version 1.1)* incorporates all those revisions and modifications made until June 2015. Subsequent amendments and/or corrigenda will be listed in the Amendment and Corrigenda Registry Table, in accordance with the procedure established in the next page.

REGISTRY OF AMENDMENTS AND CORRIGENDA

The publication of amendments and corrigenda is regularly announced by mail to the States and International Organisations, and on the website of the ICAO South American Regional Office, which should be consulted by those using this publication. Blank boxes facilitate recording.

AMENDMENTS			
No.	**Effective date**	**Date recorded**	**Recorded by**

CORRIGENDA			
No.	**Effective date**	**Date recorded**	**Recorded by**

— — — — — — — —

ACRONYMS AND ABBREVIATIONS

CAA	Civil aviation authority
ACC	Area control centre
AD	Aerodrome
AIP	Aeronautical information publication
AIS	Aeronautical information service
AIREP	Air-report
ANSP	Air navigation service provider
ASHTAM	A special series NOTAM notifying by means of a specific format a change in activity of a volcano, a volcanic eruption and/or a volcanic ash cloud that is of significance to aircraft operations
ATC	Air traffic control
ATCO	Air traffic controller
ATFM	Air traffic flow management
ATM	Air traffic management
ATS	Air traffic services
CDM	Collaborative decision-making
FMU	Air traffic flow management unit
FIR	Flight information region
IAVW	International airways volcano watch
IVATF	International volcanic ash task force (of ICAO)
LOA	Letter of agreement
MET	Meteorology
MWO	Meteorological watch office
NOTAM	Notice to airmen
PANS ATM	Procedures for air navigation services
SAM	ICAO South American Region
SARPS	Standards and recommended practices
SIGMET	Information concerning en-route weather phenomena that may affect the safety of aircraft operations
SMS	Safety management system
SRA	Safety risk assessment
VAA	Volcanic ash advisory
VAAC	Volcanic ash advisory centre
VACP/SAM	SAM volcanic ash contingency plan
VAG	Volcanic ash advisory in graphical form
VAR	Volcanic activity report from aircraft (the real-time part of the VAR is issued in the same manner as an AIREP Special)
VOLCEX	Regular ICAO volcanic ash exercises to validate and improve regional volcanic ash contingency plans and procedures
VONA	Volcano observatory notice for aviation
WAFC	World area forecast centre

DEFINITIONS APPLICABLE TO THE VACP/SAM

Air report. Report from an aircraft in flight prepared in accordance with position and operational or meteorological information reporting requirements.

Volcanic ash. Comprised of minerals unique to the volcanic eruption. Minerals common to most volcanic ash are silica together with smaller amounts of the oxides of aluminium, iron, calcium and sodium. The glassy silicate material is very hard and extremely abrasive. Its melting point is below jet engine burner temperature, which introduces additional hazards. (Refer to Section 2.1 of ICAO's *Manual on volcanic ash, radioactive material and toxic chemical clouds* (Doc 9691)).

Volcanic ash advisory centre. A meteorological centre designated by regional air navigation agreement to provide advisory information to meteorological watch offices, area control centres, flight information centres, world area forecast centres, relevant regional area forecast centres, and international OPMET data banks regarding the lateral and vertical extent and forecast movement of volcanic ash in the atmosphere following volcanic eruptions.

Area control centre. A unit established to provide air traffic control service to controlled flights in control areas under its jurisdiction.

World area forecast centre (WAFC). A meteorological centre designated to prepare and supply significant weather forecasts and upper-air forecasts in digital and/or pictorial form on a global basis to regional area forecast centres, and direct to States by appropriate means as part of the aeronautical fixed service.

Air traffic service unit. A generic term meaning variously, an air traffic control unit, a flight information centre, or an air traffic services reporting office.

Aeronautical meteorological station. A station designated to make observations and meteorological reports for use in international air navigation.

State of Registry. The State on whose register the aircraft is entered.

State of the Operator. The State in which the operator's principal place of business is located or, if there is no such place of business, the operator's permanent residence.

Air traffic flow management. A service established with the objective of contributing to a safe, orderly and expeditious flow of air traffic by ensuring that ATC capacity is utilized to the maximum extent possible, and that the traffic volume is compatible with the capacities declared by the appropriate ATS authority.

Air traffic management. The dynamic and integrated management of air traffic and airspace (including air traffic services, airspace management, and air traffic flow management) in a safe, economic and efficient manner, through the collaborative provision of seamless facilities and incorporating ground-based and airborne functions.

AIRMET information. Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather phenomena that may affect the safety of low-level aircraft operations and which was not already included in the forecast issued for low-level flights in the flight information region concerned or sub-area thereof.

Meteorological information. Meteorological report, analysis, forecast, and any other statement relating to existing or expected meteorological conditions.

SIGMET information. Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather phenomena that may affect the safety of aircraft operations.

Meteorological report. A statement of observed meteorological conditions related to a specified time and location.

Standards and recommended practices. The Council adopts standards and recommended practices in accordance with Articles 54, 37, and 90 of the Convention on International Civil Aviation, and defined as follows:

Standard. A standard is any specification for physical characteristics, configuration, material, performance, personnel or procedure, the uniform application of which is recognised as necessary for the safety or regularity of international air navigation and to which Contracting States will conform in accordance with the Convention; if unable to comply, the Council must be notified in accordance with Article 38 of the Convention.

Recommended practice. A recommended practice is any specification for physical characteristics, configuration, material, performance, personnel or procedure, the uniform application of which is recognised as desirable in the interest of safety, regularity or efficiency of international air navigation and to which Contracting States will endeavour to conform in accordance with the Convention.

Volcanic cloud. The sum of the material ejected from a volcano into the atmosphere and transported by upper winds. It comprises volcanic ash, gases and chemical substances1 (refer to Section 2.1 of ICAO's Manual on volcanic ash, readioactive material and toxic chemical clouds (Doc 9691)).

Meteorological office. An office designated to provide meteorological service for international air navigation.

Aerodrome meteorological office. An office, located at an aerodrome, designated to provide meteorological service for international air navigation.

Procedures for air navigation services. Procedures approved by the Council, which include, in general, operational procedures that are considered to be insufficiently mature to be adopted as international standards and recommended practices, or more permanent texts that are not suitable or are too detailed to be included in an Annex.

Collaborate decision-making. A process whereby all ATM decisions, except tactical ATC decisions, are based on the exchange of all information relevant to air traffic operations between civilian and military stakeholders.

Flight information region. An airspace of defined dimensions within which flight information service and alerting service are provided.

Air traffic services. A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service).

Air traffic management service. A system that provides ATM by integrating human resources, information, technology, and facilities with the support of ground-based, airborne and/or airspace-based communications, navigation and surveillance.

Flexible use of airspace. An airspace management concept based on the principle that airspace must not be designated as exclusively military or civilian, but rather as a continuous airspace in which the requirements of all users are met as much as possible.

International airways volcano watch. Joint international arrangements for monitoring and providing warnings to aircraft of volcanic ash in the atmosphere.

Note.— The IAVW is based on the cooperation of aviation and non-aviation operational units using information derived from observing sources and networks that are provided by States. The watch is coordinated by ICAO with the cooperation of other concerned international organisations.

Affected area. A volume of airspace, an aerodrome or other area on the ground, identified by VAA/VAG and/or SIGMET as being affected by known or forecast volcanic cloud contamination.

Areas of contamination. Information on areas of observed and/or forecast volcanic ash in the atmosphere is provided by means of appropriate MET messages in accordance with Annex 3 – Meteorological Service for International Air Navigation.[1]

Danger area. An airspace of defined dimensions within which activities dangerous to the flight of aircraft may exist at specified times.

NOTE.- In the context of volcanic ash cloud contamination, danger area is a volume of airspace identified by NOTAM as being affected by levels of known or forecast volcanic cloud contamination which States judge merit publication to operators.

Prohibited area. An airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is prohibited.

Restricted area. An airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is restricted in accordance with certain specified conditions.

[1] This will mainly include volcanic ash advisories (issued by the volcanic ash advisory centres) and SIGMET information on volcanic ash (issued by meteorological watch offices).

1. FOREWORD

1.1 The severity, persistence, and higher frequency of volcanic events with ash dispersion that have recently occurred in the South American (SAM) Region of ICAO (Hudson in 1991; Chaitén in 2008; Cordón Caulle in 2011; Villarica, 2015; Cabulco, 2015; and others), with their repercussions on the provision of air navigation services, call for a regional contingency plan to address events of this nature when volcanic activity affects one or more of its flight information regions (FIRs). The purpose of this plan is to show a general scheme of action for these contingencies, based on the recommendations, procedures, examples, etc. contained herein, in order to contribute to safe and orderly air traffic flow in the SAM Region. This plan establishes standard guidelines for warning aircraft of a volcanic eruption and the procedures to be followed. The plan also serves as a guide for the States of the Region for drafting their national volcanic ash contingency plans.

1.2 Volcanic contamination--the one caused by volcanic ash being the most severe—is a flight safety hazard. The mitigation of hazards posed by volcanic ash in the atmosphere and/or the aerodrome cannot be done in isolation, but through collaborative decision-making (CDM), with the participation of all stakeholders. During an eruption, volcanic contamination can reach and exceed the cruising altitudes of turbine-powered aircraft within minutes and spread over vast geographical areas within a few days. Volcanic ash encounters may generate a variety of hazards, including one or more of the following:

a) malfunction or failure of one or more engines, causing not only the reduction or total loss of thrust, but also failure of electrical, pneumatic, and hydraulic systems;

b) blockage of pitot or static sensors, resulting in unreliable airspeed readings and erroneous warnings;

c) windscreens rendered partially or completely opaque;

d) smoke, dust and/or toxic chemical contamination of cabin air, forcing the crew to don oxygen masks, which affects speech communications; electronic systems may also be affected;

e) erosion of external and internal aircraft components;

f) reduced electronic cooling efficiency, leading to a series of aircraft system failures;

g) the aircraft may have to be manoeuvred in a manner that conflicts with other aircraft; and

h) volcanic ash deposition on a runway may degrade aircraft braking performance, even more so if the volcanic ash is wet; and in extreme cases, it may lead to runway closure.

1.3 The regulatory authorities of the State of the Operator or State of Registry (see **Appendix G**), as applicable, should establish the appropriate operational procedures to be followed by the flight crew when operating within or near airspace with volcanic ash contamination. In accordance with ICAO Annex 6 – *Operation of Aircraft*, the Operators are required to conduct a risk assessment of operations in volcanic ash and to implement the appropriate mitigation measures in accordance with their safety management system (SMS) as approved by the State of the Operator or State of Registry, as applicable. The manual on *Flight Safety and Volcanic Ash – Risk management of flight operations with known or forecast volcanic ash contamination* (ICAO Doc 9974) contains more detailed guidance on the safety risk assessment (SRA) in flight operations related to volcanic ash contamination.

1.4 This document is an ATM contingency plan that includes interfaces with supporting services such as the Aeronautical Information Service (AIS) and the Meteorological Service (MET). Whenever mention is made in this Plan of actions by the volcanic Ash Advisory Centres (VAACs) (see **Appendix E**) and the Meteorological Watch Offices (MWOs) (see **Appendix D**), and when the Operators

are described, it will be only for clarification purposes. Consideration should also be given to ATS contingency plans, which cover other abnormal situations that could interact with a volcanic ash contingency. The distribution of the respective AIS and MET messages on volcanic ash is defined in the corresponding ICAO Annexes, namely Annex 15 – *Aeronautical Information Services,* and Annex 3 – *Meteorological Service for International Air Navigation.*

1.5 Volcanic ash may also affect aircraft operation at aerodromes. Volcanic ash deposition at an aerodrome, even in very small quantities, may result in the closure of the aerodrome until all the deposited ash has been removed. In extreme cases, the aerodromes could be left completely inoperative, causing repercussions in air traffic management (ATM), *e.g.*, diversions to alternate aerodromes, rerouting of traffic flows, etc.

1.6 It is imperative that information on volcanic activity is disseminated as soon as possible. In order to assist staff in expediting the process of originating and issuing relevant SIGMET, NOTAM, and ASHTAM messages, templates thereof should be available for each stage of the volcanic activity. **Appendix J** shows examples of SIGMET, NOTAM, and ASHTAM messages containing operational measures and the different stages of volcanic activity. A list of ICAO-registered volcanoes, stating the name, number and nominal position of the volcano (see Doc 9691 Manual on volcanic ash, radioactive material and toxic chemical clouds, Appendix F) should be available at the State's International NOTAM Office. In order to ensure the smooth execution and effectiveness of the contingency plan in the event of a real volcanic eruption, annual exercises, called VOLCEX, should be conducted at intervals determined by GREPECAS.

1.7 This document has been prepared in accordance with a proposal of amendment to the *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM, Doc 4444), paragraph 15.8, *Procedures for an ATC unit when a volcanic ash cloud is reported or forecast*, which is already available.

1.8 **Appendices A** and **B** contain, respectively, general considerations on the development of an ATM contingency plan for volcanic ash, and the problems that flight crews are expected to face when encountering volcanic ash.

2. INTRODUCTION

2.1 Declaration of a danger area

2.1.1 If it is considered that the volcanic event could pose a hazard to aviation, a danger area[2] may be declared by NOTAM. However, this option should only be applied over and in the proximity of the volcanic source. Normally, clearances will not be issued through the danger area unless explicitly requested by the flight crew. In this context, it should be noted that the final responsibility for aircraft safety rests with the flight crew. Therefore, the final decision regarding routing, whether to avoid or proceed through an area of volcanic activity, is the flight crew's responsibility. Mention in this document of the possible establishment of danger areas does not imply that States are prevented from establishing restricted or prohibitied areas over their sovereign territory if considered necessary by the State concerned.

2.1.2 Although it is the prerogative of the provider State to promulgate a danger area in airspace over the high seas, it should be recognised that restrictions cannot be imposed to the freedom of flight over the high seas, in accordance with the United Nations Convention on the Law of the Sea (Montego Bay, 1982).

2.2 Phases of an event

2.2.1 The response to a volcanic event that affects air traffic has been divided into four distinct phases in this document – a Pre-Eruption Phase, a Start of Eruption Phase, an On-going Eruption Phase, and a Recovery Phase **—** as follows:

a) **PRE-ERUPTION PHASE (**when applicable**):** The initial response, "raising the alert", commences when a volcanic eruption is expected.

Appropriate AIS and MET messages may be issued in accordance with Annex 15 and Annex 3, respectively, and disseminated to affected aircraft in flight by the most expeditious means. It should be noted that, sometimes volcanoes erupt unexpectedly without any alert being raised, hence the pre-eruption phase may be omitted.

b) **START OF ERUPTION PHASE** (when applicable)**:** The start of eruption phase commences at the outbreak of the volcanic eruption and entrance of volcanic ash into the atmosphere, and mainly involves aircraft in flight. Appropriate AIS and MET messages may be issued in accordance with Annex 15 and Annex 3, respectively, and a danger area may be declared by NOTAM. Normally, clearances will not be issued through the danger area unless explicitly requested by the flight crew.

c) **ON-GOING ERUPTION PHASE:** The on-going eruption phase commences with the issuance of the first volcanic ash advisory (VAA) containing information on the extent and movement of the volcanic ash cloud following completion of the previous reactive responses. Appropriate AIS and MET aprmessages may be issued in accordance with Annex 15 and Annex 3 respectively.

d) **RECOVERY PHASE:** The recovery phase commences with the issuance of the first VAA/VAG indicating that the FIR is no longer contaminated with volcanic ash or the first VAA/VAG containing the statement "NO FURTHER ADVISORY", which normally occurs when it is determined that no volcanic ash is expected in the atmosphere and the volcanic activity has reverted to its pre-eruption state.

[2] Depending on the State's regulations, the area may be established as a "danger area", "restricted area" o "prohibited area". Over the high seas, only a "danger area" may be established.

Appropriate AIS and MET messages shall be issued, in accordance with Annex 15 and Annex 3, respectively.

Note: These descriptions are amplified in Chapter 3 of this document.

2.2.2 Although the four phases describe actions to be undertaken during the actual volcanic event, they are based on a theoretical scenario. Actual eruptions may not always be so distinct with respect to ATM actions to be undertaken. Similarly, an eruption may occur without any pre-eruptive activity, or may cease and restart more than once. Hence, the first observation may be the presence of an ash cloud that is already some distance away from the volcano. It is essential that the contingency plan prepare the ATM system for an appropriate response depending on the actual conditions. Therefore, the "Pre-Eruption Phase" and "Start of Eruption Phase" described in this document are annotated "when applicable" in order to provide for flexibility in the application of the contingency plan in those parts of the world with insufficient volcano monitoring and alerting.

2.2.3 Flight crews are required to report observations of volcanic activity by means of a special air-report (special AIREP). Arrangements should be put in place to ensure that such information is transferred without delay to the appropriate aeronautical agencies responsible for subsequent action. The communication and dissemination of pilot reports on volcanic activity are described in **Appendix C**.

3. PRE-ERUPTION PHASE

3.1 General

3.1.1 Where flight operations are planned in areas that are susceptible to volcanic eruptions, ATS units may expect to receive from flight crews the ICAO Volcanic Activity Report (VAR) form (published in the *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM, Doc 4444), Appendix 1).

3.1.2 The focus of this phase is to gain early recognition of volcanic events. This phase is frequently characterised by a very limited availability of information on the potential extent and severity of the impending eruption. The priority is to ensure the continued safety of aircraft in flight, and there is therefore a requirement to promulgate information as a matter of urgency. Notwithstanding the potentially limited extent of information available, the pre-eruption phase actions described below should be carried out for every expected eruption.

3.1.3 Generally, aircraft pilots are the source of information for an eruption, except in those cases in which there is an established volcano monitoring system. Consequently, pilots operating in areas with unsupervised volcanoes should always stay alert to those signs that could indicate an eruption and also understand the importance of their role as providers of information. Operators should provide pilots with the ICAO Volcanic Activity Report (VAR) form, preferably in a user-friendly electronic format.

3.1.4 The initial response, "raising the alert", commences when a volcanic eruption is expected or when it occurs unexpectedly. The source of that information may be the pilot (AIREP/VAR) and/or the meteorological or volcanological agencies (VONAs). Arrangements in each State between volcanological and meteorological organisations and air traffic management agencies should ensure that alerting information is provided expeditiously to the affected aircraft in flight or through VONA, SIGMET, NOTAM, ASHTAM or retransmission of AIREPs, as appropriate, and disseminated in accordance with the established procedures.

3.1.5 This phase focuses on drawing the attention of aircraft to a potential hazard and protecting them from the hazards inherent to the eruption itself. Actions are based on well-prepared contingency plans and standard operating procedures. Aircraft are expected to exit or avoid the affected area in accordance with the standard operating procedures. This alert will trigger actions such as the collection of additional data and the conduction of specific safety risk assessments (SRAs).

3.2 Action by the originating ACC* *(eruption expected in its own flight information region)*

* Where the "ACC" term is used in this document, it is understood to also include all ATS facilities

3.2.1 In the event of significant pre-eruption volcanic activity, an eruption in process, or a reported volcanic ash cloud, which could pose a hazard to aviation, the area control centre (ACC) that receives the information should do as follows:

a) advise the associated MET provider, in accordance with national/regional arrangements (unless said provider is the originator of the initial report), and the AIS, which, in turn, will inform the corresponding air traffic flow management (ATFM) units;

b) ensure that appropriate MET (SIGMET) and AIS (NOTAM/ASHTAM) messages are originated in accordance with Annexes 3 and 15. These must provide precise information regarding the activity of the volcano as soon as it becomes available. It is imperative that this information is issued by the Meteorological Watch Office and the international NOTAM Office and disseminated as soon as possible, in accordance with the provisions of the aforementioned Annexes;

c) when so required by the State, define an initial, precautionary danger area in accordance with established procedures. The size of this danger area should include a reasonable volume of airspace consistent with the limited information available, trying to avoid undue disruption of flight operations;

i. if no such procedures have been established, the danger area should be defined as a circle with a radius of 222 km (120 NM). If the eruption has not started and if there is no information available on upper wind, the circle should be centred on the estimated location of the volcanic activity or, if more information is available, the circle should have a radius of 111 km (60 NM);

ii. if a precautionary danger zone has been established, its size should include a reasonable volume of airspace consistent with the limited information available, trying to avoid the disruption of flight operations; and

Note.– An area with a radius of 5 to 10 minutes of flight time represents only 2 to 3 minutes of additional flight.

iii. although the ATC does not normally issue clearances through a danger area, it is the responsibility of the pilot-in-command to choose the safest course of action.

d) alert the flights that are already in the danger area and offer assistance to enable aircraft to exit the area in the most expeditious and appropriate manner. Flight crews should be provided with all necessary information to make safe and efficient decisions in dealing with the hazards in the defined area. Aircraft that are close to the area should be offered assistance to remain clear of the area. Likewise, new tactical clearances should be issued to those flights whose original route is affected by this area;

e) Immediately notify other ACCs of the event, indicating the location and dimensions of the danger area. It should also renegotiate and re-route, as necessary, those flights already coordinated but still within adjacent flight information regions. They will also require adjacent ACCs to reroute flights not yet coordinated to keep them clear of the area. It should be noted that flight crews may decide not to completely avoid the area based on, for example, visual observations;

f) implement flow management measures if necessary to maintain the required level of safety;

g) make sure that SIGMETs and NOTAM/ASHTAMs are issued. These should provide information on the activity of the volcano as precisely as possible, based on its availability. The message should include the name (as applicable), the reference number and the location of the volcano, together with the date and time of start of the eruption. It is imperative that the information is issued by the meteorogical watch office and the international NOTAM office and disseminated as soon as possible;

h) in order to assist staff in expediting the process of composing the NOTAM/ASHTAM messages, templates should be available for each stage of volcanic activity. Appendix J contains examples of NOTAM/ASHTAMs for these cases.

3.2.2 The initial NOTAM/ASHTAM and its subsequent messages shall be sent to all addressees in the distribution list and also to the meteorological agencies concerned, adding the corresponding heading of the World Meteorological Organization (WMO).

3.3 Action by adjacent ACCs

3.3.1 During the pre-eruption phase, the ATC should inform aircraft that they might be tactically re-routed to avoid danger areas. Adjacent ACCs should take the following action to provide proper assistance:

a) following coordination with the originating ACC, re-clear flights to which services are being provided and whose routes will be affected by the establishment of the danger area; and

b) unles otherwise instructed, continue normal operations, and

i. if one or more routes are affected by the danger area, suggest the rerouting of aircraft in flight, as applicable, to other routes away from the danger area; and

ii. remain aware of the affected area at all times.

3.4 Action by the ATFM unit

3.4.1 The ATFM unit and the associated volcanic ash advisory centre (VAAC) will determine when their initial communications will take place on the basis of bilateral agreements. Upon reception of information on volcanic activity from the VAACs, the ATFM unit should initiate actions in accordance with its procedures to ensure exchange of information in support of CDM among the air navigation service providers (ANSPs), MWOs, VAACs and aircraft operators concerned.

4. START OF ERUPTION PHASE

4.1 General

4.1.1 This phase commences at the outbreak of a volcanic eruption, with volcanic ash being ejected into the atmosphere. The focus of the processes in this phase is to protect aircraft in flight and at aerodromes from the hazards of the eruption, collect relevant information, and convert available information about the volcanic ash cloud (horizontal and vertical extent, etc.) into reliable and precise information.

4.1.2 The information for starting this phase can come from pilots (AIREP/VAR), ATS personnel, MET provider, or volcanological data (VONA/SIGMET). **Appendix L** contains the VONA format and an example.

4.1.3 In addition to relevant actions described under the pre-eruption phase, the main activities of the start of eruption phase are: issuance of a start-of-eruption SIGMET; issuance of a start-of-eruption NOTAM/ASHTAM; provision of information and assistance to traffic in flight. As appropriate, danger areas will be declared via NOTAM. This phase will last until such time as the on-going eruption phase is activated.

4.2 ACTION BY THE ORIGINATING ACC *(eruption in its own flight information region)*

4.2.1 The ACC providing services in the FIR within which the volcanic eruption takes place should inform flights thereof and about the existence, extent and forecast movement of volcanic ash, and provide useful information for the safe conduct of flights.

4.2.2 Rerouting of traffic shall commence immediately or may be in progress if the alerting time has been sufficient. The ACC should assist in rerouting aircraft around the danger area as expeditiously as possible. Adjacent ACCs should also take the danger area into account and give similar

assistance to aircraft as early as possible. Although the ATC does not normally issue clearances through the danger area, it will inform aircraft about the hazard and will continue to provide normal services. Aircraft are expected to stay clear of the danger area, but it is the responsibility of the pilot-in-command to determine the safest course of action.

4.2.3 During this phase, the ACC should:

a) maintain close liaison with the associated MWO. The MWO should issue a start-of-eruption SIGMET message through the most expeditious means. It may simply inform that an ash cloud has been reported, the date/time and its location. The start-of-eruption SIGMET can also be promulgated by means of a VAA. During this phase, information on the extent and severity of the event may be limited; however, whenever possible, the message should contain information on the extent and forecast movement of the ash according to the appropriate information sources;

b) when necessary, ATFM measures should be reviewed and updated, based on forecasts and the cooperation of aircraft operators (CDM) and adjacent ACCs for the safe conduct of flight operations;

c) make sure that a NOTAM is originated to define a danger area that includes a volume of airspace consistent with the limited information available. In determining the area, information on upper winds should be taken into account, if available. The purpose is to ensure safety of flight in the absence of any prediction of the extent of contamination from a competent authority;

d) ensure that differences found between published information and observations (pilot reports, atmospheric measurements, etc.) are forwarded as soon as possible to the appropriate authorities to ensure their dissemination to all concerned; and

e) begin planning the CDM for the on-going eruption phase in conjunction with the aircraft operators, the appropriate ATFM unit and ACCs concerned.

4.3 Action by adjacent ACCs

4.3.1 During the start-of-eruption phase, adjacent ACCs should take the following action:

a) maintain a close liaison with the appropriate ATFM unit and the originating ACC in order to design, implement and keep ATFM measures duly updated for the safe conduct of flight operations;

b) the adjacent ACC, in cooperation with the originating ACC and aircraft operators, should impose, as needed, tactical measures in addition to those issued by the corresponding ATFM unit;

c) maintain awareness of the affected area; and

d) begin planning for the on-going eruption phase in conjunction with the aircraft operators, the appropriate ATFM units, and ACCs concerned.

4.4 Action by the ATFM unit

4.4.1 During the start of eruption phase, depending on the impact and/or extent of the volcanic ash, the appropriate ATFM unit should organise the exchange of the latest information on the developments with the VAACs, ANSPs, MWOs, and operators concerned in order to support CDM, and communicate the available updated information to the appropriate regional or inter-regional ATFM units.

5. ON-GOING ERUPTION PHASE

5.1 General

5.1.1 The on-going eruption phase commences with the issuance of the first volcanic ash advisory/volcanic ash advisory in graphical form (VAA/VAG) by the Buenos Aires and Washington VAACs. The VAA/VAG will contain the current position of the volcanic ash and forecasts of the vertical and horizontal extent of the volcanic ash cloud and its forecast movement at six-hour intervals, from T+0 until T+18 hours. When the volcanic ash cloud is expected to move considerably for a period of 6 hours, SIGMET messages should be issued at shorter intervals. Both messages should be issued in accordance with Annex 3 provisions.

5.1.2 Volcanic ash cloud forecasts at T+6, T+12 and T+18 hours and more extensive forecasts (if available) are used for preparing the NOTAM/ASHTAM. Volcanic ash cloud forecasts and/or VAA/VAGs could include (if available) quality indicators (*e.g.,* certainty, variability, etc.) as well as risk levels that could be more easily used in SRAs.

5.1.3 Volcanic ash may affect any combination of airspace; therefore, it is not possible to prescribe measures for each particular situation. Furthermore, it is not possible to detail the actions to be taken by each ACC. The following guidance may prove useful during the on-going eruption phase but should not be considered mandatory:

a) depending on the impact and/or extent of volcanic ash, the corresponding ATFM unit may take the initiative to organise teleconferences with the VAACs, ANSPs, MWOs, volcanological agencies and operators concerned to exchange the latest information on the developments in support of CDM,

b) during this phase, VAACs should try to calculate the vertical extent of the area containing ash and provide the appropriate VAA/VAG in order to define the contaminated airspace as precisely as possible. For flight planning purposes, operators should try to have their aircraft overfly the horizontal and vertical boundaries of the danger area as if it were mountainous terrain. Operators shall be warned about the risk of cabin depressurization or engine failure that could take place if the flight level cannot be maintained, especially in the case of extended range operations by twin-engined aeroplanes (ETOPS), and

c) any differences between published information and observations (pilot reports, atmospheric observations, etc.) must be forwarded as soon as possible to the appropriate authorities.

5.2 Action by the ACCs

5.2.1 The ACCs affected by the movement of ash should make sure that the NOTAM/ASHTAM continues to be originated at appropriate intervals. The ACCs involved and the ATFM units should continue publishing details of the measures taken, to ensure their distribution to all stakeholders.

5.2.2 If ash is reported or forecast in the FIR for which the ACC is responsible, it should apply the following procedures:

a) immediately relay all available information to pilots whose aircraft could be affected to ensure that they are aware of the horizontal and vertical extent of the airspace contaminated with ash;

b) if so required, suggest the appropriate rerouting to help flights avoid areas of known or forecast contamination;

c) the ATC should not issue clearances for entry or operation of aircraft in a danger area. Aircraft should be provided the necessary assistance to exit a danger area as soon as posssible;

d) request a special air-report when the flight route leads the aircraft to or close to the forecast ash cloud, and send that special air-report to the corresponding agencies; and

g) if an aircraft has informed the ACC that it has entered an area contaminated with volcanic ash:

i. consider that the aircraft is is an emergency situation;

ii. do not make modifications to the assigned route or level, unless it is requested by the flight crew or is required to meet airspace requirements or traffic conditions; and

iii. do not initiate vectoring without approval by the pilot.

5.2.3 Experience has shown that the escape manoeuvre recommended for an aircraft that has encountered a volcanic ash cloud is to reverse the course and start descending (if allowed by the terrain). However, the pilot has the final decision.

Note 1.— General procedures to be applied when a pilot reports an emergency situation are contained in Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM, Doc 4444) *Chapter 15,* Procedures related to emergencies, communication failure and contingencies.

Note 2.— Guidance material concerning the effect of volcanic ash and its impact on aeronautical operational and support services is provided in Chapters 4 and 5 of the Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds (Doc 9691).

5.3 Action by the ATFM unit

5.3.1 Depending on the impact and/or extent of the volcanic ash and in order to support CDM, the appropriate ATFM unit should organise the exchange of the latest information available on the volcanic event with the VAACs, ANSPs, MWOs and operators concerned.

5.3.2 The ATFM unit will apply ATFM measures on request of the ANSPs concerned. The measures should be reviewed and updated in accordance with the latest information. Operators will be advised to periodically review the NOTAM/ASHTAMs and SIGMETs for the area.

Note 1.- The applicable ATFM measures appear in the Caribbean/South American (CAR/SAM) ATFM Manual http://www.icao.int/SAM/eDocuments/2ATFM%20Manual%20Spa%20MAR10.pdf

5.3.3 The ATFM unit should also consider civil-military coordination for the implementation of the Flexible Use of Airspace (FUA) concept, which permits temporary use of alternate routes that normally cross restricted airspaces, thus preventing aircraft from travelling long distances to avoid them.

Note 1.- Circular 330 AN/189 on civil-military cooperation in air traffic management provides guidance and examples on this topic.

Note 2.- Additional information on FUA may be obtained in the Guidelines for the Implementation of Flexible Use of Airspace (FUA) in the South American Region (SAM/FUA Guidelines) http://www.icao.int/SAM/eDocuments/Manual%20Guía%20FUA.pdf

6. RECOVERY PHASE

6.1 The recovery phase commences with the issuance of the VAA/VAG indicating that the FIR is no longer contaminated with volcanic ash, or of the first VAA/VAG containing the statement "NO FURTHER ADVISORY" **—** which normally occurs when it is determined that volcanic activity has returned to its pre-eruption status and the airspace is no longer contaminated with volcanic ash. Accordingly, the corresponding MET/AIS messages should be issued, in accordance with Annexes 3 and 15.

6.2 ACCs and ATFM units should return to their normal operations as soon as possible.

6.3 Once the event has concluded, the CAA should conduct an evaluation of the activities carried out by the different areas involved in order to improve the procedures applied.

Note 1.- Regarding the responsibilities assigned to the ATFM units mentioned in this document, these should be undertaken by the respective ACCs until the ATFM units are implemented.

Note 2.- All the actions described herein must, inasmuch as possible, be contained and honoured in letters of agreement between all units concerned.

7. RESPONSE TO VOLCANIC ASH EMERGENCIES AT AERODROMES

7.1 *LAR 153 – Aerodrome operations,* sets forth aerodrome operation requirements for States participating in the Regional Safety Oversight System (SRVSOP) that decide to adopt said regulation. Its objective is to promote among its member States the harmonisation and updating of safety regulations and procedures for civil aviation.

7.2 Item 153.540 – *Control of volcanic ash emissions*, of said regulation establishes that:

a) The aerodrome operator must prepare a contingency plan for the control of volcanic emissions in accordance with **Appendix 2- Emergency response**, Part III – Volcanic ash emergencies of this Regulation, that is acceptable to the CAA, in order to ensure safety at the aerodrome;

b) The contingency plan for the control of volcanic emissions must include procedures to be applied before, during, and after the natural phenomenon, in order to protect:

1) Aircraft in flight;
2) Aircraft on the ground;
3) Fuel tanks;
4) Ground vehicles;
5) Aeronautical infrastructure, which includes:
   i. Radio aids;
   ii. Communications;
   iii. Runways, taxiways, aprons, terminals;
   iv. Ramp equipment; and
   v. Electric power service, power plants, drinking water.

8. REFERENCE DOCUMENTS

- Annex 3: Meteorological service for international air navigation;

- Annex 6: Operation of aircraft;

- Annex 11: Air traffic services;
- Annex 15: Aeronautical information service;
- Annex 19: Safety management;
- LAR 153 – Aerodrome operations;
- Doc 4444 Procedures for air navigation services (PANS) – Air traffic management;
- Doc 9691Manual on volcanic ash, radioactive maerial and toxic chemical clouds;
- Doc 9766 Handbook on the international airways volcano watch – Operational procedures and list of points of contact;
- Doc 9974 Flight safety and volcanic ash - Risk management of flight operations with known or forecast volcanic ash contamination;
- Air traffic management (ATM) volcanic ash contingency plan template prepared by the IVATF.

APPENDIX A

GENERAL GUIDANCE FOR THE DEVELOPMENT OF AN ATS VOLCANIC ASH CONTINGENCY PLAN

(This information has been adapted from the *Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds* (Doc 9691). Refer to that document for further details.)

1. A volcanic ash contingency plan must establish sequential steps to provide a coordinated and controlled response to an event of this nature. Responsibilities should be perfectly well defined for Chiefs/Managers in charge of the ATS unit, supervisors and air traffic controllers (ATCO), officials or person responsible for keeping contacts periodically updated. The plan should also identify the units to be contacted, the type of messages to be created, the proper distribution of those messages, and how to carry out the task. The list of contacts at MWO/NOF/CAA/ANSP/volcanological institutes is contained in **Appendix K**.

2. The personnel must be trained and warned about the potential consequences of an encounter between an aircraft and a volcanic ash cloud.

3. Some points to be taken into account are as follows:

a) volcanic ash contamination may extend hundreds of miles horizontally and reach the stratosphere vertically;

b) volcanic ash may block the pitot-static system of an aircraft, resulting in unreliable airspeed indications;

c) braking conditions at aerodromes where volcanic ash has recently been deposited on the runway will be affected. This is more pronounced on runways contaminated with wet ash. Both pilots and ATCOs should be made aware of the consequences of volcanic ash ingestion into the engines during landing and taxiing. For take-off, it is recommended that pilots void operating in visible airborne ash; instead, they should allow sufficient time for the particles to settle before initiating a take-off roll, in order to reduce the risk of particle ingestion into the engines. Likewise, a thorough clean-up should be carried out to remove ashes from the movement area to be used before igniting the engines;

d) volcanic ash may result in loss of power in one or all engines of an aircraft; and

e) aerodromes where volcanic ash has deposited could be declared as unsafe for flight operations. This could have consequences for the ATM system.

4. The ACC, together with the ATFM units, will serve as the critical communication link between the affected aircraft in flight and information providers. During volcanic ash contamination episodes within the FIR, the ACC has two major communication roles: first and foremost is their ability to communicate directly with aircraft that may encounter ash en route. ATCOs should be able to warn pilots of the flight levels affected by ash, the projected trajectory and drift of the cloud based on the information provide in the volcanic ash SIGMET, the VAAs, and working with the MWO. Through the use of radio communications, the ACCs can coordinate alternate routes with flight crews to keep them clear of the ash cloud. In this latter case, it is extremely important to establish close civil-military coordination to implement the Flexible Use of Airspace (FUA) concept, which allows for temporary use of alternate routes that normally cross restricted airspaces, thus preventing aircraft from travelling long distances to

avoid them. Circular 330 AN/189 on civil-military cooperation in air traffic management provides guidance and examples on this topic, the same as the SAM FUA Manual.

5. Similarly, the ACC, through the issuance of a NOTAM/ASHTAM for volcanic activity can disseminate information on the status and activity of a volcano and on increased pre-eruption volcanic activity. NOTAM, ASHTAM and SIGMETs together with AIREPs are critical to dispatchers for flight planning purposes. Operators need as much advance notification as possible on the status of a volcano for strategic planning of flights and the safety of passengers. Dispatchers need to be in communication with pilots en route so that coordinated decisions can be made between the pilot, the dispatcher and the ATC regarding available alternate routes. The ACC should advise the ATFM unit on the availability of alternate routes. It must not be assumed, however, that an aircraft that is projected to encounter an ash cloud will be provided a desirable air route to avoid the cloud. Other considerations have to be taken into account, such as existing traffic density on other air routes and the amount of fuel reserve available for flights that may have to be diverted to other routes.

6. The NOTAM/ASHTAM for volcanic activity provides information on the status of activity of a volcano when a change of operational significance occurs or is expected to occur in its activity. It is issued by the ACC through the respective international NOTAM office, based on the information received from any one of the information sources and/or information provided by the associated VAAs, meteorological stations, or the volcano observatory. The NOTAM/ASHTAM also provides information on the location, extent and movement of the ash cloud and the air routes and flight levels affected. NOTAMs may also be used to limit access to airspace affected by volcanic ash. Complete guidance on the issuance of the NOTAM and ASHTAM is provided in Annex 15 — *Aeronautical Information Services*. Annex 15 also includes a colour code chart that indicates the level of activity of the volcano. The colour code alert chart may be used to provide information on the status of the volcano, with "red" being the most severe, *i.e.,* volcanic eruption in progress with an ash column/cloud reported above flight level 250; and "green" at the other end indicating that volcanic activity has ceased and volcano activity is back to its pre-eruption state. It is very important that the volcanic ash NOTAM be cancelled and the ASHTAM be updated as soon as the volcano has reverted to its pre-eruption state, no further eruptions are expected by vulcanologists and no ash cloud is detectable or reported by the FIR concerned.

7. It is essential that the procedures to be followed by ACC personnel and supporting services such as MET, AIS and ATFM, continue during the volcanic eruption/presence of volcanic ash cloud, as described in the previous paragraphs; and that they be reflected in local staff manuals or instructions (adjusted as necessary to take account of local circumstances). It is also essential that such procedures/ instructions form part of the basic training for ATS, AIS, ATFM, and MET personnel whose jobs would require them to take action in accordance with the procedures. Global information on the status of activity of volcanoes is provided in the monthly *Scientific Event Alert Network Bulletin* published by the United States Smithsonian Institution and sent free of charge to ACCs/FICs requesting it.

8. When considering the need to develop a local contingency plan, each State should generate an Action Plan that includes at least three (3) phases, namely:

- Phase I: Development of the National volcanic ash contingency plan, taking into account the regional volcanic ash contingency plan;
- Phase II: Harmonisation of the National contingency plan with those of adjacent countries; and
- Phase III: Delivery of the National contingency plan to the corresponding ICAO Regional Office.

9. When preparing the National Contingency Plan, attention should be paid to the guidelines contained in Attachment D to ICAO Annex 11 on contingency planning, and to national ATS contingency plans.

- - - - - - - - -

APPENDIX B

ASPECTS TO BE CONSIDERED BY THE PILOT WHEN ENCOUNTERING VOLCANIC ASH

1. ATS personnel should be aware that flight crews may have to immediately face some or all of the following issues when they encounter volcanic ash. ATCOs must be alert to the following issues:

a) smoke or dust appearing in the cockpit which may prompt the flight crew to don oxygen masks (which could interfere with the clarity of speech communications);

b) acrid odour similar to electrical smoke;

c) multiple engine failures, such as stalls, increasing exhaust gas temperature (EGT), flare, fire, and thrust loss resulting in an immediate deviation from the assigned altitude;

d) on engine restart attempts, engines may go idle, especially at high altitudes (which could result in inability to maintain height or Mach number);

e) at night, static discharges known as “St. Elmo's fire” may be observed around the windshield, accompanied by a bright orange glow in the engine inlet(s);

f) possible loss of visibility due to cockpit windows becoming cracked or discoloured, as a result of the sandblast effect of the volcanic ash;

g) cabin windows may become completely opaque; and/or

h) at night, sharp distinct shadows may be cast by landing lights against volcanic ash (as compared to the diffuse shadows observed in water clouds), affecting visual perception of objects outside the aircraft.

2. Simultaneously, ATS personnel will be waiting for flight crews to execute contingency procedures such as:

a) if possible, the flight crew may immediately reduce thrust to idle;

b) exit volcanic ash cloud as quickly as possible. The shortest distance/time out of the ash may require an immediate, descending 180-degree turn (terrain permitting);

c) don flight crew oxygen masks at 100 per cent (if required);

d) monitor airspeed and pitch attitude. If unreliable airspeed is suspected, or a complete loss of airspeed indication occurs (volcanic ash may block the pitot system), the flight crew will establish the appropriate pitch attitude;

e) land at the nearest suitable aerodrome; and

f) upon landing, thrust reversers may be used as lightly as feasible.

- - - - - - - - -

APPENDIX C

COMMUNICATION AND DISSEMINATION OF PILOT REPORTS OF VOLCANIC ACTIVITY

1. INTRODUCTION

1.1 ICAO Annex 3 — *Meteorological Service for International Air Navigation* (paragraph 5.5, g) and h)) prescribes that volcanic ash clouds, volcanic eruptions and pre-eruption volcanic activity, when observed, shall be reported by all aircraft. The ICAO *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM, Doc 4444) contain detailed provisions on this special air report requirement in paragraphs 4.12.3 and 4.12.5, and the Volcanic Activity Report form in Appendix 1.

1.2 Experience has shown that reporting and sharing of information on volcanic ash encounters in accordance with the above mentioned provisions (in-flight and post-flight) varies across the world. The efficiency and quality of reporting currently depend heavily on regional characteristics and the level of regional integration. A high level of global harmonization is essential to achieve the desired level of implementation and consistency of the information.

2. PURPOSES OF VOLCANIC ASH REPORTING AND DATA COLLECTION

2.1 The main purposes for volcanic ash reporting and data collection are to:

a) locate the volcanic hazards:
b) notify immediately other aircraft (in-flight) about the hazard;
c) notify other interested parties: ANSPs (ATC, AIS, ATFM), VAACs, MWO, etc to ensure the consistent production of appropriate information and warning products in accordance with existing provisions;
d) analyse collected reports from the post-flight phase in order to:
    1) identify areas of concern;
    2) validate and improve volcanic ash dispersion forecasts;
    3) improve existing procedures;
    4) assist in defining better airworthiness requirements; and
    5) share lessons learned, etc.

3. PHASE OF OPERATIONS

3.1 The roles and responsibilities of the participants in the collection, exchange and dissemination of the volcanic information are distinctly different in two distinct phases:

a) in-flight; and
b) post-flight.

3.2 The following section analyses these separately.

4. PARTICIPANTS IN THE REPORTING PROCESS, THEIR ROLES AND RESPONSIBILITIES

4.1 Identification of the participants as well as their roles and responsibilities in general, but specifically during the two different phases of operations, is an important element in improving collection, exchange and dissemination of volcanic information. The number of participants and their roles and responsibilities depends on the phase of operations (in-flight, post-flight), their position in the information chain within one of these two phases and national/regional arrangements. One of the main issues regarding participants' roles and responsibilities is that each of them is, at one time or another, both a data/information provider and user of the information.

4.2 *In-Flight Phase*

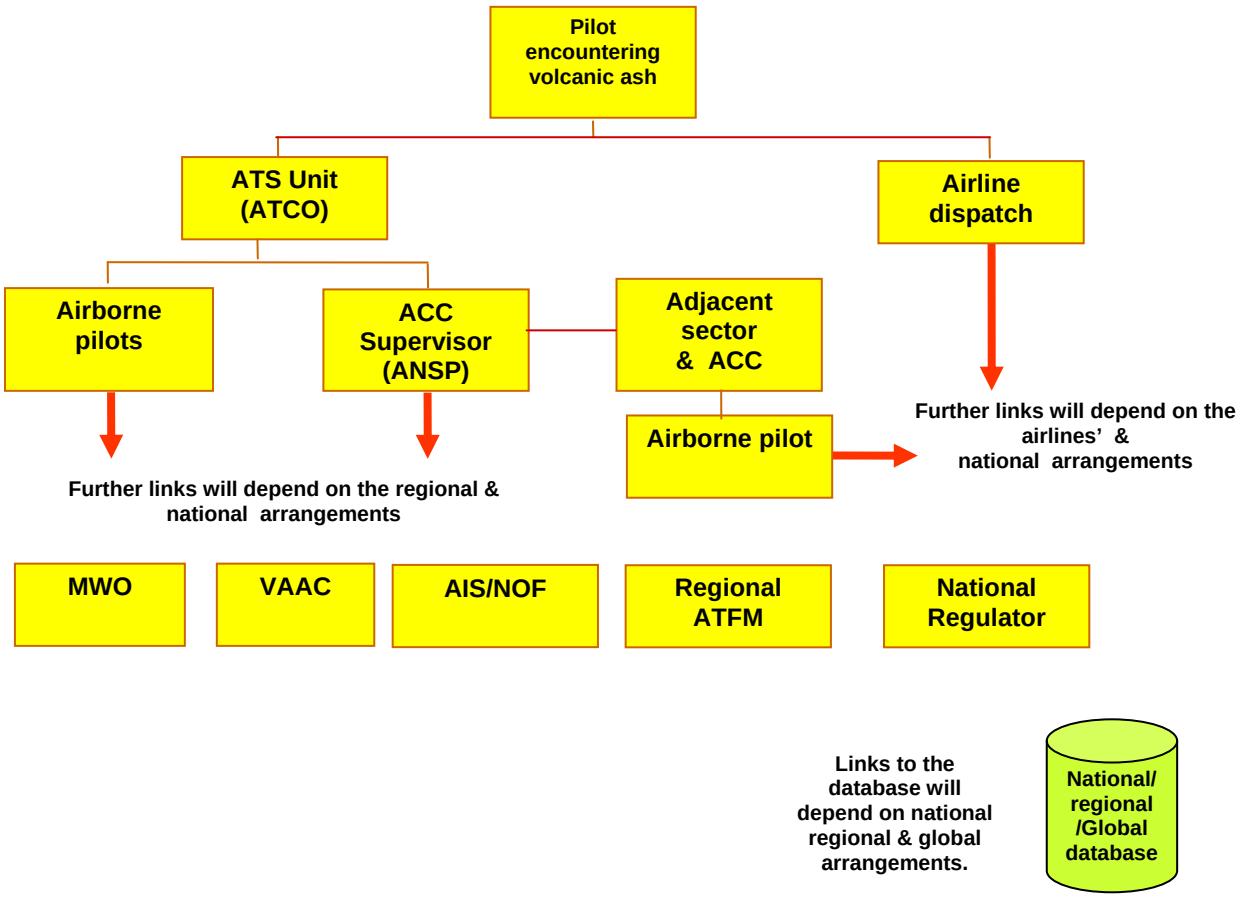
4.2.1 Participants, Roles & Responsibilities

	Participants	Roles & Responsibilities
1.	Pilots, civil and/or military, observing and/or encountering volcanic activity	To provide as much detailed information as possible about the type, position, colour, smell, dimensions of the volcanic contamination, level and time of the observation and forward VAR Part I immediately to the ATS unit with which the pilot is in radiotelephony (R/T) communication. Record the information required for VAR Part II on the appropriate form as soon as possible after the observation or encounter, and file the report via data link, if available, or by any authorized available mean and disseminated by the civil aviation authority of the State.
2.	ATS unit receiving the information from the pilot encountering volcanic event	To ensure that information received by an air traffic controller from the pilot has been copied, clarified (if necessary) and disseminated to other pilots as well as to the ACC Supervisor. In addition, air traffic controllers could ask other pilots flying within the same area if they have observed any volcanic activity.
3.	ATS unit/ACC Supervisor (if applicable) or other responsible person within the Air Navigation Service Provider	To use all means of communication and available forms to ensure that the information received from the air traffic controller has been: ✓ passed on to the associated meteorological organizations and VAACs, in accordance with national/regional arrangements; ✓ fully and immediately disseminated across the organization, in particular to adjacent sectors and the associated NOTAM Office (NOF);

		✓ passed on to the neighbouring sectors and ACCs (if necessary); ✓ passed on to the regional ATFM centre if existing (e.g. CFMU in Europe); ✓ passed on to the national/regional authority responsible for the handling of contingency situations. *Note: The order is depends on what the State deems appropriate.*
4.	Neighbouring ANSPs (ACCs etc.)	To ensure that information is provided to flight crews flying towards the area affected by the volcanic contamination; disseminated across the organization and the system prepared to cope with the possible changes of the traffic flows; and that the information is provided to the national authority responsible for the handling of contingency situations and passed on to the NOF and MWO as required.
5.	MET Watch Office	To use the information originated by flight crews and forwarded by the ATS unit which received the information in accordance with Annex 3.
6.	VAAC	To use the information originated by flight crews, MWOs and other competent sources in accordance with Annex 3
7.	AIS / NOF	To publish appropriate AIS messages in accordance with Annex 15.
8.	ATFM unit or centre (if existing)	To ensure that information received is stored and made available for information to all partners in its area of responsibility (ANSPs, airlines, VAAC, MET etc.). As part of the daily activity, coordinate ATFM measures with ACCs concerned.

4.2.2 *In-flight reporting – Sample Flow Chart of the volcanic ash information*

4.2.2.1 The chart below is a graphical representation of a possible path of the in-flight volcanic ash information and may differ between regions depending on regional arrangements. It also gives the position of the volcanic ash participants in the reporting chain. The flow chart is not exhaustive and the path of the information can be extended and new participants could be added depending of the national and regional requirements.



4.3 ***Post-Flight Operations Roles & Responsibilities and order of reporting***

	Participants	Roles & Responsibilities
1.	Civil and/or military pilots/airlines having observed or encountered an eruption or volcanic contamination	To file the volcanic ash report with as much detailed information as possible about the volcanic activity and/or encounter (position, colour, smell, dimensions, FL, time of observation, impact on the flight, etc.). Ensure that the VAR is filed and transmitted to the relevant recipients as soon as possible after landing (if not filed via datalink already during the flight). Make an entry into the Aircraft Maintenance Log (AML) in case of an actual or suspected encounter with volcanic contamination.
2.	ANSP	To provide a summary report of effects of the volcanic activity that affected its operations at least once per day to the national authority with as much detailed information as possible about the number of encounters, impact on air traffic management, etc.).

3.	AOC Maintenance - Post flight Inspection	To report about the observation of the aircraft surfaces, engine, etc, and to provide the information to the national (or regional or global, where applicable) central data repository.
4.	Investigation authority	All aeronautical service providers (including operators, ANSPs, airports, etc) shall investigate the effects of a volcanic activity, analyze the information and search for conclusions; and report the investigation results and relevant information to the national supervisory authority and any central data repository.
5.	National Authority	To handle the national central data repository and report to the regional/global central data repository if any. To analyze reports from its aeronautical service providers and take action as appropriate.
6.	Regional Central Data Repository	To collect the national data and make them available to interested stakeholders under agreed conditions.
7.	MWO	To use the national and regional information coming from national and regional central data repositories.
8.	VAAC	To use the information originated by flight crews, and other competent sources to: a) validate its products accordingly and; b) improve the forecast.
9.	Global Data Repository (and research institutes - where appropriate)	To analyse the information stored in the regional central data repository and provide the research outcomes for lessons learnt process.
10.	Knowledge management (e.g. SKYbrary)	To use the post-flight lessons learnt and disseminate them to interested stakeholders.
11.	ICAO	To review/revise ATM volcanic ash contingency plans.

4.4 *Tools for presenting and sharing the volcanic ash information*

4.4.1 To report, transmit and disseminate the volcanic ash encounter information, different types of tools can be used. The list below is provided to give ideas as to what tools can be used. It could also be split into regulatory and general information tools. At any case, it is not an exhaustive list and can be updated with new elements depending on regional experiences.

a) Radiotelephony and Data link Communications
b) VAR
c) NOTAM/ASHTAM
d) SIGMET
e) VAA/VAG
f) Central data repository e.g. CFMU Network Operations Portal (NOP)

g) Centralized web based sites with the regularly updated information and maps – e.g. EVITA - http://www.eurocontrol.int/services/evita-european-crisis-visualisation-interactive-tool-atfcm
h) Teleconferences
i) Periodic Bulletins with the set of information defined by the data providers and data users; e.g. Smithsonian Institution Weekly Bulletin.
j) Updated volcanic ash activity reports issued by meteorological stations.
k) Centralized internet-based sites for the sharing of lessons learnt (Knowledge management – e.g. SKYbrary http://www.skybrary.aero/index.php/Main_Page)

- - - - - - -

APPENDIX D

ACTION TO BE TAKEN BY METEOROLOGICAL WATCH OFFICES IN THE EVENT OF A VOLCANIC ERUPTION

1. Upon receiving information on a volcanic eruption and/or the existence of volcanic ash, the MWO shall:

a) issue a volcanic ash warning SIGMET message valid for 6 (six) hours. The addressing in the SIGMET should include the SADIS, the international OPMET data banks, and the regional OPMET data bank of Brasilia. Keep in constant coordination with the ACC to ensure consistency in the issuance and content of SIGMETs and NOTAM/ASHTAMs.

b) if the eruption has occurred within its area of responsibility, coordinate the issuance of the VONA with the volcanological agency, if it has not been received yet;

c) notify the designated VAACs so that they will provide relevant details of the eruption to the FIRs under the jurisdiction of the ACC, also asking them for the corresponding volcanic ash advisory (VAA) with information on the extent and trajectory of volcanic ash;

d) notify the ACC as soon as possible if the volcanic ash cloud can be identified through meteorological radar images or meteorological satellite images/data, and if so, provide information regularly on the horizontal and vertical extent of the cloud and its trajectory, using the advisory received from the VAAC as the source; and

2. If an MWO becomes aware of the occurrence of pre-eruption activity, a volcanic eruption, or the presence of an ash cloud through any other source, said information will be transmitted immediately to the ACC. Then, the aforementioned procedure will be followed.

3. In case any other meteorological office becomes aware of the occurrence of pre-eruption activity, a volcanic eruption, or the presence of an ash cloud through any other source, said information will be transmitted immediately to the MWO so that it may be relayed to the ACC and the appropriate VAACs.

- - - - - - - - -

APPENDIX E

ACTION TO BE TAKEN BY THE VOLCANIC ASH ADVISORY CENTRES (VAACs) IN THE EVENT OF A VOLCANIC ERUPTION

1. Upon becoming aware of the occurrence of pre-eruption activity, a volcanic eruption, or the presence of an ash cloud through an MWO o any other source, the VAACs should:

a) Start running the volcanic ash dispersion/trajectory models to provide the relevant advisories (VAA/VAG) to the MWOs, the ACCs, the appropriate ATFM units, and the Operators concerned;

b) Review the satellite data/images and reports from pilots flying in the affected area during the event, in order to establish if the volcanic ash cloud is identifiable and, if so, to determine its extent and movement;

c) Inform the associated ATFM units about the volcanic event;

d) Prepare and issue advisories on the extent and forecast trajectory of volcanic contamination (VAA) in message format for delivery to MWOs, ACCs, ATFM units, and aircraft Operators within the area of responsibility of the VAAC, in addition to other VAACs, WAFCs, and the regional OPMET data bank of Brasilia.

e) Monitor all incoming satellite information and any other available information that will help determine the movement of the volcanic ash cloud;

f) Continue issuing advisories (VAA/VAG) to MWOs, ACCs, ATFM units, and Operators concerned. These VAA/VAGs will be issued with a validity of T+0, T+6, T+12, and T+18 hours, at least at 6-hour intervals. They will be issued more frequently if necessary. The procedure will continue until such time that the volcanic ash is no longer discernible from satellite data, no more reports of volcanic ash are received from the affected area, and no more eruptions from the volcano are reported; and

g) Keep in regular contact with the VAACs and the meteorological offices concerned, and if possible, with the Smithsonian Institute Global Volcanism Network, in order to keep updated information on the status of volcanoes in the area of responsibility.

- - - - - - - - -

APPENDIX F

RECOMMENDED ACTIONS BY STATES OF THE OPERATOR/REGISTRY WITH REGARDS TO AIRCRAFT OPERATIONS IN THE EVENT OF A VOLCANIC ERUPTION

Safety Risk Assessment for Flights in the Proximity of Airspace with Volcanic Ash

1. Introduction

1.1 It is recommended that the States of Registry or States of the Operator, as appropriate, that intend to allow operators under their jurisdiction to operate in areas contaminated with volcanic ash, request the latter to conduct safety risk assessments before initiating operations.

1.2 The safety risk assessment should be completed before planning operations in airspace and/or to/from aerodromes that might be affected by volcanic ash.

2. Applicability

2.1 To all Operators conducting flights in airspace and/or to/from aerodromes that might be affected by volcanic ash.

3. Recommendations

3.1 *ICAO Annex 6, Chapter 3, paragraph 3.3 Safety Management,* recommends that the States of the Operator or of Registry, as appropriate, request all Operators that are planning to operate in areas where volcanic ash is expected, to conduct safety risk assessments before planning their operations. Safety risk assessments should require the following from the Operators:

a) conduct their own risk assessment and develop operational procedures to address any remaining risk;

b) establish the appropriate maintenance inspections of damage caused by ash; and

c) ensure that any incident related to volcanic ash is reported through the AIREPs, followed by the corresponding Volcanic Activity Report (VAR).

3.2 Appendix G provides a guide for the preparation of the safety risk assessment.

- - - - - - - - -

APPENDIX G

EXAMPLE OF A SAFETY RISK ASSESSMENT PROCESS

1. Introduction

1.1 The safety risk assessment process is described in the *Safety Management Manual (Doc. 9859).* The process involves the identification of hazards associated to the activity (in this case, airspace in the proximity of volcanic ash or flights to/from aerodromes affected by volcanic ash), taking into account the severity of the consequences of the phenomenon (severity), the possibility or likelihood of occurrence, whether the resulting risk is acceptable and falls within the safety performance margins of the organisation (acceptability) and finally, the adoption of actions to reduce the safety risk to an acceptable level (mitigation).

2. Hazard identification

2.1 Hazard is considered to be any situation or condition with the potential of having adverse consequences. Appendix H contains a suggested non-exhaustive list of topics.

3. Safety risk assessment

3.1 Risk is the determination of the probability and severity of the adverse consequences resulting from a hazard.

3.2 All stakeholders should be consulted to help the Operator decide on the possibility of a hazard causing harm and to assist in the mitigation of any perceived safety risk.

3.3 The safety risk from each hazard should be assessed using a suitable calibrated safety risk assessment matrix. The *Safety Management Manual (Doc 9859)* contains an example of a safety assessment matrix. An alternative that is aligned with the safety management system (SMS) of the organisation could be equally appropriate. The safety risk analysis should take into account the severity of the adverse consequences resulting from a particular hazard and their probability of occurrence.

3.4 The severity of any adverse consequences resulting from a particular hazard should be assessed using a properly calibrated severity scale. The *Safety Management Manual (Doc 9859)* contains examples of such scales. An alternative that is aligned with the safety management system (SMS) of the organisation could be equally appropriate. It should be borne in mind that, for any flight, safety deviations resulting from an encounter with volcanic ash could be quite significant.

3.5 *Risk probability*

3.5.1 The possibility or likelihood of adverse consequences resulting from a particular hazard should be assessed. The probability must be consistent with the duly calibrated probability scale. The *Safety Management Manual (Doc 9859)* contains examples of these probability scales. An alternative that is aligned with the safety management system (SMS) of the organisation could be equally appropriate.

3.5.2 When assessing the probability or possibility of adverse consequences resulting from a particular hazard, the following factors should be taken into account:

- The degree of exposure to the hazard. The SAM Volcanic ash contingency plan.

- Any historic incident or data on a hazardous event that affects safety. This can be derived from the industry, regulators, other Operators, air navigation service providers, internal reports, etc.

- The expert opinion of the main stakeholders.

3.5.3 The results of this assessment should be recorded in a hazard register, also known as "risk register". Appendix I contains an example of the hazard register.

3.6 ***Risk tolerance***

3.6.1 At this stage of the process, the safety risks should be classified acceptable or unacceptable. The *Safety Management Manual (Doc 9859)* provides an appropriate set of definitions for Risk Classification.

3.6.2 Appropriate mitigation measures should be considered for each hazard identified, recorded in the hazard register and implemented. Mitigation measures must be adopted in order to reduce safety risks to an acceptable level, but additional mitigation measures should also be considered, when reasonably feasible, if they will further reduce the safety risk beyond the acceptable level. Thus, the mitigation process would reduce the safety risk to values as low as reasonably feasible.

3.6.3 Not all hazards may be suitably mitigated; in such cases, the operation should not proceed.

3.7 ***Mitigation actions***

3.7.1 Risk mitigation actions by themselves may introduce new hazards. When the organisation has an effective SMS, it must contain procedures for continuous monitoring of hazards and risks, with the support of qualified personnel to accept mitigation actions. Operators that do not have an effective SMS should repeat the safety risk assessment at regular intervals, applying any mitigation measures, in accordance with any changes in the original risk assessment. This ensures continuous safety management/monitoring.

3.8 ***Records***

3.8.1 The results of safety risk assessments should be documented and disseminated throughout the organisation, and submitted to the Operator's National Safety Authority. Actions should be completed and any mitigation verified and supported by evidence prior to the start of operations.

3.8.2 Any assumptions should be clearly stated, and the safety risk assessment reviewed at regular intervals to ensure that the assumptions and decisions remain valid.

3.8.3 Any safety performance monitoring requirements should also be identified and met through the organisation's safety risk assessment process.

- - - - - - - - -

APPENDIX H

PROCEDURES TO BE CONSIDERED BY AN AIRCRAFT OPERATOR WHEN CONDUCTING A SAFETY RISK ASSESSMENT

Considerations	***Actions***
Preparation	
Type Certificate Holder	The operator should obtain advice from the TCHs of the aircraft and engines it operates concerning operations in potentially contaminated airspace and/or to/from aerodromes contaminated by volcanic ash. This advice should set out: ✓ the features of the aircraft or engine that are susceptible to airworthiness effects related to volcanic ash; ✓ the nature and severity of these effects; ✓ the effect of volcanic ash on operations to/from contaminated aerodromes; ✓ the related pre-flight, in-flight and post-flight precautions to be observed by the operator including any necessary amendments to Aircraft Operating Manuals, Aircraft Maintenance Manuals, Master Minimum Equipment List/Dispatch Deviation or equivalents required to support the operator; ✓ the recommended continuing airworthiness inspections associated with operations in volcanic ash-contaminated airspace and to/from volcanic ash contaminated aerodromes; this may take the form of instructions for continuing airworthiness or other advice.
Operator personnel or their service providers	The operator should publish procedures for flight planning, operations, engineering and maintenance ensuring that: ✓ personnel responsible for flight planning are equipped to evaluate correctly the risk of encountering volcanic ash cloud-contaminated airspace, or aerodromes, and can plan accordingly; ✓ flight planning and operational procedures enable crews to avoid areas and aerodromes with unacceptable volcanic ash contamination; ✓ flight crews are aware of the possible signs of entry into a volcanic ash cloud and execute the associated procedures; ✓ engineering and maintenance personnel are able to assess the need for, and to execute, any necessary maintenance or other required interventions.

Considerations	***Actions***
Operator procedures	
Provision of enhanced flight watch	The operator should: ✓ closely and continuously monitor VAA, VAR/AIREP, SIGMET, NOTAM and ASHTAM information, and information from its crews, concerning the volcanic ash cloud hazard; ✓ ensure that its Operations Unit, or equivalent, and its crews, have access to plots of the affected area from SIGMETs and NOTAMs; ✓ ensure that the latest information is communicated to its crews and planners in a timely fashion.
Flight planning	The operator should develop a safety risk assessment for planned flights into areas forecast to be, or aerodromes known to be, contaminated with volcanic ash which the CAA should evaluate during normal oversight of the operator's SMS. The operator's process should be sufficiently flexible to allow re-planning at short notice should conditions change.
Departure, destination and alternates	For the airspace to be traversed, or the aerodromes in use, the operator should determine, and take account of: ✓ the degree of known or forecast contamination; ✓ any additional aircraft performance requirements; ✓ required maintenance considerations; ✓ fuel requirements for re-routing and extended holding.
Routing policy	The operator should determine, and take account of: ✓ the shortest period in and over the forecast contaminated area; ✓ the hazards associated with flying over the contaminated area; ✓ drift down and emergency descent considerations.
Diversion policy	The operator should determine, and take account of: ✓ maximum allowed distance from a suitable alternate; ✓ availability of alternates outside the forecast contaminated area; ✓ diversion policy after a volcanic ash encounter.
Minimum Equipment List / Dispatch Deviation Guide	The operator should consider additional restrictions for dispatching aircraft with unserviceabilities which might affect: ✓ air conditioning packs; ✓ engine bleeds; ✓ pressurization system; ✓ electrical power distribution system; ✓ air data computers; ✓ standby instruments; ✓ navigation systems; ✓ de-icing systems; ✓ engine driven generators; ✓ Auxiliary Power Unit (APU); ✓ Airborne Collision Avoidance System (ACAS); ✓ Terrain Awareness Warning System (TAWS); ✓ Autoland systems; ✓ provision of crew oxygen; and ✓ supplemental oxygen for passengers. *(Note.— This list is not exhaustive.)*

Considerations	***Actions***
Flight Crew Procedures	
Standard operating procedures	The operator should ensure that crews are familiar with normal and abnormal operating procedures and particularly any changes regarding: ✓ pre-flight planning; ✓ in-flight monitoring of volcanic ash cloud affected areas and avoidance procedures; ✓ diversion policy; ✓ communications with ATC; ✓ in-flight monitoring of engine and systems potentially affected by volcanic ash cloud contamination; ✓ recognition and detection of volcanic ash clouds; ✓ in-flight indications of a volcanic ash cloud encounter; ✓ procedures to be followed if a volcanic ash cloud is encountered; ✓ unreliable or erroneous airspeed; ✓ non-normal procedures for engines and systems potentially affected by volcanic ash cloud contamination; ✓ engine-out and engine relight; ✓ escape routes; and ✓ operations to/from aerodromes contaminated with volcanic ash. *(Note.— This list is not exhaustive*.)
AML	The operator should ensure that crews: ✓ make an AML entry related to any actual or suspected volcanic ash encounter whether in-flight or at an aerodrome; ✓ confirm, prior to flight, completion of maintenance actions related to an AML entry for a volcanic ash cloud encounter on a previous flight.
Incident reporting	The operator should specify crew requirements for: ✓ reporting an airborne volcanic ash cloud encounter (VAR); ✓ post-flight volcanic ash cloud reporting (VAR); ✓ reporting non-encounters in airspace forecast to be contaminated; ✓ filing a mandatory occurrence report as required by the State.

Considerations	***Actions***
Maintenance Procedures	
Maintenance procedures	An operator operating in, or near, areas of volcanic ash cloud contamination should: ✓ enhance vigilance during inspections and regular maintenance and make appropriate adjustments to maintenance practices; ✓ have produced a continuing airworthiness procedure to follow when a volcanic ash cloud encounter has been reported or suspected; ✓ ensure that a thorough investigation is carried out of any signs of unusual or accelerated abrasions or corrosion or of volcanic ash accumulation; ✓ cooperate in reporting to TCHs and the relevant authorities its observations and experiences from operations in areas of volcanic ash cloud contamination; ✓ comply with any additional maintenance recommended by the TCH.

Note.— The above list is not exhaustive; the operator should develop its own list taking into account its specific equipment, experience, knowledge and type of operation.

APPENDIX I

SAMPLE OF A HAZARD RECORD (RISK RECORD)

HAZARD		Hazard consequence description	Existing controls	Outcome (Pre-mitigation)			Further mitigation required	Event (Post-mitigation)			Affected by the risk	Monitoring and review actions
N°	Descripton			Severity	Probability	Risk		Severity	Probability	Risk		

(Add rows if required)

APPENDIX J

SAMPLES OF SIGMET, NOTAM AND ASHTAM

Publication *WMO N° 386 Volume I (Manual on the Global Telecommunication System) Part II (Operational Procedures for the Global Telecommunication System)* presents a guide of the World Meteorological Organization headers (WMO) referred in the pre-eruption Phase.

NOTAM Offices should be reminded that ASHTAM (or volcanic ash NOTAM) should be distributed through AFTN/AMHS to their associated MWO, SADIS and all VAACs, in accordance with the standards contained in ICAO Doc. 9766, Chapter 4, paragraph 4.3.

1. SIGMET.

SAMPLE: **FIRST SIGMET**

SEGU SIGMET 05 VALID 161314/161614 SEGU-
SEGU GUAYAQUIL FIR VA TUNGURAHUA 152-08 POS S0128 W07826
VA CLD OBS AT 1300Z FL190 MOV W=

SAMPLE: **SIGMET WITH PROJECTION**

SUEO SIGMET 3 VALID 071820/080020 SUMU-
SUEO MONTEVIDEO FIR VA ERUPTION CORDON CAULLE 1507-15 PSN S4052
W07220 OBS ASH CLOUD: SFC/FL180 VA CLD 35 NM WIDE LINE BTN S4052 W06630 -
S4127 W07053 - S4200 W06956 - S4318 W06907 - S4432 W06905
FCST ASH CLD +06HR: 071930Z SFC/FL180 S4052 W07220 - S4130 W0550 -
S4200 W06140 - S4400 W06130 - S4230 W06640 - S4052 W07220

2. NOTAM warning on pre-eruptive activity.

SAMPLE:

(A0777/15 NOTAMN
Q) SAEF/QWWXX/IV/NBO/W/000/999/4052S07220W020
A) SAEF B) 1502260830 C) 1502261100
E) INCREASE VOLCANIC ACTIVITY, POSSIBLY INDICATING IMMINENT ERUPTION, REPORTED FOR VOLCANO CORDON CAULLE 1507-141 S4031 W07212 CHILE. VOLCANIC ASHCLOUD IS EXPECTED TO REACH 50,000 FEET FEW MINUTES FROM START OF ERUPTION. AIRCRAFT ARE REQUIRED TO FLIGHT PLAN TO REMAIN AT LEAST XXXNM CLEAR OF VOLCANO AND MAINTAIN WATCH FOR NOTAM/SIGMET FOR SAEF AREA.
F) GND G) UNL)

3. NOTAM setting a dangerous zone after initial eruption.

SAMPLE:

(A0778/15 NOTAMR A0777/15
Q) SAEF/QWWXX/IV/NBO/W/000/500/4052S07220W030
A) SAEF B) 1502260900 C) 1502261200
E) VOLCANIC ERUPTION REPORTED IN VOLCANO CORDON CAULLE
1507-141 S4031 W07212 CHILE. VOLCANIC ASH CLOUD REPORTED REACHING
FL500. AIRCRAFT ARE REQUIRED TO REMAIN AT LEAST XXXNM CLEAR OF
VOLCANO AND MAINTAIN WATCH FOR NOTAM/SIGMET FOR SAEF AREA.

F) GND G) 500)

4. NOTAM setting a dangerous zone including an Area of high (or high/médium or high/médium/low) contamination.

SAMPLE:

(A0779/15 NOTAMN
Q) SAEF/QWWXX/IV/NBO/W/000/500/4052S07220W030
A) SAEF B) 1502260900 C)1502261200
E) TEMPORARY DANGER ZONE HAS BEEN ESTABLISHED FOR VOLCANIC ASH
AREA OF HIGH CONTAMINATION IN AREA XXXXS XXXXXW XXXXS
XXXXXW XXXXS XXXXXW XXXXS XXXXXW
F) SFC
G) FL 350

5. NOTAM to define a Medium contamination area in a non-dangerous zone.

SAMPLE:

(A0780/15 NOTAMN
Q) SAEF/QWWXX/IV/NBO/W/000/20
A) SAEF B) 1502260900 C) 1502261200
E) VOLCANIC ASH AREA OF MEDIUM CONTAMINATION FORECAST IN AREAS XXXXS XXXXXW XXXXS XXXXXW XXXXS XXXXXW XXXXS XXXXXW
F) SFC
G) FL200)

6. ASHTAM warning on pre-eruptive activity.

SAMPLE:
VASA 0002/15 SACF 1505051340
ASHTAM 0002
A) CORDOBA FIR
B) 1505051215
C) VOLCAN LASCAR 1505 – 10=
D) 2337S 06773W
E) YELLOW ALERT
F) 10000/15000FT
J) VOLCANIC ASH ADVISORY CENTRE - BUENOS AIRES
K) POSSIBLE AFFECTED ZONE BY VOLCANIC ASH SOUTH JUJUY, SALTA CENTER, LAST ASH POSITION AT 1309 UTC LINE FROM 2750S 06210W UP TO 2655S 06040W POSSIBLE ALTITUD FL 100/150

7. ASHTAM warning on pre-eruptive activity.

SAMPLE:

VASA 0002/15 SACF 1505051430
ASHTAM 0002
A) CORDOBA FIR
B) 1505051215
C) VOLCAN LASCAR 1505 – 10=
D) 2337S 06773W
E) RED ALERT
F) SFC/15000FT
J) VOLCANIC ASH ADVISORY CENTRE - BUENOS AIRES
K) AFFECTED ZONE BY VOLCANIC ASH SOUTH JUJUY, SALTA CENTER, NORTH SANTIAGO DEL ESTERO, SOUTH CHACO AND NORTH SANTA FE, LAST ASH POSITION AT 1420 UTC LINE FROM 2750S 06210W UP TO 2655S 06040W ALTITUD FL 100/150

8. ASHTAM warning on the reduction of the eruptive activity.

SAMPLE:

VASA 0002/15 SACF 1505051940
ASHTAM 0002
A) CORDOBA FIR
B) 1505051215
C) VOLCAN LASCAR 1505 – 10=
D) 2337S 06773W
E) YELLOW ALERT
F) SFC/15000FT
J) VOLCANIC ASH ADVISORY CENTRE - BUENOS AIRES
K) AFFECTED ZONE BY VOLCANIC ASH SOUTH JUJUY, SALTA CENTER, NORTH SANTIAGO DEL ESTERO, SOUTH CHACO AND NORTH SANTA FE, LAST ASH POSITION AT 1920 UTC LINE FROM 2750S 06210W UP TO 2655S 06040W ALTITUD FL 100/150

APPENDIX K

LIST OF CONTACTS OF MWO/NOF/CAA/ANSP/VULCANOLOGICAL INSTITUTE

State	Office	ICAO Indicator	FIR	e-MAIL	AFTN	TELEPHONE/ FAX	Remarks
ARGENTINA							

APPENDIX L

VONA FORMAT (Volcano Observatory Notice for Aviation) results from GREPECAS Conclusion 15/11 and is included as Appendix E to Doc 9766 – Handbook on the International Airways Volcano Watch (IAVW)

VOLCANO OBSERVATORY NOTICE FOR AVIATION-VONA	
Issued:	Universal (Z) date and time (YYYYMMDD/HHMMZ)
Volcano:	Name and number (per Smithsonian database at http://www.volcano.si.edu/world/)
Current Aviation Color Code:	As shown in Appendix 3 to ICAO Annex 15 (**GREEN, YELLOW, ORANGE, OR RED** in upper-case bold font**)**
Previous Aviation Color Code:	If it is the first notice put NIL. Lower case font bold
Source:	Name of Volcano Observatory (volcanological agency)
Notice Number:	Create unique number for each VONA that includes year
Volcano Location:	Latitude, longitude in NOTAM format (N or S deg min W or E deg min - XXXXS XXXXXW)
Area:	Regional descriptor or simply the State
Summit Elevation:	Height in metres (and feet) Example: 5000 m (16000 ft) of the ash cloud expelled)
Volcanic Activity Summary:	Concise statement that describes activity at the volcano. If known, specify time of onset and duration (local and UTC) of eruptive activity. If eruption is ongoing at the time of VONA release, indicate "eruption and ash emission is continuing"
Volcanic Cloud Height:	Best estimate of ash-cloud top in nnnnn FT (nnnn M) above summit or AMSL (specify which) in metres (and in ft). Example: 6500 m (18000 ft). Give source of height data (ground observer, pilot report, radar, etc.). "UNKNOWN" if no data available, or "NO ASH CLOUD PRODUCED" or "NIL" if applicable.
Other Volcanic Cloud information:	Brief summary of relevant cloud characteristics such as colour of cloud, shape of cloud, direction of movement, etc. Specify if cloud height is obscured or suspected to be higher than what can be observed clearly. "UNKNOWN" if no data available, or "NO ASH CLOUD PRODUCED" or "NIL" if applicable.
Remarks:	Optional; brief comments on related topics such as monitoring data, observatory actions, volcano's previous activity, etc.
Contacts:	Names, phone numbers (voice and fax), email addresses.
Next Notice:	"A new VONA will be issued if conditions change significantly or the colour code is changed". Indicate if final notice for an event. Include URL of website where latest volcanic information is posted, or indicate if this is the final notification of an event.

SAMPLE OF VONA

VOLCANO OBSERVATORY NOTICE FOR AVIATION	
Issued:	20150605/1626Z
Volcano:	Volcano Ubinas N° 354020
Current Aviation Colour Code:	Orange
Source:	Instituto Geofísico del Peru
Notice Number:	092015
Volcano Location:	S1621 W07054
Area:	PERU
Summit Elevation:	5672m (18608.7 ft)
Volcanic Activity Summary:	At 11:26 local time (16:26 UTC), an emission of volcano Ubinas was registered with a duration of 58 seconds. The ash column flow up to 700 metres over the crater base and was spread by the wind to Southeast.
Volcanic Cloud Height:	700 m (3937 ft)
Other Volcanic Cloud information:	The ejected material was ash, colour gray.
Remarks:	The Southern Vulcanological Observatory of the *Instituto Geofisico del Peru* predicts that the ash ejection could be to the SOUTHEAST direction of the volcano.
Contacts:	IGP - Arequipa Telephone: +5154 251 373 Fax: +5154 251 373 Orlando Macedo orlando.macedo@igp.gob.pe Jorge Andrés Concha Calle comuvulcanologia@igp.gob.pe IGP - Lima Telephone +511 317 2321 Fax José Macharé jose.machare@igp.gob.pe
Next Notice:	WHEN SIGNIFICANT CHANGES ARE REGISTERED