



**WORKSHOP FOR THE AFRICA INDIAN OCEAN
INTER-REGIONAL/STATE ATM COORDINATION.**

(Teams Microsoft, 28 June 2021)

PREPARED BY ARMA

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AFI Inter-Regional/State ATM Coordination Meeting
Microsoft Teams Meeting, 28 June 2021
PROVISIONAL AGENDA

Item	Description	By	Remarks
1.	Highlights of CRA/14 Report and Trend Analysis	ARMA	
2.	Trans-Regional Large Height Deviation(LHD)	ARMA	
3.	Review of PIRG Conclusions/Recommendation	ARMA	
4.	Update on SLOP	ARMA	
5.	PBCS Implementation Status	ARMA	
6.	Stakeholder roles in the implementation process	ARMA	
7.	Preparations for CRA/15	ARMA	
8.	Overview of the report	ARMA	

PART I:

COLLISION RISK ASSESSMENT 14 : AFRICA INDIAN OCEAN REGION

CRA	N_{az}^{total}	TOTAL VERTICAL TLS EXCEEDED BY A FACTOR OF
CRA 14 2019	10.9×10^{-9}	3.3
CRA 13 2018	75.4×10^{-9}	15.0
CRA 12 2017	58.6×10^{-9}	11.7
CRA 11 2016	36.4×10^{-9}	7.3
CRA 10 2015	141.2×10^{-9}	28.2
CRA 9 2014	63.7×10^{-9}	12.7
CRA 8 2013	31.4×10^{-9}	6.3
CRA 7 2012	8.0×10^{-9}	1.6
CRA 6 2011	23.2×10^{-9}	4.7
CRA 5 2010	33.0×10^{-9}	6.6
POSC CRA (2008-2009)	31.2×10^{-9}	6.2

AFI Airspace – estimated annual flying hours = 552 755.72 hours (note: estimated hours based on Dec 2019 traffic sample data)			
Source of Risk	Risk Estimation	TLS	Remarks
CRA 13 Total Risk(Previous)	75.4×10^{-9}	5.0×10^{-9}	Above TLS
Technical Risk	7.47×10^{-10}	2.5×10^{-9}	Below Technical TLS
Operational Risk	10.1×10^{-9}	-	-
CRA 14 Total Risk	10.9×10^{-9}	5.0×10^{-9}	Above TLS

Input data

- 1 Jan 2019 – 31 Dec 2019

Traffic flow data:

- Received Forms 2 & 4 from 17 out of 27 FIRs/UIRs.
- Total 54% of the data received

Incident data:

- Forms 1 & 3
- AIAG data

There are contributors to the Total Risk:

- Risk due to flying on wrong level

events coded as WO and WS

$$N_{az\ wl} = 0 + 3.09 \times 10^{-9} + 0 + 0 = \mathbf{3.09 \times 10^{-9}}$$

-
- Risk due to climbing / descending through a flight level

Events coded as: CO, CS, and CC

$$Naz_{cl/d} = 5.18 \times 10^{-9} + 3.21 \times 10^{-10} + 3.12 \times 10^{-12} + 2.31 \times 10^{-12} = \mathbf{5.50 \times 10^{-9}}$$

The highest reported risk in the CRA14.

- Risk due to Large Height Deviations (LHDs) not involving whole number of flight levels

Events coded as LHD

$$Naz_{non-whole} = \mathbf{1.62 \times 10^{-11}}$$

- Technical risk

$$Naz = 2 \times 7.19 \times 10^{-9} \times 0.4015 \times 0.1260 \times 1.0262 = \mathbf{7.47 \times 10^{-10}}$$

- (H/WC risk)

Events coded as H/WC

$$Naz_{wl\ H/WC} = 0 + 0 + 0 + 1.51 \times 10^{-9} = \mathbf{1.51 \times 10^{-9}}$$

Important details that need to be completed on Form 1, 3 and AIAG data to assess:

- Number and duration of LHD events involving flying at a wrong flight level
- Number and duration of LHD events involving improper flight level crossings –duration from relative vertical speed
- Number, magnitude, and duration of LHD events involving none-whole numbers of flight levels
- Number, magnitude, and duration of other LHD events, if any, that involve vertical collision risk

PART II:

Trans-regional Co-ordination Failures (LHD):

Transregional co-ordination failures affect 3 Regional Monitoring Agencies:

Africa Indian Ocean Region (ARMA)

Middle East Region (MIDRMA)

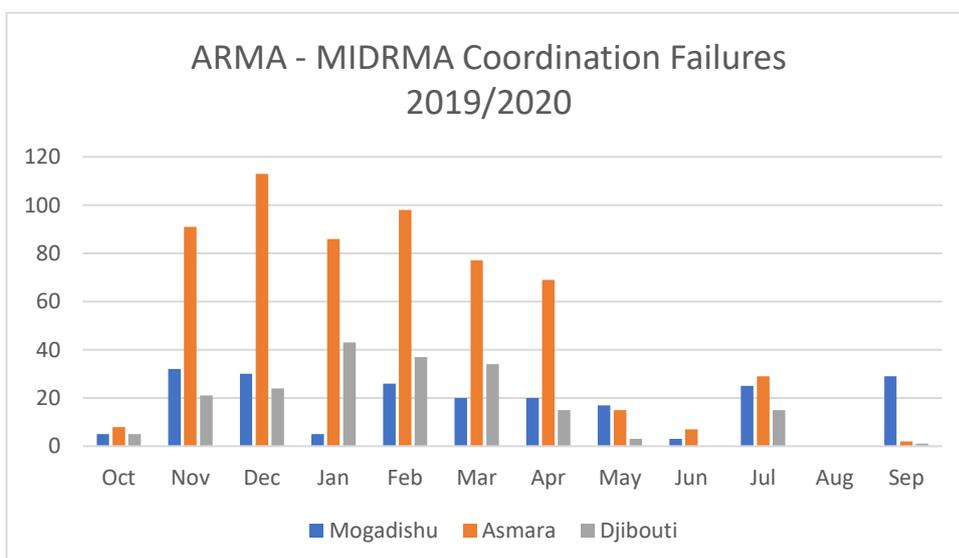
Asia Region (MAAR)

ARMA receives these reports from other RMAs but not from the AFI States which are mentioned in the reports, these reports are not included in the CRA report as the LHD occur at the Regional boundaries and are reported by the MIDRMA States.

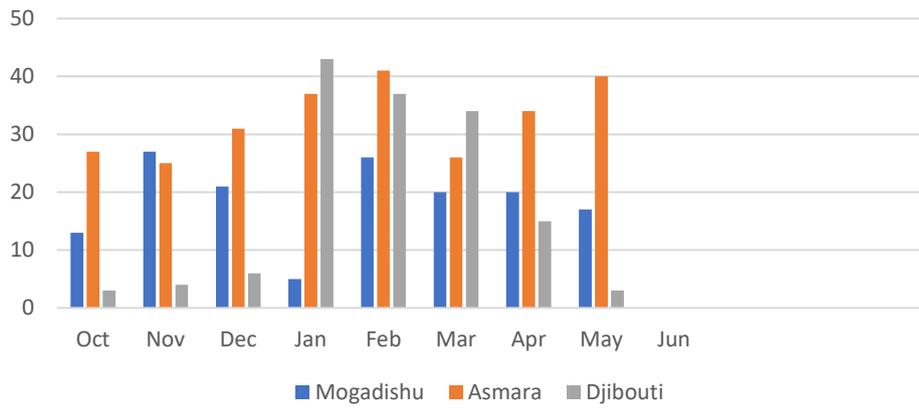
There are 4 hotspots between the AFIRMA and MIDRMA that are a cause for concern due to the regular trans-regional co-ordination failures that occur. The Sanaa FIR submits numerous large height deviation reports daily for 4 FIR's in the AFI Region namely Mogadishu FIR, Addis Ababa FIR, Asmara FIR and Djibouti FIR

These LHD occur in the same airways constantly and they have been identified as **hotspots** due to the recurring events,

- ASMARA – DEKRA
- ADDIS ABABA - PARIM
- DJIBOUTI – DEKRA/PARIM/TORBA
- MOGADISHU – DEMGO/BOMIX/VEDET/SUHIL



ARMA - MIDRMA Coordination Failures 2020/2021



PART III:

APIRG/22 & RASG-AFI/5 Conclusion 1/04: RVSM Airspace Monitoring

That AFI States:

- a) Submit RVSM Data to ARMA Office on a monthly basis;*
- b) Encourage Airlines and Operators to periodically height monitor their RVSM approved aircraft; and*
- c) Implement Strategic Lateral Offset Procedures and other recommended measures aimed to reduce AFI target level of safety (TLS).*

Conclusion: RVSM Airspace Monitoring

That AFI States:

- a) Submit RVSM Data to ARMA Office on a monthly basis;*
- b) Encourage Airlines and Operators to periodically height monitor their RVSM approved aircraft; and*
- c) Implement Strategic Lateral Offset Procedures and other recommended measures aimed to reduce AFI target level of safety (TLS).*

ARMA Actions:

- Data submission 2020 update on Part VII.***
- There has been progress on height monitoring requests, we encourage Airlines and Operators to comply with ICAO Annex 6.***
- SLOP at 74% implementation as per Part IV***

APIRG/22 Conclusion 22/12: Establishment of the AFI Performance-Based Communication and Sur-veillance (PBCS) Monitoring

That:

- a) The AFI PBCS monitoring should be established as part of the AFI RMA monitoring mechanism;*
- b) ICAO to formally request South Africa, as matter of urgency, to facilitate the inclusion of PBCS monitoring in the functions and responsibilities of the AFI Regional Monitoring Agency (ARMA) and provide necessary expertise for both functional areas (RVSM and PBCS), as well associated support to States and service providers as applicable;*
- c) South Africa be mandated to formulate cost recovery mechanism in accordance with ICAO policies and in coordination with users and AFI ANSPs as necessary, and provide an up-date to AFI States and ANSPs through the Secretariat and the APIRG framework;*
- d) The Secretariat to provide assistance and support as necessary to facilitate early establishment of the AFI PBCS monitoring mechanism; and*
- e) The proposed terms of reference of the ARMA relating to PBCS monitoring at **Appendix 4C** to this report be reviewed and updated as necessary.*
- f) PBCS monitoring should be established as part of the South Atlantic Regional Monitoring Agency (SATMA) monitoring mechanism*

ARMA Actions:

- AFI PBCS Monitoring has been established as a part of AFI RMA Monitoring Mechanism***
- The request was formally sent and a response issued to ICAO.***
- Cost Recovery mechanism has not been established as a task team has not been identified due to lockdown procedures.***

Adoption of RCP 240 and RSP 180 for implementation in the AFI Region

2.13 The meeting also noted the low pace of implementation of PBCS operation in the AFI Region and took note that the NAT region has experienced 7 months after PBCS implementation and that States were still not able to produce PBCS approvals and recognized that setting up the process to transmit PBCS/RCP/RSP approvals is expected to be slow in the AFI region. It was therefore recommended to urge this region to begin the process as soon as possible.

APIRG22 Conclusion 22/13: Adoption of RCP 240 and RSP 180 for PBCS operations in AFI Region

That,

- a) AFI States start pre-implementation as RCP/RSP specifications have been defined to establish PBCS policies for ANSP, Operators and Airworthiness. Publish the PBCS requirements in Aeronautical Information Publication;*
- b) States/ANSPs adopt RCP 240 and RSP 180 for implementation in the AFI and SAT area and establish a line of communication with AFI Regional Monitoring Agencies regarding non-compliance.*
- c) ANSPs establish mechanisms to recognize RCP/RSP Capabilities in ATC automation and provide RCP/RSP compliant air traffic services;*
- d) Operators prepare to file RCP/RSP capabilities in flight plans and participate in PBCS Implementation and Monitoring programmes; and*
- e) States that have aircraft that operate outside of the AFI Region to start developing PBCS policies to help their operators with RCP/RSP(PBCS) Approvals as per ICAO Doc 9869.*

ARMA Actions:

- ARMA encourages States to share their Aeronautical Information Publications for PBCS requirements that have been published.*
- RCP 240 and RSP 180 approval data appended onto the RVSM Forms as per Appendix A and B.*
- ARMA Encourages States to use the new forms.*

APIRG/22 Conclusion 22/16: Implementation of eleventh TAG meeting report

That:

- a) States update the contact details of RVSM National Programme Managers or Focal Points by 31 December 2019;*
- b) ICAO and ARMA jointly conduct seminars for State agencies and RVSM NPM/Focal Points in 2019 to inform and/or update them on RVSM requirements and post implementation responsibilities of States, ANSPs, Airspace Users and other stakeholders;*
- c) AFI Trans-regional co-ordination failures between Sanaa FIR and Mogadishu, Asmara and Djibouti should be given immediate attention due to the number of events that have occurred;*

ARMA Actions:

- RVSM National Programme Managers or Focal Points were updated in 2020 during the RVSM NPM Workshop. Another workshop will be held in October 2021.*
- Workshop was conducted in*
- Issues with Transregional LHD Between AFI and MID Region have been reported at all relevant ICAO Offices and intervention is required from the regional offices.*

PART IV:

FIR	Implemented SLOP (Yes/No)
Accra	Yes
Addis Ababa	No
Antananarivo	Yes
Asmara	No
Beira	Yes
Brazzaville	Yes
Cape Town	No
Dakar Terrestrial	Yes
Dar Es Salaam	Yes
Entebbe	Yes
Gaborone	No
Harare	Yes
Johannesburg	Yes
Johannesburg Oceanic	Yes
Kano	Yes
Kinshasa	Yes
Lilongwe	No
Luanda	Yes
Lusaka	Pending
Mauritius	No
Mogadishu	Yes
Nairobi	No
N'djamena	Yes
Niamey	Yes
Roberts	Yes
Seychelles	Yes
Windhoek	No
Percentage of Implementation	74%
Percentage Not Implemented	26%
Total Implemented	19
Total Not Implemented	8
Pending Implementation Awaiting Evidence	1
Total FIR's	27

PART V: PBCS ROADMAP

TASK ID	TASK DESCRIPTOR	COMPLETE BY	LEAD
GENERAL PROJECT DEVELOPMENT & MANAGEMENT			
1	Plan	AFI RMA	AFI RMA
2	Target dates	PIRG	PIRG
3	RCP/RSP specifications	PIRG	PIRG
4	AFI PBCS Workshop(s)	2019-2023	ICAO/ States
DOCUMENTATION			
5	Operational concepts	PIRG	ATNS ATM & ARMA, States
6	GOLD amendments	PIRG	GOLD ad-hoc group
7	Contingency procedures		ATNS ATM/cns
8	Restoration of service	APIRG	PIRG
9	Flight plan requirements	a) ATNS and GOLD b) amend Doc 4444	ICAO
10	PfA for NAT Regional Supplementary Procedures (AFI SUPPS)	ATNS ATM/cns	States
11	AIPs and other State documents supporting AFI SUPPS	Consistent with Task 10	States
14	GOLD proposal for RCP/RSP compliance determination	ANSPs	CNSG
15	GOLD proposal for guidelines on operator eligibility	ANSPs and CAA	OPS/AIR
IMPLEMENTATION ACTIVITIES			
12	ATC automation changes	Before the start of operational trials of RLongSM or RLatSM.	AFI ANSPs
13	Confirm actual CPDLC and ADS C performance	Prior to operational implementation	ANSPs, Operators, IATA and ARMA
AIRWORTHINESS AND OPERATIONAL ELIGIBILITY			
16	State regulations and guidance material	Available from ICAO and other RMA's	SOG, States, ANSPs, Users
POST IMPLEMENTATION TASKS			
17	Post-implementation monitoring		ANSPs, ARMA

NAT PBCS Monitoring Report by Airframe for AFI Registered airframes

Period: January to June 2020

Color key:

Meets criteria

99.0%-99.9% * Multiple entries are seen for some registration numbers in the same FIR because of the use of different operator codes.

Under criteria * Results for airframes with low counts of messages/transactions may have skewed results. Request further information from monitoring data contacts.

State of Registry	Data Source (FIR)	3-letter ICAO Operator code (where applicable)	4-letter ICAO Aircraft Type	Registration Number	ADS-C downlink Message Counts	95% RSP 180 benchmark ASP <=90 sec	99.9% RSP 180 benchmark ASP <= 180 sec	CPDLC Transaction Counts (WILCO Received)	95% RCP 240 benchmark ACP <= 180 sec	99.9% RCP 240 benchmark ACP <=210 sec
AFI	Santa Maria	***	A332	***XU	366	98,4%	99,7%	8	100,0%	100,0%
AFI	Santa Maria	***	A332	***XV	594	95,8%	98,0%	11	100,0%	100,0%
AFI	Santa Maria	***	A332	***XW	735	97,0%	99,0%	20	90,0%	95,0%
AFI	Santa Maria	***	A332	***XX	361	94,7%	98,3%	13	100,0%	100,0%
AFI	Santa Maria	***	A332	***XY	781	97,4%	98,5%	22	100,0%	100,0%
AFI	Santa Maria	***	A332	***XZ	386	90,9%	93,5%	11	90,9%	100,0%
AFI	Santa Maria	***	A333	***XI	731	94,1%	98,5%	18	94,4%	100,0%
AFI	Santa Maria	***	A333	***XJ	827	94,1%	97,3%	27	96,3%	100,0%
AFI	Santa Maria	***	A333	***XK	906	94,9%	97,7%	20	90,0%	95,0%
AFI	Santa Maria	***	A333	***XL	1001	94,0%	97,0%	27	88,9%	100,0%
AFI	Santa Maria	***	A333	***XM	495	94,5%	98,4%	12	83,3%	100,0%
AFI	Santa Maria	***	A343	***XA	227	100,0%	100,0%	7	100,0%	100,0%
AFI	Santa Maria	***	A343	***XB	134	93,3%	94,8%	4	100,0%	100,0%
AFI	Santa Maria	***	A343	***XC	177	91,0%	94,4%	2	100,0%	100,0%
AFI	Santa Maria	***	A343	***XC	137	94,9%	97,1%	3	100,0%	100,0%
AFI	Santa Maria	***	A346	***ND	711	95,5%	96,8%	14	100,0%	100,0%
AFI	Santa Maria	***	A346	***NC	399	97,5%	98,7%	7	100,0%	100,0%
AFI	Santa Maria	***	A346	***NF	1414	96,7%	98,6%	36	100,0%	100,0%
AFI	Santa Maria	***	A346	***NG	2004	97,0%	98,5%	47	95,7%	100,0%
AFI	Santa Maria	***	A346	***NF	1365	97,0%	98,5%	27	100,0%	100,0%
AFI	Santa Maria	***	A346	***NI	747	95,7%	97,5%	18	50,0%	88,9%

PART VI:

PBCS Implementation Plan -Checklist

Task ID	Task Descriptor	Task Detail	ICAO reference
Group A tasks – State/region preparation			
A-1	AIP – Prescription of an RCP/RSP specification	Prescribe the appropriate RCP/RSP specification in the AIP (or equivalent publication). If applicable, common AIP language may be based on a bilateral, multilateral or regional air navigation agreement.	PBCS Manual (Doc. 9869) Chapter 4
A-2	ANSP – PBCS policies, objectives supporting safety oversight	Identify means to apply RCP/RSP specifications and compliance criteria for initial approval and continued compliance, including:	PBCS Manual Chapter 5 Section 5.2.1 Section 5.2.2
		a) ATS provision requirements, and requirements for ATS unit's system and CSP/SSP service agreements, if applicable;	
		b) flight plan requirements; and	
		c) monitoring, alerting and reporting requirements.	
A-3	Operator and aircraft system – PBCS policies, objectives supporting safety oversight	Identify means to determine aircraft operator eligibility requirements for PBCS operations, including requirements for operations, maintenance, aircraft system and CSP/SSP service agreements, if applicable:	PBCS Manual Chapter 5 Section 5.2.1 Section 5.2.3
		a) establish State airworthiness requirements;	
		b) establish operational policy/procedures requirements for operational approval;	
		c) prepare State inspectors to perform tasks for operational approval;	
		d) develop plan to issue operational approval to national operators. Train pilots and, if applicable, dispatchers on PBCS operations; and	
		e) develop and distribute operations manuals, pilot bulletins or other appropriate documents containing PBCS policy and/or procedures.	
		<i>Note. – State of the Operator identifies means for commercial air transport operations. State of Registry identifies means for general aviation operations. State of Design identifies means for design approval of the aircraft system.</i>	
A-4	Regional Supplementary Procedures (Doc 7030) for PBCS operations, if applicable	On behalf of a region, a State may develop a proposed amendment to the Regional Supplementary Procedures (Doc 7030), if applicable.	PBCS Manual Chapter 4 Chapter 5
Group B tasks – ANSP general project development and management			
B-1	PBCS Implementation Plan	Establish PBCS implementation team and prepare a plan outlining the tasks for PBCS implementation. Include interdependencies between tasks, when each task is to be completed, lead point of contact and any coordination required.	State/region specific, this appendix serves as a guide.
B-2	Target dates for PBCS and relevant ATM operations	Identify key target dates for implementing PBCS supporting specified ATM operation(s) and the tasks identified in the plan.	State/regions
B-3	RCP/RSP specifications	Identify and confirm applicable RCP/RSP specifications that will be used for operational implementation of communication and surveillance capabilities supporting specified ATM operation(s). Existing RCP/RSP specifications may be appropriate for a new ATM operation predicated on RCP/RSP specifications (e.g. application of performance-based separation minimum), or when implementing an emerging technology to provide a communication or surveillance capability (e.g. SATVOICE) supporting an existing ATM operation. If a new RCP or RSP specification is needed, establish a task to coordinate with ICAO on the development of the appropriate RCP/RSP specifications for update to Doc 9869.	PBCS Manual Chapter 3 Appendix B Appendix C

B-4	PBCS awareness	Establish means to raise awareness on PBCS implementation in a particular region or airspace through workshops and distribution of information. Establish a planning team to work with ICAO and subject matter experts to develop relevant material.	PBCS Manual GOLD (Doc. 10037) SVOM (Doc. 10038)
Group C tasks – ANSP implementation activities – ATS service provision			
C-1	Operational concepts and procedures for PBCS operations	Develop operational concepts for implementation of any ATM operation predicated on an RCP/RSP specification. Consider the following:	PBCS Manual GOLD (Doc. 10037) SVOM (Doc. 10038)
		a) applicable ATM operation(s);	
		b) relevant interoperability requirements for communication and surveillance capabilities;	
		c) provision for PBCS operations and appropriate RCP/RSP specifications;	
		d) operating procedures for PBCS operations;	
		e) operator/flight/flight crew and/or ATS unit/controller contingency procedures when system degrades below that required by RCP/RSP specifications; and	
		f) procedures for resuming specified ATM operation(s) after system is restored to an acceptable level of performance.	
C-2	ATC automation changes to use flight plan RCP/RSP indicators	Implement changes to recognize and use flight plan RCP/RSP indicators to apply ATM operation(s) predicated on the RCP/RSP specifications only to eligible operators/aircraft, and/or adapt other system parameters, if applicable (e.g. set timer threshold values), based on different performance levels). This task should be complete prior to operational implementation of ATM operation(s) predicated on RCP/RSP specifications.	PBCS Manual Chapter 5 Section 5.4
C-3	ATC automation changes for PBCS monitoring	Implement post-implementation monitoring capability in ATC automation. This task should be completed to obtain a sufficient sample to confirm ACP and ASP comply with RCP/RSP specifications prior to implementation of specified ATM operation(s).	PBCS Manual Chapter 5 Section 5.5 Appendix D Appendix E
C-4	Confirm initial ANSP compliance with RCP/RSP specifications	Prior to operational implementation, confirm CPDLC and ADS-C comply with RCP/RSP specifications:	PBCS Manual Chapter 5 Section 5.2.2 Section 5.3.1 Section 5.3.2 Appendix D Appendix E
		a) measure actual performance against RCP/RSP specifications for compliance to support initial approval of ATS provision, including CSP/SSP service agreement, if applicable;	
		b) identify any aspect of service performance that is not compliant with the RCP/RSP specifications; and	
		c) take appropriate action to mitigate.	
Group D tasks – Aircraft operator, Aircraft type/system (airworthiness) eligibility			
D-1	Confirm initial operator and/or aircraft type/system compliance with RCP/RSP specifications	Prior to operational approval, confirm CPDLC and ADS-C aircraft equipment and operator capabilities comply with RCP/RSP specifications:	PBCS Manual Chapter 5 Section 5.2.3 Section 5.3.2 Section 5.3.3 Section 5.3.4 Appendix D Appendix E
		a) measure actual performance against RCP/RSP specifications for compliance to support initial approval of operator, including aircraft system approval and CSP/SSP service agreement, if applicable;	
		b) identify any aspect of aircraft type/system and/or capability performance that is not compliant with the RCP/RSP specifications; and	
		c) take appropriate action to mitigate.	
Group E tasks – All stakeholders – post-implementation monitoring			
E-1	PBCS monitoring – post-implementation	On-going post-implementation data collection, monitoring, problem reporting and tracking, analysis and corrective action. When performance falls below specified levels, or problems are reported, operational judgment may be a consideration in determining appropriate actions.	PBCS Manual Chapter 5 Section 5.5 Appendix D Appendix E RMA Manual (Doc 9937) PBHSM Manual (Doc. xxxxx)

PART VII:

Data Submitted

2020

ACC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Accra	Yes											
Addis Ababa	No											
Asmara	No											
Beira	Yes											
Cape Town	No	No	Yes									
Da Es Salaam	No											
Entebbe	Yes	No	Yes									
Gaborone	No											
Harare	Yes											
Johannesburg	Yes											
Johannesburg Oceanic	Yes											
Kano	Yes											
Kinshasa	Yes	No	No	No	No	No						
Lilongwe	No											
Luanda	Yes											
Lusaka	No	No	Yes	No	No	No	Yes	Yes	No	No	No	Yes
Mauritius	No	No	No	Yes	No							
Mogadishu	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Nairobi	Yes											
Roberts	Yes											
Seychelles	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes
ZZ Abidjan	Yes											
ZZ Antananarivo	Yes	No	Yes									
ZZ Bamako	Yes											
ZZ Brazzaville	Yes											
ZZ Dakar*	No	Yes	No	Yes	Yes	No						
ZZ Douala	Yes											
ZZ Libreville	Yes											
ZZ Lome	Yes	No	Yes									
ZZ N'djamena	Yes											
ZZ Niamey	No	Yes										
ZZ Nouakchott	Yes											
ZZ Ouagadougou	Yes											

PART VIII:

- **ARMA would like to highlight the positive progress that the AFI Region has made for the Collision Risk Assessment 14 Results.**
- **The team appreciates the efforts made by States in submitting data and Large Height Deviation reports.**
- **AFI Region Total Vertical Risk improved and is now much closer to the Target Level of Safety(TLS) than it has ever been in 9 years.**
- **ARMA has identified that data tracking has been an issue and would like support from the ICAO offices in the development of an ARMA Website, where data can be loaded directly onto the site, where the AFI RVSM/PBCS Database could readily be available and updated without having host issues and where the height monitoring schedule and slots could easily be accessible to airlines and operators.**
- **Implementation of PBCS requires all stakeholder engagement and participation, every stakeholder has a role to play, the process cannot be solely initiated by ARMA. Monitoring cannot be conducted until pre-implementation by States has commenced.**

Appendix A

NEW F2 RVSM/PBCS FORMS

Appendix B

NEW F3 RVSM/PBCS FORM