



International Civil Aviation Organization

MID RVSM Safety Assessment Seminar

(Bahrain, 22-24 February 2010)



SUMMARY

1. INTRODUCTION:

1.1 The MID RVSM Safety Assessment Seminar was successfully held in Bahrain from 22 to 24 February 2010. Thirty four (34) participants from 10 States (Bahrain, Egypt, Iran, Iraq, Jordan, Oman, Qatar, Saudi Arabia, Syria and UAE) and 1 international organization (IATA) have attended the seminar. The list of participants is at **Attachment A**. The Seminar was hosted by the Middle East Regional Monitoring Agency (MIDRMA). It was moderated by Mr. Mohamed Smaoui, RO/AIS/MET, ICAO MID Regional Office.

1.2 The Seminar addressed different subjects related to RVSM implementation and safety assessment, according to the following agenda:

1. Introduction
2. RVSM implementation and Regional Monitoring Agencies (RMAs)
3. RVSM Safety Assessment/Height-keeping Performance Monitoring
4. Seminar Outcome/Recommendations
5. Closing Session

1.3 The main objective of the Seminar was to raise the awareness of States and their Air Navigation Service Providers about the requirements for sustained RVSM safety assessment activity.

1.4 A number of presentations covering the different agenda items were provided during the Seminar as follows:

Title of the Presentation	Speaker
RVSM Implementation in the MID Region and MID RMA Project	Mr. Mohamed Smaoui Regional Officer AIS/MET, ICAO MID Office, Cairo
RMA Issues	Mr. Saulo Da Silva Technical Officer ATM ICAO HQ, Montreal
MID RMA Activities	Mr. Fareed Al-Alawi MIDRMA Manager
Altimetry System Errors (ASE) issues	Mr. Andrew Lewis Technical Manager Airspace, Network Planning, Navigation Directorate of Airspace Policy - EUROCONTROL

Title of the Presentation	Speaker
RVSM Height-keeping Performance Monitoring	Mr. Robert L. Miller, Jr. Vice President, Aerospace Division CSSI, Inc.
Monitoring and Validation of Aircraft Height Keeping Performance in Europe	Mr. Andrew Lewis Technical Manager Airspace, Network Planning, Navigation Directorate of Airspace Policy - EUROCONTROL
The Safety Web – Real Time Risk Monitoring	Professor Hussein Abbass Director Defence & Security Applications Research Centre University of New South Wales Australian Defence Force Academy Campus
RVSM Software	Dr. Sameer Alam Research Fellow (ATM) University of New South Wales Australian Defence Force Academy Campus
RADAC System	Mr. Per-Olov Hornaeus Systems Engineer COMBITECH AB, Sweden
Efficient Air Transportation	Mr. Kenny Norberg Marketing Director, SAAB Sweden
MID RMA Safety Monitoring Activities/difficulties	Mr. Fathi Ibrahim Al-Thawadi Head of Aeronautical & Airport Ops. Systems Civil Aviation Affairs, Bahrain (MIDRMA)
Threat and Error Management (TEM) and Normal Operation Safety Survey (NOSS)	Dr. Christopher S. Henry Director NOSS Collaborative USA
European Safety Assessment Methodology	Mr. Andrew Lewis Technical Manager Airspace, Network Planning, Navigation Directorate of Airspace Policy – EUROCONTROL
RMA Manual	Mr. Saulo Da Silva Technical Officer ATM ICAO HQ, Montreal
Development of MIDRMA SMRs	Mr. Fareed Al-Alawi MIDRMA Manager

2. SUMMARY OF DISCUSSIONS

2.1 The Seminar reiterated the benefits of RVSM implementation and underlined the need for RVSM implementation within Baghdad FIR.

2.2 The Seminar recalled ICAO Annex 6, Annex 11 and Doc 9574 (RVSM Manual) provisions related to RVSM safety assessment and in particular monitoring of height-keeping performance.

2.3 The Seminar reiterated that the introduction and continued safe use of RVSM in a portion of airspace is said to be “safe” if the risk of midair collision meets the agreed Target Level of Safety (TLS). The Technical Risk or Risk associated with height-keeping performance should not exceed 2.5×10^{-9} fatal accidents per flight hour and the Overall Risk due to all causes should not exceed 5×10^{-9} fatal accidents per flight hour.

2.4 The Seminar noted that aircraft height-keeping performance is function of performance of aircraft altimetry and altitude-keeping systems. Such performance is assessed through the results of height-keeping performance monitoring.

2.5 The responsibilities of the RPG, the RMA and States/ATC with regard to RVSM implementation and continued operation were highlighted. The need for States to report required data to the RMA on regular basis and in a timely manner was particularly underlined.

2.6 The main causes of Altitude Deviations/Level Busts were presented. The Seminar recognized that the level of reporting of Altitude Deviation Reports (ADRs), which contributes to the assessment of the overall risk, is very low and does not reflect the reality.

2.7 The Seminar recognized that the quality of data reported by States to the RMA has a direct impact on the quality of the risk assessment. A good estimation of the risk could not be achieved without high-quality data. In this regard, it was recommended that States put in place a formal mechanism for the reporting of ADRs and CFRs, with appropriate procedures and forms and a continuous monitoring, if it's not already done as part of SMS implementation.

2.8 The Seminar was briefed about the MIDRMA Project and the MIDRMA activities and difficulties.

2.9 Some global issues related to the RMAs were presented especially the lack of reporting of required data by States and the lack of expertise to perform safety assessment.

2.10 The need for global coordination was highlighted. In this regard, it was recognized that the RMA coordination Group, meeting once a year, represent a good mechanism to ensure successful coordination.

2.11 The need for a suitable monitoring infrastructure was highlighted. In this regard, the advantages and drawbacks of ground-based systems (Height Monitoring Units (HMU) and Aircraft Geometric Height Measurement Element (AGHME)) and air portable GPS Monitoring Units (GMU or enhanced GMU (EGMU)) were noted. The Seminar was also informed that Research and Development is currently being carried out in Australia and USA for the use of ADS-B for height-keeping monitoring.

2.12 The Seminar was apprised of the European method of monitoring aircraft using HMU infrastructure as well as the European Safety Assessment Methodology.

2.13 It was highlighted that the height-keeping monitoring could not be carried out without RVSM approval, since the aircraft need to enter the RVSM airspace in order to be monitored. In this regard, it was recommended that Temporary approvals be granted to the aircraft/operator until the height-keeping monitoring results could be obtained.

2.14 The Seminar noted the causes and effects of Altimetry System Errors (ASE), how ASE is detected and how problems are solved. In this respect, it was highlighted that:

- Airworthiness Authorities should ensure that adequate RVSM compliance checks are made;
- a review of the compliance methods for non-standard configurations is needed;
- Manufacturers should review inspection and maintenance procedures with regard to ASE; and
- Operators should ensure that they react appropriately to RMA's ASE reports.

2.15 The three elements of the safety assessment process, as detailed in the ICAO Doc 9574, were presented:

- Quantitative safety goal: Target Level of Safety (TLS);
- Mathematical Model used to estimate risk (both Technical and Operational); and
- Decision-making process using TLS and risk estimates.

2.16 The Seminar noted with interest the Research and Development (R&D) of the University of New South Wales, Australia related to Safety Web-Real Time RVSM Risk Monitoring/Assessment based mainly on FPL, radar and ADS-B data. The main steps for the estimation of the Technical Risk carried out by the RVSM Risk Assessment Software were presented, especially:

- Passing Frequency;
- Total Vertical Error (TVE);
- Probability of vertical overlap $P_z(1000)$; and
- Probability of horizontal (lateral) overlap.

2.17 SAAB/COMBITECH presented their RADAC System which was lately purchased by the MIDRMA. RADAC is a Radar Data Acquisition and Analysis platform composed mainly of two modules: Radar Performance Analysis (RPA) and Passing Frequency System (PFS).

2.18 NOSS Collaborative made a presentation on Threat and Error Management (TEM) and Normal Operation Safety Survey (NOSS).

2.19 The importance of gathering stakeholders and providing forums for discussion of issues related to sustained RVSM safety assessment activity was highlighted.

2.20 The participants expressed their gratitude to ICAO, the MIDRMA and Bahrain CAA for organizing such an important Seminar. The feedback of the participants related to the evaluation of the Seminar is at **Attachment B**.



International Civil Aviation Organization

MID RVSM Safety Assessment Seminar

(Bahrain, 22-24 February 2010)

LIST OF PARTICIPANTS

NAME	TITLE & ADDRESS
<u>STATES</u>	
BAHRAIN	
Mr. Fareed Abdullah Al Alawi (MID RMA)	Head, Air Traffic Operation Civil Aviation Affairs P.O. Box 586 KINGDOM OF BAHRAIN Fax: (973) 17 32 1992 Tel: (973) 17 321 158 Mobile: (973) 396 51 596 Email: falalawi@caa.gov.bh
Mr. Fathi Ibrahim Al-Thawadi (MID RMA)	Head of Aeronautical & Airport Ops. Systems Civil Aviation Affairs P.O. Box 586 KINGDOM OF BAHRAIN Fax: (973) 17 321 992 Tel: (973) 17 329 153 Mobile: (973) 396 766 14 Email: fathi@caa.gov.bh
Mr. Sanad S. Salim (MID RMA)	Chief, Computer Services Civil Aviation Affairs P.O. Box 586 KINGDOM OF BAHRAIN Fax: (973) 17 321 992 Tel: (973) 17 321 054 Mobile: (973) 396 96 991 Email: ssalim@caa.gov.bh
Mr. Ibrahim Dashghooni	ATC Supervisor Civil Aviation Affairs P.O. Box 586 KINGDOM OF BAHRAIN Fax: (973) 17 321 1029 Tel: (973) 17 321081 Mobile: (973) 394 70 025 Email: dash_goni@yahoo.com

NAME	TITLE & ADDRESS
Mr. Taha Hussain	ATC Supervisor Civil Aviation Affairs P.O. Box 586 KINGDOM OF BAHRAIN Fax: (973) 17 3211029 Tel: (973) 17 321081 Mobile: (973) 394 44 452 Email: tahahaj@hotmail.com
Mr. Vinesh Dulabh	Standards Training Officer Civil Aviation Affairs P.O. Box 144 KINGDOM OF BAHRAIN Fax: (973) 19 321 992 Mobile: (973) 390 94 500 Email: vdulabh@caa.gov.bh
Mr. Mohammed Hassan Al-Asfoor	Sr. Navaid Engineer Civil Aviation Affairs P.O. Box 586 KINGDOM OF BAHRAIN Fax: (973) 19 321 992 Tel: (973) 19 321035 Mobile: (973) 39691035 Email: malasfoor@caa.gov.bh
Mr. Khalid Hassan	Air Traffic Controller Supervisor Civil Aviation Affairs P.O. Box 586 KINGDOM OF BAHRAIN Fax: (973) 19 321 029 Tel: (973) 19 321081 Mobile: (973) 396 23 443 Email: khalid8272@yahoo.com Kamohammed@caa.gov.bh
EGYPT Mr. Hassan Kamel Abdel Meguid	ATS Safety Manager National Air Navigation Services Company (NANSC) Cairo International Airport Road Cairo - EGYPT Fax: (202) 2265 7842 Tel: (202) 2265 7842 Mobile: (2010) 184 3602 Email: hassan.kamel@nansceg.org hassankam@hotmail.com

NAME	TITLE & ADDRESS
Mr. Mahmoud Abdel Aziz	G.M. of Quality National Air Navigation Services Company Cairo Air Navigation Centre Cairo Airport Road Cairo - EGYPT Fax: (202) 22671053 Tel: (202) 22671053 Mobile: (2016) 351 0769 Email: mahmoud5531@hotmail.com
IRAN, ISLAMIC REPUBLIC OF Mr. Alireza Majzoubi	Chief of Tehran ACC Iran Airport Company (IAC) P.O. Box 13445 Tehran - ISLAMIC REPUBLIC OF IRAN Fax: (+98)21 44544114 Tel: (+98)21 44544114 Mobile: (+98)9123053095 Email: maj.alireza@yahoo.com
Mr. Mohamed Hassan Moghadassi	Expert in Charge of Tehran ACC Iran Airport Company (IAC) Tehran - ISLAMIC REPUBLIC OF IRAN Fax: (+98)21445441117 Tel: (+98)2144544060 Mobile: (+98)9 1243939387 Email: mhmatc@gmail.com
IRAQ Mr. Mohammed Hussein Kareem	Air Traffic Controller/Radar Iraqi Civil Aviation Authority Baghdad International Airport Baghdad - IRAQ Mobile: 7902388183 Email: ml_1961@yahoo.com
Mr. Riyadh Abd Al-Deen Azeez	Air Traffic Controller Iraqi Civil Aviation Authority Baghdad International Airport Baghdad - IRAQ Mobile: 791280405 Email: riyadh-1968@yahoo.com

NAME	TITLE & ADDRESS
<p>JORDAN Mr. Fawaz Abdalla</p>	<p>ATC Chief Civil Aviation Regulatory Commission Queen Alia International Airport Amman - JORDAN Fax: (962) 6 4451619 Tel: (962) 6 44525222 Mobile: (962) 7756136 Email: atc22us@yahoo.com c.twr-qa@carc.gov.jo</p>
<p>Mr. Khaled Arabiyat</p>	<p>Chief SMS Civil Aviation Regulatory Commission P.O. Box 15060 Code 11134 Amman - JORDAN Fax: (962) 4886829 Mobile: (962)795596597 Email: smatm@carc.gov.jo</p>
<p>Mr. Omar Al-Qudah</p>	<p>Supervision in Amman TACC Civil Aviation Regulatory Commission P.O. Box 7547 Amman - JORDAN Tel: (962) 4891401 Mobile: (962) 777363588 Email: alqudah1@yahoo.com</p>
<p>Mr. Azmi Al-Amireh</p>	<p>Chief Controller Amman - JORDAN Mobile: (962) 777534375 Email: alhareth1999@yahoo.com</p>
<p>OMAN Mr. Hamood Said Al-Yahyai</p>	<p>SOI ATC Royal Air Force Oman Muscat, SULTANATE OF OMAN Fax: (968) 334776 Tel: (968) 334211 Mobile:(968) 99415696 Email: hamood1526@yahoo.com</p>
<p>Mr. Ahmed Abdullah Al-Abri</p>	<p>Pilot A.320 Muscat, SULTANATE OF OMAN Mobile: (968) 96007001 Email: alqurm444@hotmail.com</p>

NAME	TITLE & ADDRESS
QATAR Mr. Ibrahim Abdul Qader	Director of Safety & Regulation Civil Aviation Authority P.O. Box 3000 Doha – QATAR Fax: (974) 465 6554 Tel: (974) 462 2300 Mobile: (974) 551 3619 Email: ibrahim@caa.gov.qa
Mr. Ahmed Mohamed Al Eshaq	Director Air Navigation Civil Aviation Authority P.O. Box 3000 Doha – QATAR Fax: (974) 465 6554 Tel: (974) 462 2300 Mobile: (974) 555 0440 Email: ahmed@caa.gov.qa
SAUDI ARABIA Mr. Faisal T Alotaibi	ATC General Authority of Civil Aviation Jeddah 21444 KINGDOM OF SAUDI ARABIA Tel: (966) 530009152 Mobile:(966) 12202213 Email: rfoatc@hotmail.com
Mr. Mahmood M Nass	ATC Supervisor General Authority of Civil Aviation Jeddah Airport KINGDOM OF SAUDI ARABIA Fax: (966) 6854011 Tel: (966) 6855007 Mobile:(966)0561414663 Email: mah5a@yahoo.com
Mr. Mahmood M. Alfar	Supervisor General Authority of Civil Aviation KINGDOM OF SAUDI ARABIA Jeddah Airport Fax: (966) 26854011 Tel: (966) 26855007 Mobile: (966) 0505713728 Email: farfor404@hotmail.com

NAME	TITLE & ADDRESS
SYRIA Mr. Adnan Al Dulli	Chief of ATC in Der Al Zor Airport Syrian Civil Aviation Authority Al Najmeh Square P.O. Box 6257 Damascus - SYRIA Fax: (963-11)367004 Tel: (963-11) 361901 Mobile:0988994707
Eng. Mohannad Al Lahyani	Chief of ATC Avionics Branch Airworthiness Inspector Syrian Civil Aviation Authority Flight Safety Directorate P.O. Box 6257 Damascus - SYRIA Fax: (963-11)54010020 Tel: (963-11) 2386365 Mobile:(963) 932616212 Email: mohannad-Lahyani@hotmail.com
Mr. Ousama Safi	Chief ATC Damascus International Airport P.O. Box 5409 Damascus - SYRIA Fax: (963-11) 5400 312 Tel: (963 11) 5400 312 Mobile: (963-94) 4672 817 Email: ousafi@mail.sy
UNITED ARAB EMIRATES Mr. Abdullah Al Hashimi	Manager ATC Operation General Civil Aviation Authority P.O. Box 666 Abu Dhabi - UNITED ARAB EMIRATES Fax: (971-2) 5996836 Tel: (971-2) 5996830 Mobile: (971-50) 4420486 Email: ahashimi@szc.gcaa.ae
Mr. Omar Abdouli	ATCO General Civil Aviation Authority P.O. Box 666 UNITED ARAB EMIRATES Mobile: (971-50) 1566236 Email: oabdouli@szc.gcaa.ae

NAME	TITLE & ADDRESS
Mr. Michael Hayes	Chief Air Navigation and Aerodrome P.O. Box 6558 Abu Dhabi - UNITED ARAB EMIRATES Mobile: (971-50) 8181295 Email: ana@gcaa.ae
<u>ORGANIZATIONS</u>	
EUROCONTROL Mr. Andrew Lewis	Technical Manager Airspace, Network Planning, Navigation Directorate of Airspace Policy - EUROCONTROL 96 Rue de la Fusee Brussels B-1130 Belgium Fax: 32 2729 5185 Tel: 32 2729 3454 Mobile: 32499981445 Email: andrew.lewis@eurocontrol.int
IATA Capt. Alaaeldin Ahmed Yassin	Sudan Airways HQ P. O. Box 253 Khartoum - SUDAN Tel: (+249)18324305 Mobile: (+249)912349515 Email: ala_ahmed@hotmail.com
Capt. Ibrahim Omer Ahmed Mahmoud	Sudan Airways Khartoum - SUDAN Fax: (+249)18243721 Tel: (+249)18243721 Mobile: (+249)912132500 Email: captibromer@sudanair.com
Capt. Mohamed Ezzat El Bailaly	Egypt Air Cairo - EGYPT Mobile: (+2)0123101560 Email: Mohamed.elbealy@egyptair.com

NAME	TITLE & ADDRESS
<u>SPEAKERS</u>	
Professor Hussein Abbass	Director Defence & Security Applications Research Centre University of New South Wales Australian Defence Force Academy Campus Canberra, ACT 2600 AUSTRALIA Fax: +61 2 62688933 Tel: +61 2 62688158 Mobile: +61402212977 Email: hussein.abbass@gmail.com
Dr. Sameer Alam	Research Fellow (ATM) University of New South Wales Australian Defence Force Academy Campus AUSTRALIA Tel: +61432297314 Email: S.alam@adfa.edu.au
Mr. Kenny Norberg	Marketing Director, SAAB Ytterbystrands V 113 185 94 Vaxhdm SWEDEN Tel: +46858084000 Mobile: +46702024020 Email: Kenny.norberg@saabgroup.com
Mr. Per-Olov Hornaeus	Systems Engineer COMBITECH AB P.O. Box 6011 SE – 17106 Solna SWEDEN Fax: +46 8 821967 Tel: +4658086018 Mobile: +46705101402 Email: per-olov.hornaeus@combitech.se
Dr. Christopher S. Henry	Director NOSS Collaborative Austin TX 78766 P.O. Box 9147 UNITED STATES Tel: +15127970685 Mobile: +1 512 797 0685 Email: henry@nosscollaborative.org

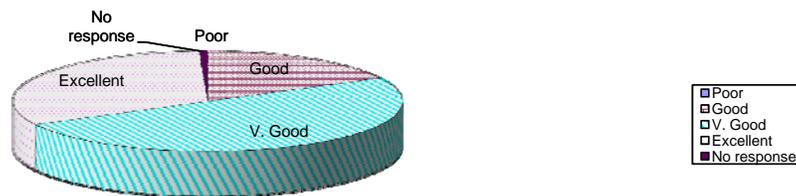
NAME	TITLE & ADDRESS
Mr. Robert L. Miller, Jr.	Vice President, Aerospace Division CSSI, Inc. 1800 New Road Northfield NJ 08225 UNITED STATES Fax: +1 609 910 0632 Tel: +1 609 916 0552 Mobile: +1 202 498 0051 Email: rmiller@cssiinc.com
<u>ICAO SECRETARIAT</u>	
HEADQUARTERS	
Mr. Saulo Da Silva	Technical Officer, Air Traffic Management (ATM) – HQ 999, University Street CANADA Fax: (514) 954 8197 Tel: (514) 954 8219 – Ext. 5872 Mobile: (514) 531 8091 Email: sdasilva@icao.int
MIDDLE EAST OFFICE	
Mr. Mohamed Smaoui	Regional Officer, AIS/MET ICAO Middle East Office Cairo-EGYPT Fax: (20-2) 2267 4843 Tel: (20-2) 22674840/1/4/5 ext. 108 Email: msmaoui@cairo.icao.int icaomid@cairo.icao.int
Mr. Saud Al Adhoobi	Regional Officer, ATM/SAR ICAO Middle East Office Cairo-EGYPT Fax: (20-2) 2267 4843 Tel: (20-2) 22674840/1/4/5 ext. 104 Email: sadhoobi@cairo.icao.int icaomid@cairo.icao.int

MID RVSM SAFETY ASSESSMENT SEMINAR EVALUATION

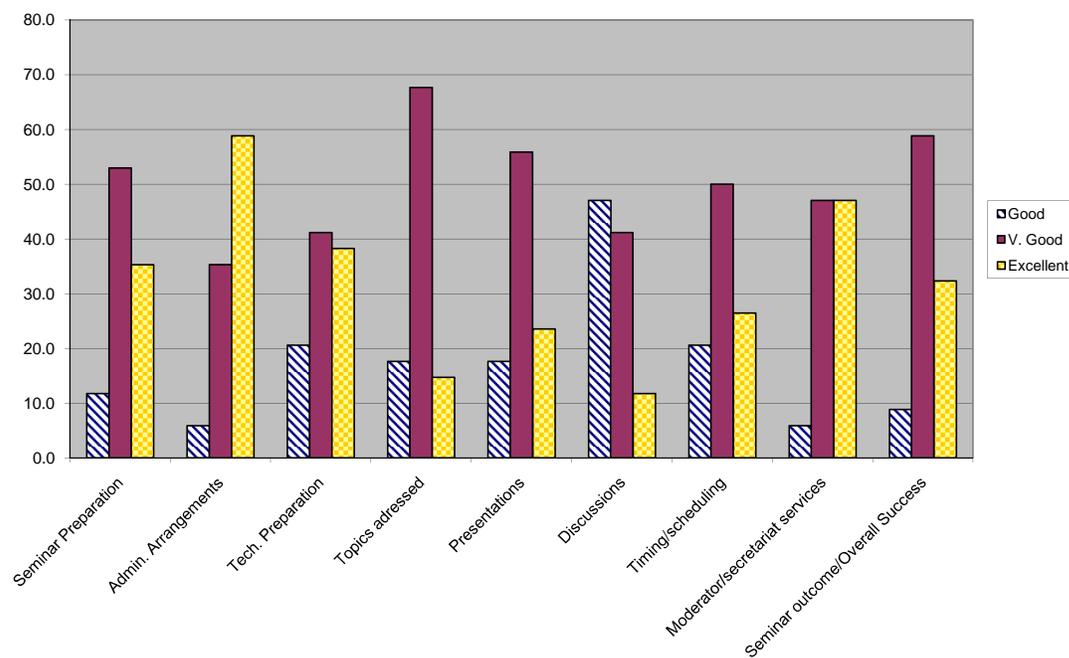
Questions	Poor		Good		V. Good		Excellent		No response		Total
	Nbr	%	Nbr	%	Nbr	%	Nbr	%	Nbr	%	
Seminar Preparation	0	0.0	4	11.8	18	52.9	12	35.3	0	0.0	34
Admin. Arrangements	0	0.0	2	5.9	12	35.3	20	58.8	0	0.0	34
Tech. Preparation	0	0.0	7	20.6	14	41.2	13	38.2	0	0.0	34
Topics addressed	0	0.0	6	17.6	23	67.6	5	14.7	0	0.0	34
Presentations	0	0.0	6	17.6	19	55.9	8	23.5	1	2.9	34
Discussions	0	0.0	16	47.1	14	41.2	4	11.8	0	0.0	34
Timing/scheduling	0	0.0	7	20.6	17	50.0	9	26.5	1	2.9	34
Moderator/secretariat services	0	0.0	2	5.9	16	47.1	16	47.1	0	0.0	34
Seminar outcome/Overall Success	0	0.0	3	8.8	20	58.8	11	32.4	0	0.0	34
AVERAGE (%)		0.0		17.3		50.0		32.0		0.7	

Poor 0 Good 17.3 V. Good 50 Excellent 32 No response 0.7

MID RVSM Safety Assessment Seminar Overall Evaluation



MID RVSM Safety Assessment Seminar Evaluation





MID RVSM Safety Assessment Seminar

(Bahrain, 22-24 February 2010)

Organized by
Middle East Regional Monitoring Agency

In co-operation with
Bahrain – Civil Aviation Affairs

