International Civil Aviation Organization

The Twentieth Meeting of the APANPIRG ATM/AIS/SAR Sub-Group (ATM/AIS/SAR/SG/20)

Singapore, 05 – 09 July 2010

Agenda Item 4: Review and progress the tasks assigned to the ATM/AIS/SAR/SG by APANPIRG

PROPOSED CHANGES TO THE OPERATIONAL LETTER OF AGREEMENT BETWEEN STATES FOR THE MONITORING OF AIRCRAFT NAVIGATION ERRORS IN THE SOUTH CHINA SEA AREA

(Presented by Singapore)

SUMMARY

This paper presents the proposed changes to the Operational Letter of Agreement between States for the monitoring of aircraft navigation errors in the South China Sea Area.

1. INTRODUCTION

1.1 In 2001, an Operational Letter of Agreement (LOA) for the Monitoring of Aircraft Navigation Errors in the South China Sea was signed to define agreed procedures for the monitoring, notification, investigation, analysis and reporting of aircraft navigation errors in respect of aircraft to which the 60nm lateral separation standard and a 10 minute or 80nm RNAV longitudinal separation minima is applied when operating on the designated RNAV routes namely, M771, N892 and L625 and N884.

1.2 At the ATM/AIS/SAR Sub-Group/18 meeting held from 22 to 27 June 2008, a revised Operational LOA for the Monitoring of Aircraft Navigation Errors in the South China Sea Area was signed. The previous LOA specified that it was for the purpose of implementing RNP10 operations in the South China Sea area whereas the revised Operational LOA allowed for the collection of data for the conduct of safety assessment to implement 50/50NM and 30/30NM reduced horizontal separation in the South China Sea area in the near future and also to include RNAV routes L642 and M767 in the collection of data.

2. DISCUSSION

2.1 Based on the Operational LOA signed in June 2008, Civil Aviation Authority of Singapore (CAAS) is the Monitoring Authority and is responsible for collating relevant data concerning flight operations along RNAV routes, L625, L642, M767, M771, N884 and N892, including the Gross Navigational Errors (GNE) reports from Hong Kong China, The Philippines and Singapore, before forwarding the reports to the Chairman, ATM/AIS/SAR Sub-Group through the ICAO Bangkok Office.

2.2 Before the introduction of reduced separation in an area or ATS route, ICAO requires a qualified Monitoring Agency to conduct an airspace safety assessment to ascertain that the Target Level of Safety is met before the implementation of reduced separation. In the case for the reduced horizontal separation, the Monitoring Agency is known as the En-route Monitoring Agency (EMA). The duties and responsibilities of an EMA can be found in the ICAO Asia Pacific Region En-route Monitoring Agency (EMA) Handbook.

2.3 In September 2007, CAAS informed ICAO that the South East Asia Safety Monitoring Agency (SEASMA) will be set up as an En-route Monitoring Agency (EMA) to provide airspace safety assessment and monitoring services to support the introduction and continued safe use of horizontal-plane separation minima in the South China Sea area. SEASMA also took over the responsibility for collating relevant data concerning flight operations along RNAV routes in the South China Sea area. SEASMA was endorsed by the Regional Airspace Safety Monitoring Advisory Group (RASMAG) to perform the role of an En-route Monitoring Agency (EMA) with effect from 1 July 2008. As such, there is a need to amend the current Operational LOA to reflect the change in the monitoring authority from CAAS to SEASMA.

2.4 The Asia Pacific Region EMA Handbook was adopted as the guidance material by the Twentieth Meeting of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/20) held in Bangkok from 7 to 11 September 2009. The proposed Operational LOA has been drafted to be aligned to the EMA Handbook as shown in Attachment A.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the change in the Monitoring Authority for the South China Sea area.

b) adopt the proposed draft Operational LOA for Aircraft Navigation Errors and a suitable date to sign the LOA among the States concerned.

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Attachment A

OPERATIONAL LETTER OF AGREEMENT BETWEEN

General Administration of Civil Aviation of China	**China**
Civil Aviation Department	**Hong Kong, China**
Directorate General of Civil Aviation	**Indonesia**
Department of Civil Aviation	**Malaysia**
Air Transportation Office	**Philippines**
Civil Aviation Authority of Singapore	**Singapore**
Aeronautical Radio of Thailand Ltd	**Thailand**
Civil Aviation Administration	**Viet Nam**

FOR

MONITORING OF AIRCRAFT NAVIGATION ERRORS

IN THE

SOUTH CHINA SEA AREA

Operational Letter of Agreement

Document Management

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Operational Letter of Agreement

Overview

Introduction

The following document is a Letter of Agreement (LOA) between those Air Traffic Service (ATS) authorities shown on page one of this document. The letter of agreement details monitoring procedures between the following ATS units:

Bangkok ACC	Hanoi ACC
Ho Chi Minh ACC	Hong Kong ACC
Jakarta ACC	Kota Kinabalu ACC
Kuala Lumpur ACC	Manila ACC
Sanya ACC	Singapore ACC

Objective

The objective of this LOA is to define agreed procedures for the monitoring, notification, investigation, analysis and reporting of aircraft navigation errors in respect of aircraft to which reduced horizontal separation minima is applied when operating on any RNAV routes in the South China Sea area.

Scope

The procedures contained in this LOA implement the performance monitoring requirements associated with the introduction of the reduced horizontal separation standard, and for the reporting and monitoring of gross lateral and longitudinal navigational errors.

For the purposes of this LOA, the term 'Service Providers' refers to organisations which are responsible for the provision of Air Traffic Control (ATC) services.

The term 'Regulatory Authority' refers to those organisations responsible for the investigation of navigational errors. In some cases, the Regulatory Authority may be the same as the Service Provider.

The term 'En-route Monitoring Agency' (EMA) refers to the organisation endorsed by the ICAO Asia Pacific Regional Airspace Safety Monitoring Advisory Group for providing airspace safety assessment and monitoring services to support the introduction and continued safe use of en-route horizontal-plane separation minima.

The designated EMA for the South China Sea Area is the South East Asia Safety Monitoring Agency (SEASMA).

Overview, continued

Effective Date	This letter of agreement becomes effective on TBN.
Background	The use of these horizontal separation standards is restricted to aircraft which meet the requirements detailed in the respective States' AIP Supplements. This includes a requirement for RNP 10 / RNP 4 Performance Based Navigation (PBN) approval and it is the responsibility of the operator to ensure that such requirements are satisfied when so declared. PBN approval includes operators meeting certain requirements with regard to crew training and in-flight operating procedures. The responsibility for approval for such operations rests with the State of Registry of the Operator. Monitoring navigation errors is a joint responsibility between the aircraft operators, the States of Registry, and the ATC providers. There are established requirements for the operators to monitor navigation performance under the terms of their PBN Approval. This document sets out the responsibilities and procedures to be followed by staff of the signatory organisations to this LOA.
Area of Applicability	The procedures outlined in this LOA shall be applied to all aircraft operating on any RNAV routes in the South China Sea area.

Operational Letter of Agreement

Monitoring Procedures

Lateral Deviations

Monitoring shall be based on radar observations.

When the radar controller observes a lateral deviation of 15NM or more, the controller shall:

- Immediately advise the pilot in command; and
- Provide the 'Duty Supervisor' with the necessary information to enable Part 1 of the Navigation Error Investigation Form (as shown in **Appendix A**) to be completed.

Where an aircraft is off-track as the result of ATC approved diversion (e.g. due weather), no notification under the terms of this Letter of Agreement need to be submitted.

Longitudinal Deviations

Monitoring of longitudinal errors shall be accomplished by reporting occurrences where the observed longitudinal separation, following a check, is either less or more than the expected longitudinal separation as detailed in the table below.

Category of Error	Criterion for Reporting
Aircraft-pair (Time-based separation applied)	Infringement of longitudinal separation standard based on routine position reports
Aircraft-pair (Time-based separation applied)	Expected time between two aircraft varies by 3 minutes or more based on routine position reports
Individual-aircraft (Time-based separation applied)	Pilot estimate varies by 3 minutes or more from that advised in a routine position report
Aircraft-pair (Distance-based separation applied)	Infringement of longitudinal separation standard, based on ADS, radar measurement or special request for RNAV position report
Aircraft-pair (Distance-based separation applied)	Expected distance between an aircraft pair varies by 10NM or more, even if separation standard is not infringed, based on ADS, radar measurement or special request for RNAV position report

- Notification, in accordance with **Appendix A**, shall be submitted in all cases of error

Notification Procedures

Action by ATC Unit	The duty supervisor, when advised of the deviation, shall be responsible for completion and submission of a Navigation Error Investigation Form (as provided in **Appendix A**). A copy of the aircraft's flight plan shall be attached to the Navigation Error Investigation Form, and forwarded to the Chief of ATC. The Chief of ATC shall forward copies of the Navigation Error Investigation Form (Parts 1 to 4) to the aircraft operator and the State of Registry of the aircraft or the State of the Operator, as considered appropriate. In addition, the copy for the aircraft operator shall be sent with a covering letter (as provided in **Appendix B**) requiring the operator to complete the Navigation Error Investigation Form and to provide reasons for the error.

Operational Letter of Agreement

Investigation Procedures

The investigation of errors notifiable under this Letter of Agreement is a joint responsibility of the operator, the Regulatory Authority of the airspace in which the error occurred, and the State of Registry or State of the Operator of the aircraft involved.

The initial investigation shall be undertaken by the aircraft operator, who is responsible for supplying all data and comments needed to complete the form at **Appendix A**. The completed forms are to be returned by the operator to the originating Regulatory Authority. For aircraft registered in States not included in this LOA, these forms are also to be forwarded to the State of Registry of the aircraft or the State of the operator.

Further action by States other than signatories to this LOA is outside the scope of this agreement, and shall be at the discretion of that State.

On receipt of the completed forms from the aircraft operator, the relevant Regulatory Authority will first check that all information required has been supplied and, if necessary, the Regulatory Authority shall request for further information from either the operator, the State of the Operator, or the State of Registry of the aircraft.

If the completed form from the aircraft operator is not received within 14 days of the date of dispatch, the Regulatory Authority will contact the operator and request for the completed form.

Once the completed form has been received, the Regulatory Authority will complete Part 5 of the Navigation Error Investigation Form as detailed in **Appendix A**. The cause of the error is to be classified in accordance with the criteria specified in Part 5.

The decision as to whether any further investigation is warranted will be taken by the Regulatory Authority based on their assessment of the seriousness of the error.

Analysis of Errors & Reporting

At the end of each month, Service Providers shall forward to SEASMA the Summary of Navigation Error Reports (provided in **Appendix C**) including 'NIL' returns together with a copy of all completed Navigation Error Investigation Form Parts 1 to 5 (provided in Appendix A) covering reported errors for that month and

For States with designated monitoring areas as stipulated in the Procedures for the Assessment of Aircraft Navigation Errors, **Appendix D**, shall in addition to the above, also provide data on the number of movements on the routes being monitored as recorded by the relevant Flight Data Processing System, or other auditable means.

SEASMA shall be responsible for the calculation of the frequency of the errors, in accordance with Doc 7030.

SEASMA should prepare an assessment schedule setting out the results of the monitoring for the preceding twelve-month period and forward a copy of this schedule to:

a. The Chairman of the APANPIRG ATM/AIS/SAR Sub-Group, through the ICAO Bangkok Office.

b. The Chairman of RASMAG through the ICAO Bangkok Office.

Permitted Error Rate Exceeded

Where the summary statistics show a long term trend which could result in the Permitted Error Rate being exceeded, ATC Authorities of the States concerned, in conjunction with the ICAO Regional Office, will jointly consider the causes, to determine if the problems can be eliminated, and to take appropriate remedial action.

Revision

This LOA shall remain in force until it is cancelled or superseded.

For any reason, which might make it advisable to change this agreement and its associated attachments, the interested State shall propose the pertinent revision.

Operational Letter of Agreement

Authority

China	Name Designation Department
Hong Kong, China	Name Designation Department
Indonesia	Name Designation Department
Malaysia	Name Designation Department
Philippines	Name Designation Department
Singapore	Name Designation Department
Thailand	Name Designation Department
Viet Nam	Name Designation Department

NAVIGATION ERROR INVESTIGATION FORM

PART 1 - **To be completed by responsible officer in the Service Provider (and aircraft owner/operator if need)**		
ATC Unit Observing Error:		
Date/Time (UTC):		
Duration of Deviation:		
Type of Error: (tick one) ☐ LATERAL ☐ LONGITUDINAL		
Details of Aircraft		
	First Aircraft	**Second Aircraft** (when longitudinal deviation observed)
Aircraft Identification:		
Name of owner/Operator:		
Aircraft Type:		
Departure Point:		
Destination:		
Route Segment:		
Cleared Track:		
Position where error was observed: (BRG/DIST from fixed point or LAT/LONG)		
Extent of deviation – magnitude and direction: (NM for lateral, min/NM for longitudinal)		
Flight Level:		
Approximated Duration of Deviation (minutes)		
For All Errors		
Action taken by ATC:		
Crew Comments when notified of Deviation:		
Other Comments:		

**** (Please Attach ATS Flight Plan)**

NAVIGATION ERROR INVESTIGATION FORM

PART 2 -	**Details of Aircraft, and Navigation and Communications Equipment Fit (To be completed by aircraft owner/operator)**		
LRNS	**Number of Systems** (0, 1, 2 etc.)	**Make**	**Model**
INS			
IRS			
GNSS			
FMS			
Others (please Specify)			
COMS			
HF			
VHF			
SATCOM			
CPDLC			
Which navigation system was coupled to the autopilot at the time of observation of the error?			
Which Navigation Mode was selected at the time of observation of the error?			
Which Communication System was in use at the time of observation of the error?			
Aircraft registration			
Aircraft model/series			
Was the aircraft operating according to PBN requirements?		☐ Yes	☐ No

NAVIGATION ERROR INVESTIGATION FORM

PART 3	**Detailed description of incident** **(To be completed by owner/operator – use separate sheet if required)**
Please give your assessment of the actual track flown by the aircraft, and the cause of the deviation:	
Corrective action proposed:	

PART 4	**To be completed by owner/operator, only in the event of partial or total navigation equipment failure.**		
Navigation System Type	**INS**	**IRS/FMS**	**Others (Please specify)**
Indicate the number of units of each type which failed			
Indicate position at which failure(s) occurred			
Give an estimate of the duration of the equipment failure(s)			
At what time were ATC advised of the failure(s)?			

NAVIGATION ERROR INVESTIGATION FORM

PART 5 **To be completed by investigating agency**		
Have all required data been supplied?	☐ Yes	☐ No
Is further investigation warranted?	☐ Yes	☐ No
Will this incident be the subject of a separate report?	☐ Yes	☐ No
Description of Error:		
Classification: (please tick) ☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I		
CLASSIFICATION OF NAVIGATION ERRORS		
Cause of Deviation		
Operational Errors		
A	Flight crew deviate without ATC Clearance;	
B	Flight crew incorrect operation or interpretation of airborne equipment (e.g. incorrect operation of fully functional FMS, incorrect transcription of ATC clearance or re-clearance, flight plan followed rather than ATC clearance, original clearance followed instead of re-clearance etc.);	
C	Flight crew waypoint insertion error, due to correct entry of incorrect position or incorrect entry of correct position;	
D	ATC system loop error (e.g. ATC issues incorrect clearance, Flight crew misunderstands clearance message etc);	
E	Coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility;	
Deviation due to navigational errors		
F	Navigation errors, including equipment failure of which notification was not received by ATC or notified too late for action;	
Deviation due to Meteorological Condition		
G	Turbulence or other weather related causes (other than approved);	
Others		
H	An aircraft without PBN approval;	
I	Others (Please specify)	

Appendix B

Template for Covering Letter to Aircraft Operator

Dear ***[Aircraft Operator]***

Air Traffic Control service providers are monitoring traffic on RNAV routes in the South China Sea Area**,** as part of the implementation of reduced separation minima on those routes.

These procedures require the reporting and investigation of:

Type of Error	Category of Error	Criterion for Reporting
Lateral deviation	Individual-aircraft error	15NM or greater magnitude
Longitudinal deviation	Aircraft-pair (Time-based separation applied)	Infringement of longitudinal separation standard based on routine position reports
Longitudinal deviation	Aircraft-pair (Time-based separation applied)	Expected time between two aircraft varies by 3 minutes or more based on routine position reports
Longitudinal deviation	Individual-aircraft (Time-based separation applied)	Pilot estimate varies by 3 minutes or more from that advised in a routine position report
Longitudinal deviation	Aircraft-pair (Distance-based separation applied)	Infringement of longitudinal separation standard, based on ADS, radar measurement or special request for RNAV position report
Longitudinal deviation	Aircraft-pair (Distance-based separation applied)	Expected distance between an aircraft pair varies by 10NM or more, even if separation standard is not infringed, based on ADS, radar measurement or special request for RNAV position report

A Navigation Error Investigation Form relating to one of your aircraft is enclosed.

An investigation of this occurrence is required. A detailed explanation should be provided within 10 days, using the attached Navigation Error Investigation Form.

Please supply any details required in Part 1 of the form which have not already been completed, together with the information requested in Parts 2, 3 and 4 (if applicable). In your reply, you are also requested to indicate any corrective action taken to prevent future occurrences.

Yours faithfully,

[Regulatory Authority]

Appendix C

SUMMARY OF NAVIGATION ERROR REPORT

South East Asia Safety Monitoring Agency

Report of Large Lateral Deviation or Large Longitudinal Error

Report to the South East Asia Safety Monitoring Agency (SEASMA) of a large lateral deviation (LLD) or a large longitudinal error (LLE), as defined below:

*Note: Do not include ATC-approved deviation due to weather or other contingency events.

Type of Error	Category of Error	Criterion for Reporting
Lateral deviation	Individual-aircraft error	15NM or greater magnitude
Longitudinal deviation	Aircraft-pair (Time-based separation applied)	Infringement of longitudinal separation standard based on routine position reports
Longitudinal deviation	Aircraft-pair (Time-based separation applied)	Expected time between two aircraft varies by 3 minutes or more based on routine position reports
Longitudinal deviation	Individual-aircraft (Time-based separation applied)	Pilot estimate varies by 3 minutes or more from that advised in a routine position report
Longitudinal deviation	Aircraft-pair (Distance-based separation applied)	Infringement of longitudinal separation standard, based on ADS, radar measurement or special request for RNAV position report
Longitudinal deviation	Aircraft-pair (Distance-based separation applied)	Expected distance between an aircraft pair varies by 10NM or more, even if separation standard is not infringed, based on ADS, radar measurement or special request for RNAV position report

Name of ATC unit:

Please complete Section I or II as appropriate

SECTION I:

There were **no** reports of LLDs or LLEs for the month of ***[MONTH]***

SECTION II:

There was/were ***[number]*** report(s) of LLD for the month of ***[MONTH]***

There was/were ***[number]*** report(s) of LLE for the month of ***[MONTH]***

Details of the LLDs and LLEs are attached.

(Please use a separate form for each report of lateral deviation or longitudinal error).

SECTION III:

When complete, please return to the following email (preferably), fax or mailing address:

Email: Valerie_sim@caas.gov.sg
Fax: +65 6545 6516

South East Asia Safety Monitoring Agency
Air Traffic Services Division
Civil Aviation Authority of Singapore
Singapore Changi Airport Terminal Building 2
Room No 046-043 4th Floor
Singapore 819643
www.seasma.com

Appendix D

Procedures for the Assessment of Aircraft Navigation Errors

1. Introduction

1.1 This document provides guidance on the methodology to be adopted in the assessment of navigation errors associated with the implementation of reduced horizontal separation minima in the South China Sea Area.

2. Data Gathering Responsibility

2.1 The States responsible for the gathering and onward forwarding of data to SEASMA for the designated monitoring areas identified in paragraph 3, shall be

a) Hong Kong China,
b) Indonesia,
c) The Philippines, and
d) Singapore.

2.2 Data gathering requirements are detailed in paragraph 4.

3. Designated Monitoring Areas

3.1 In order to validate the monitoring requirements supporting the reduction in horizontal separation minima, it is necessary to assess the track keeping ability of aircraft operating on the route structure, whilst they have been using on-board RNAV navigation systems only, for a maximum period of time, relative to the route being flown.

3.2 It is also essential that observation of the navigation of the aircraft, using radar, occurs before the on-board navigation systems have been able to "up-date" using ground-based navigation aids, such as DME/DME, or VOR/VOR.

3.3 The appropriate areas at which the required monitoring may be undertaken, based on the extensive ground-based navigation aid coverage in the South China Sea Area are specified as follows;

Route	Segment	FIRs Involved
L625	AKOTA and AVMUP	MANILA
L642	ESPOB and ENREP	SINGAPORE
M635		
M767	TEGID and BOBOB	SINGAPORE
M771	DULOP and DUMOL	HONG KONG
M774		
N884	LULBU and LEGED	MANILA
N892	MELAS and MABLI	SINGAPORE,

3.4 Monitoring of aircraft on these route segments should be undertaken as soon as possible after the aircraft enters radar coverage.

3.5 It should be noted that navigation error reports relating to areas other than those stated above, should also be processed and reported on, in order to support data gathering for future reductions in lateral and longitudinal separation. Details on the processing of these reports are given at paragraph 6.

4. Collection and Forwarding of Data

4.1 Those States identified in Paragraph 2 are required, at the end of each month, to collect the following data:

a) Record navigation errors at the required monitoring areas, by way of the "Navigation Error Investigation Form", as detailed in Appendix A of the Letter of Agreement for the Monitoring of Aircraft Navigation Errors in the South China Sea Area; and

b) Total monthly movement statistics relating to air traffic passing the designated monitoring areas within the designated monitoring height band.

Note: The recording of monthly traffic movement statistics in the monitoring areas should be auditable – in other words, some formal method of recording the movements – eg copies of flight progress strips or data from Flight Data Processing Systems – should be available for audit if required.

4.2 After collection, the required data should be forwarded to the SEASMA, for assessment, to arrive not later than 15 days from the end of the month within which the data was collected. This will allow time for the Navigation Error Investigation Forms relating to occurrences near the end of a month, to be processed and returned as detailed in that form.

4.3 In respect of paragraph 4.1.a), if there had been no error report received, a "Nil Return" should be submitted to the SEASMA using the form in Appendix C.

5. Assessing of Navigation Errors

5.1 The monitoring requirements associated with the introduction of the reduced horizontal separation minima will be in accordance with the requirements for RNP10 / RNP4 PBN, i.e. aircraft navigation performance shall be such that the standard deviation of lateral track errors shall be in accordance with the PBN requirement.

5.2 The requirements will be met, if the number of navigation errors by approved flights, measured in the monitoring area, divided by the total number of approved flights over those monitoring points, is less than the required

parameters, over a period of time for the PBN requirement. (See Attachment B).

5.3 The assessments for each month should be recorded separately, and also cumulatively, on a month-to month basis. If the assessment in any particular month exceeds the required parameter, a check should be made to ensure that the cumulative assessment does not also exceed the required parameter.

5.4 If a trend is identified, which indicates that the required parameter is being exceeded regularly, or the cumulative assessment indicates a upwards trend, the SEASMA should notify, though the ICAO Bangkok Office, the APANPIRG ATM/AIS/SAR Sub-Group and RASMAG, which should then investigate the need for a review of the applicable procedures.

5.5 An example of an assessment schedule is shown at Attachment B.

6. Processing of Navigation Error Reports Relating to Areas Other Than Required Monitoring Areas

6.1 All participating States to this LOA shall notify all appropriate navigation errors to SEASMA. This data should be collated and assessed in the following manner.

6.2 If the navigation error report relates to aircraft tracking on RNAV routes as specified in para 3.3 the error should be assessed and processed in accordance with paragraph 5 above.

6.3 If the report relates to aircraft tracking on other routes, the errors should be assessed, and recorded separately. This information should be assessed by the APANPIRG ATM/AIS/SAR Sub-Group and RASMAG meeting, for appropriate action.

7. Reporting Procedures

7.1 SEASMA should prepare an assessment schedule (refer to Attachment B), and forward a copy of this schedule, at least every 12 months, to:

a) The Chairman of the APANPIRG ATM/AIS/SAR Sub-Group, through the ICAO Bangkok Office., and

b) The Chairman of RASMAG through the ICAO Bangkok Office.

.7.2 In addition, a report should be prepared on those errors reported in accordance with paragraph 6.3 above.

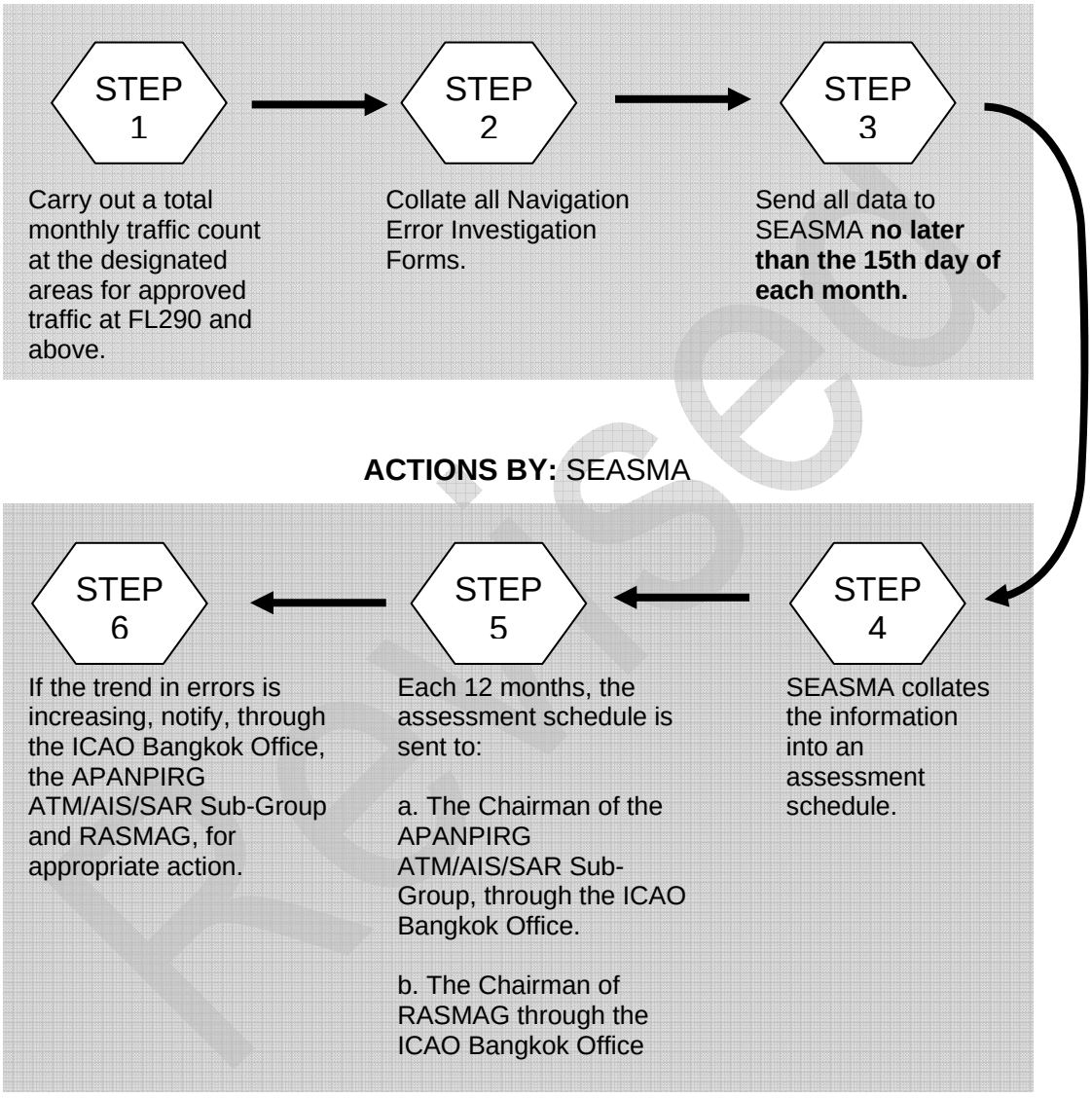
8. Attachments to Appendix D

Attachment A – Assessment Schedule Process
Attachment B – Sample Assessment Schedule

Attachment A

Assessment Schedule Process for Designated Monitoring Areas

ACTIONS BY: HONG KONG, CHINA
INDONESIA
THE PHILIPPINES
SINGAPORE



Attachment B

Example of Navigation Error Assessment Schedule For Designated Monitoring Areas

a. Example of Monthly Total – Single Area

Month/ 2007	Total traffic at DULOP/DUMOL	Errors Category 1	Errors Category 2	Error Rate Category 1	Error Ratio Category 2
April	3105	1	0	3.22×10^{-4}	0
May	3042	2	0	6.57×10^{-4}	0
June	2810	0	0	0	0
July	2995	1	1	3.34×10^{-4}	3.34×10^{-4}

Category 1 => 15NM Category 2 =25 – 35NM

b. Example of Cumulative Monthly Total – Single Area

Month/ 2007	Total traffic at DULOP/DUMOL	Errors Category 1	Errors Category 2	Error Rate Category 1	Error Ratio Category 2
April	3105	1	0	3.22×10^{-4}	0
May	6147	3	0	4.88×10^{-4}	0
June	8957	3	0	3.35×10^{-4}	0
July	11952	4	1	3.34×10^{-4}	8.36×10^{-3}

Category 1 => 15NM Category 2 = 25 – 35NM

c. Example of Monthly Total – All Six Areas

Month/ 2007	Total traffic at Areas	Errors Category 1	Errors Category 2	Error Rate Category 1	Error Ratio Category 2
April	7852	2	0	2.55×10^{-4}	0
May	8311	2	0	2.41×10^{-4}	0
June	8263	1	0	1.21×10^{-4}	0
July	7678	1	1	1.30×10^{-4}	1.30×10^{-4}

Category 1 => 15NM Category 2 = 25 – 35NM

d. Example of Cumulative Monthly Total – All Six Areas

Month/ 2007	Total traffic at Areas	Errors Category 1	Errors Category 2	Error Rate Category 1	Error Ratio Category 2
April	7852	2	0	2.55×10^{-4}	0
May	16163	4	0	2.47×10^{-4}	0
June	24426	5	0	2.05×10^{-4}	0
July	32104	6	1	1.87×10^{-4}	3.11×10^{-3}

Category 1 => 15NM Category 2 =25 – 35NM