INTERNATIONAL CIVIL AVIATION ORGANIZATION

ASIA/PACIFIC REGION ATM CONTINGENCY PLAN

Version 2.0, SEPTEMBER 2017

This Plan was developed by the Asia/Pacific Regional ATM Contingency Plan Taskforce

Approved by ATM/SG/5 and published by the
ICAO Asia and Pacific Office, Bangkok

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SCOPE OF THE PLAN

Plan Structure

1.1 The Asia/Pacific Region ATM Contingency Plan (hereinafter referred to as the Plan) falls within a hierarchy of planning documents (**Figure 1**) defining global vision and strategy, and regional implementation action.

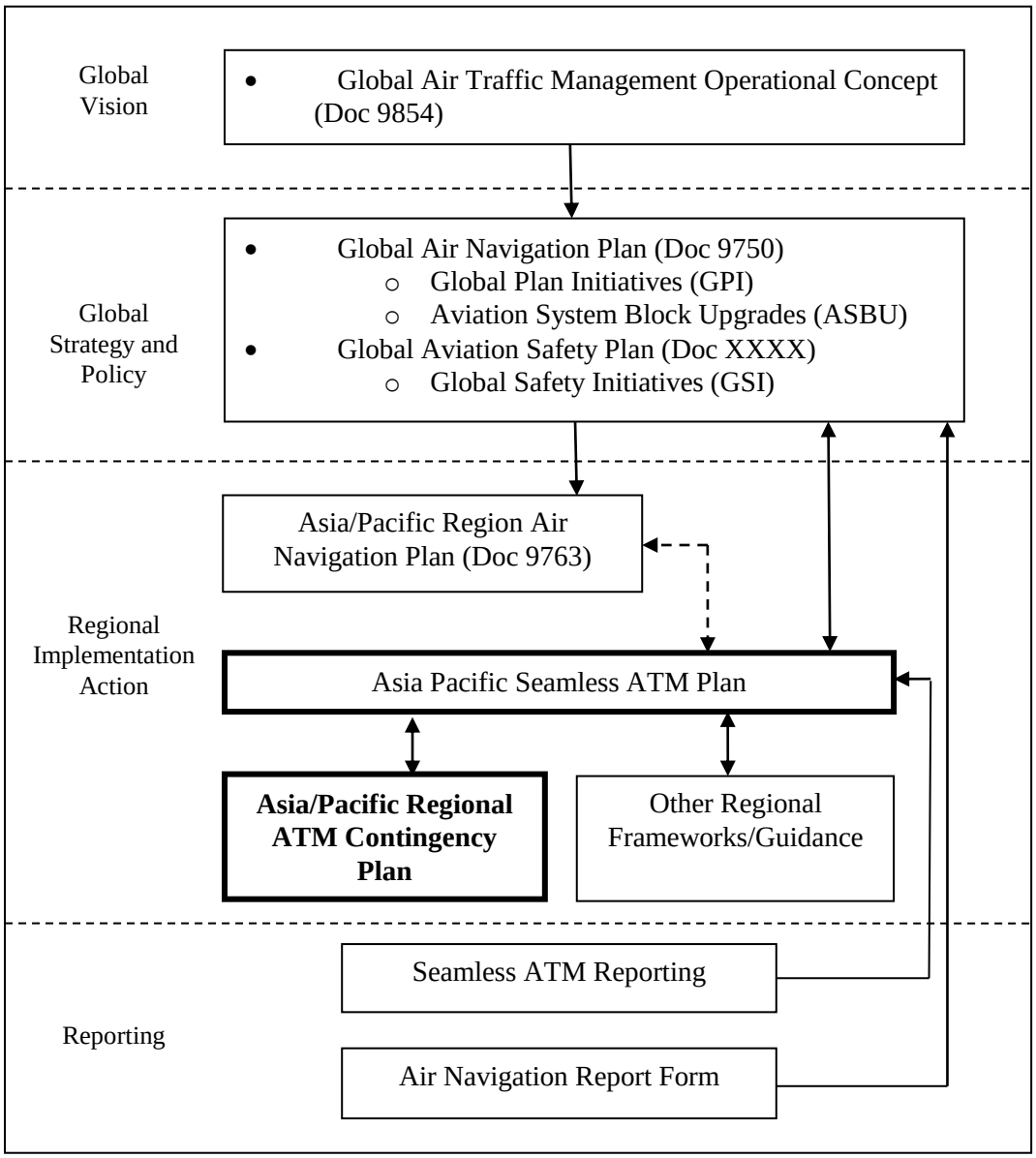

Figure 1: Regional Planning Documents and Linkages.

1.2 The Plan is structured to provide:

- Regional ATFM planning principles;
- Regional contingency planning elements;
- Analysis of the current Regional contingency planning status;
- A performance improvement plan;
- Considerations for research and future development; and
- Milestones, timelines, priorities and actions.

1.3 The plan describes a hierarchy of contingency plans, and categories of contingency events:

a) Hierarchy of contingency plans:

i. **Level 1**, for domestic (internal State) plans having little or no effect on external air navigation service providers;

ii. **Level 2**, for coordinated (inter-State) contingency plans involving two or more States; and

iii. **Level 3,** for sub-Regional or Regional contingency plans, detailing contingency arrangements affecting airspace users or services provided outside the contingency airspace.

b) Categories of contingency plans:

i. **Category A – Airspace Safe, but Restricted or No ATS**, due to causal events such as industrial action, pandemic, earthquake, nuclear emergency affecting the provision of ATS, or ATM system failure or degradation;

ii. **Category B – Airspace Not Safe**, due to causal events such as Volcanic Ash Cloud (VAC), nuclear emergency, military activity; and

iii. **Category C – Airspace Not Available**, due to causal events such as pandemic, national security – normally a political decision.

1.4 Level 1 Contingency Plans and Level 2 Contingency Arrangements are referenced but not included in the Plan. Level 3 (sub-Regional) ATS contingency route structures and flight level allocation schemes (FLAS), where established by coordinating States, are provided in the Appendices to the plan.

1.5 The Plan's appendices provide details of:

- **Appendix A -** ATM Contingency Planning Principles;
- **Appendix B -** Basic Contingency Plan Elements;
- **Appendix C -** Contingency Plan Template;
- **Appendix D -** List of Actions to be taken in the event of Volcanic Ash Cloud;
- **Appendix E** – Example of Volcanic Ash Cloud Contingency Plan;
- **Appendix F** – Sub-Regional ATM Contingency Routes and FLAS;
- **Appendix G** – Regional ATM Contingency Readiness Analysis; and
- **Appendix H** – State Contingency Points-of-Contact.

Plan Review

1.6 The plan requires regular updating to accommodate changes in contingency arrangements and contact details. Updating of the plan appendices is carried out by the ICAO Asia/Pacific Regional Office on receipt of updates from States, and is not dependent on re-versioning or APANPIRG approval. It is intended that APANPIRG and its contributory bodies conduct a complete review of the Plan every three years, or at shorter intervals as determined by APANPIRG.

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OBJECTIVES

Plan Objectives

2.1 The objectives of the Plan are to

i. provide a contingency response framework for Asia/Pacific States to ensure the managed continuation of aircraft operations in affected FIRs, including transiting between unaffected FIRs, during contingency events;

ii. ensure timely, harmonized and appropriate responses to all events resulting in disruption to the provision of Air Traffic Services (ATS), or in which ATS is involved, and hence to normal aircraft movement; and

iii. provide a greater degree of certainty for airspace and aerodrome users during contingency operations.

2.2 In order to meet these objectives the Plan:

i. Provides uniform policy and guidance for responding to reasonably foreseeable operational restrictions, including short, medium and long term actions, prevention of overload of the contingency system and guidance for implementation and resumption

ii. Reviews that status of ATM Contingency Plans and contingency preparedness of Asia/Pacific Region States;

iii. Identifies areas where ATM contingency planning requires improvement to comply with ICAO Standards and Recommended Procedures defined in Annex 11 *Air Traffic Services* and accepted best practices;

iv. analyses contingency procedures in use in other ICAO Regions and harmonizes where practicable with similar work in adjacent airspaces;

v. takes into account the varying levels of contingency response necessary for a range of precipitating events;

vi. provides principles for ATM contingency planning;

vii. details recommended contingency responses to events such as, but not limited to, severe meteorological and geological phenomena, pandemics, national security and industrial relations issues; and

viii. provides contingency planning templates for States.

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ABBREVIATIONS AND ACRONYMS

AAR	Aerodrome Arrival Rate or Airport Acceptance Rate
ABI	Advanced Boundary Information (AIDC)
ACAS	Airborne Collision Avoidance System
ACC	Area Control Centre
ACP	Acceptance (AIDC)
ADOC	Aircraft Direct Operating Cost
ADS-B	Automatic Dependent Surveillance-Broadcast
ADS-C	Automatic Dependent Surveillance-Contract
AIDC	ATS Inter-facility Data Communications
AIGD	ICAO ADS-B Implementation and Guidance Document
AIM	Aeronautical Information Management
AIRAC	Aeronautical Information Regulation and Control
AIRD	ATM Improvement Research and Development
AIS	Aeronautical Information Service
AIXM	Aeronautical Information Exchange Model
AMAN	Arrival Manager
ANSP	Air Navigation Service Provider
AN-Conf	Air Navigation Conference
AOC	Assumption of Control (AIDC)
AOM	Airspace Organization and Management
APAC	Asia/Pacific
APANPIRG	Asia/Pacific Air Navigation Planning and Implementation Regional Group
APCH	Approach
APEC	Asia Pacific Economic Cooperation
APSAPG	Asia/Pacific Seamless ATM Planning Group
APV	Approach with Vertical Guidance
APW	Area Proximity Warning
ASBU	Aviation System Block Upgrade
ASD	Aircraft Situation Display
ASEAN	Association of Southeast Asian Nations
ASMGCS	Advanced Surface Movements Guidance Control Systems
ATC	Air Traffic Control
ATCONF	Worldwide Air Transport Conference
ATFM	Air Traffic Flow Management
ATIS	Automatic Terminal Information Service
ATS	Air Traffic Services
ATSA	Air Traffic Situational Awareness
ATM	Air Traffic Management
CANSO	Civil Air Navigation Services Organization
CARATS	Collaborative Actions for Renovation of Air Traffic Systems
CDM	Collaborative Decision-Making
CCO	Continuous Climb Operations
CDO	Continuous Descent Operations
CFIT	Controlled Flight into Terrain
CLAM	Cleared Level Adherence Monitoring
COM	Communication
CONOPS	Concept of Operations
CNS	Communications, Navigation, Surveillance
CPAR	Conflict Prediction and Resolution

CPDLC	Controller Pilot Data-link Communications
CPWG	Cross-Polar Working Group
CSP	Communication Service Provider
CTA	Control Area
CTR	Control Zone
DARP	Dynamic Airborne Re-route Planning
DGCA	Directors General of Civil Aviation
DMAN	Departure Manager
DME	Distance Measuring Equipment
EST	Coordinate Estimate
FAA	Federal Aviation Administration
FDPS	Flight Data Processing System
FIR	Flight Information Region
FIRB	Flight Information Region Boundary
FL	Flight Level
FLAS	Flight Level Allocation Scheme
FLOS	Flight Level Orientation Scheme
FRMS	Fatigue Risk Management System
FUA	Flexible Use Airspace
GANIS	Global Air Navigation Industry Symposium
GANP	Global Air Navigation Plan
GASP	Global Aviation Safety Plan
GBAS	Ground-based Augmentation System
GDP	Gross Domestic Product
GLS	GNSS Landing System
GNSS	Global Navigation Satellite System
GPI	Global Plan Initiative
HF	High Frequency
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IMC	Instrument Meteorological Conditions
INS	Inertial Navigation Systems
IO	International Organizations
IPACG	Informal Pacific ATC Coordinating Group
ISPACG	Informal South Pacific ATS Coordinating Group
ITP	In-Trail Procedure
KPA	Key Performance Area
LNAV	Lateral Navigation
LVO	Low Visibility Operations
MET	Meteorological
METAR	Meteorological Aerodrome Report
MLAT	Multilateration
MSAW	Minimum Safe Altitude Warning
MTF	Major Traffic Flow
NextGen	Next Generation Air Transportation System
OPMET	Operational Meteorological
OLDI	On-Line Data Interchange
OTS	Organised Track System
PACOTS	Pacific Organized Track System
PARS	Preferred Aerodrome/Airspace and Route Specifications
PASL	Preferred ATM Service Levels
PBN	Performance-based Navigation
PIA	Performance Improvement Areas

PKP	Passenger Kilometres Performed
PVT	Passenger Value of Time
RAIM	Receiver Autonomous Integrity Monitoring
RAM	Route Adherence Monitoring
RANP	Regional Air Navigation Plan
RPK	Revenue Passenger Kilometres
RNAV	Area Navigation
RNP	Required Navigation Performance
RVSM	Reduced Vertical Separation Minimum
SAARC	South Asian Association for Regional Cooperation
SATVOICE	Satellite Voice Communications
SAR	Search and Rescue
SBAS	Space Based Augmentation System
SCS	South China Sea
SESAR	Single European Sky ATM Research
SHEL	Software, Hardware, Environment and Liveware
SID	Standard Instrument Departure
SIGMET	Significant Meteorological Information
SPECI	Special Weather Report
STAR	Standard Terminal Arrival Route or Standard Instrument Arrival (Doc 4444)
STCA	Short Term Conflict Alert
STS	Special Handling Status
SUA	Special Use of Airspace
SUR	Surveillance
SWIM	System-Wide Information Management
TAF	Terminal Area Forecast
TAWS	Terrain Awareness Warning Systems
TBO	Trajectory Based Operations
TCAC	Tropical Cyclone Advisory Centre
TCAS	Traffic Collision Avoidance System
TOC	Transfer of Control
UAS	Unmanned Aircraft Systems
UAT	Universal Access Transceiver
UPR	User Preferred Routes
VHF	Very High Frequency
VNAV	Vertical Navigation
VAAC	Volcanic Ash Advisory Centre
VMC	Visual Meteorological Conditions
VOLMET	Volume Meteorological
VOR	Very High Frequency Omni-directional Radio Range
VSAT	Very Small Aperture Terminal
WAFC	World Area Forecast Centre

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EXECUTIVE SUMMARY

Executive Summary – Asia/Pacific Regional ATM Contingency Readiness

4.1 Amendment 40 to Annex 11 – *Air Traffic Services (ATS)*, applicable from November 2003, included requirements and guidance material for ATS contingency measures:

> **2.30 Contingency Arrangements**
>
> *Air traffic services authorities shall develop and promulgate contingency plans for implementation in the event of disruption, or potential disruption, of air traffic services and related supporting services in the airspace for which they are responsible for the provision of such services. Such contingency plans shall be developed with the assistance of ICAO as necessary, in close coordination with the air traffic services authorities responsible for the provision of services in adjacent portions of airspace and with airspace users concerned.*

4.2 Analysis of the results of a survey of the ICAO Asia/Pacific (APAC) Region's ATM contingency readiness revealed a number of areas where improvement was required. Overall regional readiness was marginal for both Level 1 and Level 2 contingency arrangements, as was the regional status of 4 key areas of contingency planning; Addressing Category A and B Events, Level 1 Plans, Coordination, Testing and Review, and Basic Plan Elements, Noting that only a limited number of Asia/Pacific administrations responded to the survey, it is likely that contingency readiness among non-responding administrations is at best marginal, and probably incomplete.

4.3 All APAC administrations should examine the outcomes of the survey analysis which, together with the requirements and guidance material in Annex 11 and the information and performance objectives provided in this document, provide administrations with guidance for the analysis and improvement of contingency readiness

BACKGROUND INFORMATION

Requirement for Contingency Plans

5.1 Annex 11 to the Convention on Civil Aviation requires that ATS authorities shall develop and promulgate contingency plans for implementation in the event of disruption, or potential disruption, of air traffic services and related supporting services in the airspace for which they are responsible for the provision of such services.

5.2 The 47th Conference of Directors General of the Asia/Pacific Region (Macao, China, October 2010) requested the ICAO Regional Office to consider the establishment of a task force for planning, coordination and implementation of a regional ATM Contingency Plan (Action Item 47/1).

5.3 Subsequently, the 22nd Meeting of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/22, Bangkok, Thailand, June 2011) formed a Regional ATM Contingency Planning Task Force (RACP/TF) for planning, coordination and implementation of a regional ATM contingency plan.

5.4 The RACP/TF Terms of Reference directed the Task Force to review the current status of ATM Contingency Plans and the contingency preparedness of Asia and Pacific Region States, and identify areas where ATM contingency planning requires improvement, and to make recommendations on those areas of improvement.

Contingency Planning Principles

5.5 ATM contingency planning principles form the basis for development of Level 1, Level 2 and Level 3 Contingency Plans in response to Category A, B and C contingency events, inter-State contingency agreements, contingency route structures, flight level allocation schemes and aircraft longitudinal spacing, communications transfer arrangements, and for any delegation of ATC separation, FIS and SAR alerting services:

5.6 Asia/Pacific Region Contingency Planning Principles as agreed by RACP/TF and endorsed by APANPIRG are included as **Appendix A.**

Basic Plan Elements

5.7 The plan includes Basic Plan Elements (BPE) which define the minimum recommended considerations for inclusion in Level 1 and Level 2 Contingency Plans. The BPE include Administration, Plan Management, Airspace, ATM Procedures, Pilot/Operator Procedures, Communications Facilities and Procedures, Aeronautical Support services including AIS and MET, and Contact Details. **Appendix B** lists the agreed BPE.

Contingency Plan Coordination and Operations Functions

5.8 Each State should establish an ATM contingency Central Coordinating Committee (CCC) function for the development, maintenance, activation and conduct of contingency plans, and for the forming and convening of an ATM Operational Contingency Group (AOCG) function.

5.9 The Central Coordinating Committee function should include relevant representation from the Regulatory Authority, Air Navigation Service Provider, Military Authority, Other relevant national authority, airspace user representatives, airport authorities meteorological authority, airport authority and other relevant authorities and agencies.

5.10 The ATM Operational Contingency Group (AOCG) function should be convened by the CCC with a primary responsibility to oversee the day to day operations under the contingency arrangements, and coordinate operational ATS activities, 24 hours a day, throughout the contingency period. The terms of reference of the AOCG will be determined by the CCC. The AOCG function will include any necessary specialist input from the following disciplines:

- Air Traffic Control (ATC)
- Aeronautical Telecommunication (COM)
- Aeronautical Meteorology (MET)
- Aeronautical Information Services (AIS)
- ATS equipment maintenance service provider

The AOCG functions shall include:

i) review and update of the Contingency Plan as required;

ii) keep up to date at all times of the contingency situation;

iii) organize contingency teams in each of the specialized areas;

iv) keep in contact with and update all affected airspace and system users, customers and other relevant stakeholders;

Note: Annex 11 provides guidelines for coordination of contingency matters with ICAO

v) exchange up-to-date information with the adjacent ATS authorities concerned to coordinate contingency activities;

vi) notify the designated organizations of the contingency situation sufficiently in advance and/or as soon as possible thereafter;

vii) take necessary action for issuing NOTAMs in accordance with the contingency plan or as otherwise determined by the particular contingency situation. Where the contingency situation is sufficiently foreseeable the relevant NOTAMs should be issued 48 hours in advance of the contingency events, using templates.

5.11 Terms of reference, and procedures for the activation of the ATM Operational Contingency Group (AOCG) function should be developed.

5.12 A template for Level 1 Contingency Plans and Level 2 Contingency Arrangements is provided in **Appendix C**.

Volcanic Ash Cloud Contingency Planning

5.13 The ICAO *Air Traffic Management Volcanic Ash Contingency Plan Template* provides information on terminology related to volcanic ash contingency responses, and the *pre-eruption*, *start of eruption*, *on-going eruption* and *recovery* phases of volcanic ash cloud events. Information is also provided on air traffic services procedures, and on air traffic flow management procedures.

5.14 The phases of volcanic eruption activity may be summarized as follows:

Pre-Eruption Phase: a volcanic eruption is expected.

Start of Eruption Phase: commences with the outbreak of the volcanic eruption and entrance of volcanic ash into the atmosphere.

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.

Recovery Phase: commences with the issuance of the first VAA containing a statement that no volcanic ash is expected.

5.15 The actions to be taken by relevant Volcanic Observatories, Volcanic Ash Advisory Centres, MWOs, AIS Units and ACCs are described in ICAO Doc 9766 – *Handbook on the International Airways Volcano Watch (IAVW)*. The relevant information from the handbook is provided in **Appendix D**.

5.16 Operators are required by ICAO Annex 6 – *Operation of Aircraft* to implement appropriate mitigation measures for volcanic ash in accordance with their safety management system (SMS), as approved by the State of the Operator/Registry. This document assumes that ICAO requirements regarding safety management systems have been implemented by all States and aircraft operators. Detailed guidance on Safety Risk Assessments (SRAs) for flight operations with regard to volcanic ash contamination can be found in the manual on *Flight Safety and Volcanic Ash – Risk Management of Flight Operations with Known or Forecast Volcanic Ash Contamination* (ICAO Doc 9974)

5.17 States' regulatory provisions and arrangements should be reviewed to ensure that, in accordance with the guidance provided in ICAO Doc 9974:

a) Aircraft operators are required to include in their safety management system (SMS) an identifiable safety risk assessment for operations into airspace forecast to be, or at aerodromes known to be, contaminated with volcanic ash

b) Safety oversight procedures are used for the evaluation of operators' capability to conduct flight operations safely into airspace forecast to be, or aerodromes known to be, contaminated with volcanic ash.

5.18 States' airspace and airport management policies and procedures should be reviewed to ensure that (in accordance with the guidance provided in ICAO Doc 9974 – *Flight Safety and Volcanic Ash* and the provisions of ICAO Doc 4444 – *PANS-ATM*, 15.8.1c and Note 2):

a) Airspace affected by volcanic ash cloud should not be 'closed'.

b) Specification in NOTAM of alternate routing or other air traffic flow management (ATFM)[1] measures to manage airspace constraints arising from volcanic ash cloud should be solely for the purpose of ensuring the predictability and regularity of air traffic, and should be based on an assessment of capacity and demand in airspace affected by volcanic ash and/or or by aircraft avoiding the volcanic ash cloud

c) NOTAM specifying alternate routing or other ATFM measures related to a volcanic eruption or volcanic ash cloud should be issued separately from the ASHTAM/NOTAM issued in accordance with Annex 15, 5.1.1.1, r and u;

d) Aerodromes should only be closed by NOTAM for periods of observed volcanic ash contamination of the surface of the aerodrome movement area;

e) Airport capacity limitations of alternate aerodromes, including apron capacity, should be considered, and recommendations for the use of other alternates considered for inclusion in NOTAM (in c, above);

f) If required by State regulations, any declaration of a Danger Area or Restricted Area should be confined to the pre-eruptive or erupting volcano and the area containing its forecast or observed ejecta[2].

5.19 To ensure effective volcanic ash information, coordination and collaboration, States should:

a) Establish a mechanism to provide regular and timely updates of information during a volcanic eruption and/or ash cloud event to ensure all stakeholders are up to date with current information, situation reports and contingency planning;

b) Participate in volcanic ash exercises; and

c) consider establishing an internal crisis management centre, where applicable, to support the collaborative and timely sharing of information such as volcanic eruptions or other crises that will have a significant impact on airport and/or airspace management

Note: This is supplemental to the provisions of Annexes 3 and 15.

[1] ATFM capability for the Asia/Pacific Region is expected to be implemented under the provisions of the Asia/Pacific Regional Framework for Collaborative ATFM.

[2] Information on the definition of a radius of special use airspace definition around a pre-eruptive or eruptive volcano may be found in the AIP New Zealand at http://www.aip.net.nz/pdf/ENR_5.3.pdf.

5.20 AIS units are required under the provisions of Annex 15 to issue information relating to volcanic ash cloud. Information may be issued in either NOTAM or ASHTAM format. Annex 15 specifies that ASHTAM shall include *Item E — Colour code for level of alert indicating volcanic activity*. Colour-coded levels for volcanic activity are not provided by all volcanic observatories and/or Volcanic Ash Advisory Centres (VAACs) in the Asia/Pacific Region, and only one State issues ASHTAM. NOTAM format should be used to disseminate volcanic ash cloud information.

5.21 NOTAM issued for volcanic eruption or volcanic ash cloud should include all items of information listed in the ASHTAM format except item I (closure of airspace and/or air routes). Colour-coded activity level information may be included in NOTAM if available.

5.22 Each State should ensure that a list of volcanoes relevant to the State is maintained at all International NOTAM Offices, with volcano name, number and nominal position.

5.23 ICAO Doc 9691 *Manual on Volcanic Ash, Radioactive material and Toxic Chemical Clouds* Appendix E – *Cross reference list of volcanoes and navigation aids* provides a list of ICAO registered volcanoes. The information provided includes the following note:

> *Note: Doc 9691 Appendix E requires that another list, the List of Volcanoes of the World for VAAC Use, available at http://www.volcano.si.edu/projects/vaac-data/ and maintained by the Global Volcanism Program of the Smithsonian Institution, should be used in case of any discrepancy between the Smithsonian database and the list published in Doc 9691 Appendix E.*

5.24 The Fourth Meeting of the Asia/Pacific Volcanic Ash Exercises Steering Group (VOLCEX/SG/4), held in Bangkok, Thailand, from 15 to 17 March 2016, recommended that the List of Volcanoes of the World for VAAC Use (Smithsonian Institution) be considered the definitive list of volcanoes for use in the Asia/Pacific Region.

5.25 The List of volcanoes is updated frequently, without notification. States should ensure that relevant NOTAM offices include in their local procedures provisions for frequent checks of the list to ensure any changes are recorded and used in ASHTAM/NOTAM and NOTAM Templates.

5.26 Examples of volcanic ash contingency plans are provided in provided in **Appendix E**.

Contingency ATS Routes and Flight Level Allocation Schemes

5.27 Where ATS contingency routes have been prepared in advance for the management of contingency events, details of the routes and associated flight level allocation schemes (FLAS) should be published in State AIP.

5.28 Except where a segment of an established ATS route forms part or all of the ATS Contingency Route, the AIP definition of the contingency route should include, in a continuous character string without spaces or other characters:

The ATS route designator CR:

The ISO3 Country Code; and

A 3-character numeric identifier of the route.

Example: CRAUS001

5.29 Where new waypoints are required to be established for contingency routes, 5-letter name code (5LNC) waypoint names for ATS contingency routes must be drawn from the ICAO International

Codes and Route Designators (ICARD) application.

5.30 Coordinated Sub-Regional ATS Contingency Routes and FLAS, where available, are provided in **Appendix F**.

Note: ATS contingency routes and FLAS provided in this plan are for general information and guidance only. Airspace users must refer to State AIP and NOTAM for authoritative information on ATS contingency routes and FLAS.

Regional ATM Contingency Plan Implementation Monitoring

5.31 The Regional ATM Contingency Plan is one of several important plans that are subsidiary to the Seamless Air Traffic Management (ATM) Plan, namely:

- Asia/Pacific Search and Rescue (SAR) Plan;
- Asia/Pacific Region ATM Contingency Plan; and
- Asia/Pacific Framework for Collaborative ATFM; and
- Asia/Pacific Collaborative Aeronautical Information Management (AIM) Plan (under development for 2018 delivery).

5.32 States report implementation of the performance expectations of the Seamless ATM Plan using an online reporting form. Monitoring and reporting schemes for subsidiary plans enhance the current Seamless ATM monitoring and reporting scheme.

5.33 The monitoring and reporting scheme for ATM Contingency Plans measures State implementation of the performance expectations specified in Section 7 of this document.

5.34 Asia/Pacific administrations should report their implementation status to the ICAO Asia/Pacific Regional Office at least once annually, by no later than 31 May each year. Reported implementation status will be examined each year by the ATM Sub-Group of APANPIRG, or other appropriate Regional body designated by APANPIRG, to measure, report and advance Regional implementation progress, and to recommend priority ATFM elements to be added to the Seamless ATM monitoring and reporting scheme.

5.35 It is expected that the relevant ATM contingency planning expert/s in each Administration will be responsible for the detailed reporting in the ATM Contingency Plan Monitoring and Reporting form, and that these experts will then liaise closely with their Administration's Seamless ATM reporting point of contact to ensure the accuracy of the higher level reporting and consistency between the separate reporting levels.

5.36 The Regional ATM Contingency Plan Monitoring and Reporting Form is provided at **Appendix I**, and is available on the ICAO Asia/Pacific Regional Office eDocuments web-page at http://www.icao.int/APAC/Pages/edocs.aspx.

CURRENT SITUATION

Analysis – Level 1 and Level 2 Contingency Plans

6.1 Asia/Pacific Region ATM Contingency Readiness was examined by RACP/TF in 2012 and 2013. States were requested to provide information on Level 1 (Internal State) and Level 2 (Inter-State) contingency planning, based on Basic Planning Elements (BPE) agreed by the Task Force.

6.2 The Task Force noted that Level 1 (*domestic* or *internal State*) plans would not be part of the Regional ATM Contingency Plan, but could be referred to in that document. Level 2 (*Inter-State*) Contingency Arrangements, should be harmonized on a sub-regional basis to form Level 3 Contingency Plan/s. Level 1 and 2 plans should address all three categories of contingency response (A, B or C), even if the Category B procedures (VAC, Nuclear emergency, etc.) were simple and of a tactical nature to deal with a changing situation.

6.3 Administrations were requested to provide information on a number of key areas:

- The percentage of ATS units with Level 1 (Internal State) Contingency Plans;
- Coordination, testing, review and amendment of Contingency Plans;
- The addressing of Category A and Category B causal events in Contingency Plans;
- Draft Basic Plan Elements (BPE) incorporated in Contingency Plans; and
- The existence of any formal Level 2 (Inter-State) Contingency Plan agreements, and their inclusions.

6.4 Responses were provided by 16 Administrations. Among the Administrations that did not respond to the questionnaire, 9 had previously reported having contingency plans in place.

6.5 Each responding Administration's overall contingency readiness was categorized as Robust, Marginal or Incomplete for both Level 1 and Level 2 plans, according to the following scale:

- Robust (80 - 100% implementation)
- Marginal (40 – 79%)
- Incomplete (0 – 39%).

Level 1 (Domestic or Internal State) Plans

6.6 Of the 16 responding Administrations there were:

- 7 with Robust Level 1 plans (~44%);
- 8 Marginal (50%); and
- 1 Incomplete (~6%).

6.7 Further detail of the analyzed results is provided in **Appendix G.** It should be noted that the percentage of non-respondent States with Robust or Marginal Level 1 and 2 contingency plans is expected to be considerably lower than respondent States.

6.8 The overall Regional status of each of the 4 key areas relating to Level 1 contingency plans was also analyzed and the results expressed as a percentage of full implementation, as were the results for individual elements within each key area.

6.9 Overall Regional status of all 4 of the key areas examined was found to be Marginal. Of the 20 elements within the 4 key areas, 1 was Incomplete, 14 were Marginal and 5 were Robust.

6.10 **Table 1** provides a summary of the reported overall Regional Level 1 contingency plan readiness.

Level 1 Plans - Summary Regional Contingency Readiness (%)			**AVG**
Addressing Category A and B Events	Nuclear Emergency	20	55%
	Pandemic	47	
	Staff Availability	53	
	Volcanic Ash Cloud	53	
	Inundation	53	
	National Security	53	
	Earthquake	67	
	ATM/CNS System Failure or Degradation	93	
Level 1 Plans	Percentage of ATSU with Level 1 Plan	63	63%
Coordination, Testing and Review	Internal Coordination of Plans	67	74%
	Regular Testing	67	
	Routine and Event Driven Review	87	
Basic Plan Elements (No. of sub-elements)	Airspace (1)	47	75%
	Communications Facilities and Procedures (4)	65	
	Pilot/Aircraft Operator Procedures (5)	72	
	Aeronautical Support Services (2)	77	
	ATM Procedures (7)	78	
	Contact Details (2)	80	
	Plan Management (2)	87	
	Administration (2)	90	

Table 1 – Level 1 Plans - Summary of Reported Regional Readiness

Level 2 (Inter-State) Plans

6.11 Analysis of the 16 questionnaire responses indicated that:

- 5 Administrations had Robust Level 1 plans (~31%);
- 5 were Marginal (~31%); and
- 6 were Incomplete (~38%).

6.12 5 Administrations had Robust Level 2 plans, 5 Marginal and 6 Incomplete.

6.13 **Table 2** summarizes the Regional Level 2 contingency readiness determined by State responses to the questionnaire, also expressed as a percentage of full implementation and presented in a potential order of priority for consideration by the Task Force.

Level 2 Plans – Summary of Overall Regional Readiness (%)	
Delegation of ATC Separation	33
Formal Inter-State Agreements (LoA or MoU)	47
Contingency Route Structure	47
Flight Level Allocation Scheme	47
Minimum Longitudinal Spacing	47
Frequency Transfer Arrangements	60
Delegation of FIS and SAR Alerting Services	60

Table 2 – Level 2 Plans – Summary of Regional Readiness[3].

[3] Delegation of ATC Separation, FIS and SAR responsibility in Level 2 plans is dependent upon both the legal and functional capacity for States to either delegate or accept delegation of separation or other ATS responsibility.

PERFORMANCE IMPROVEMENT PLAN

ATM Contingency Operations Capability

Note: prior to implementation, ATM Contingency plans should be verified by an appropriate safety assessment conducted under the State's Safety Management System.

- **Expected implementation by 10 November 2016**

Level 1 (Domestic or Internal State) Plans

7.1 Each State should establish an ATM contingency Central Coordinating Committee (CCC) function for the development, maintenance, activation and conduct of contingency plans, and for the forming and convening of an ATM Operational Contingency Group (AOCG) function.

7.1 Terms of reference and procedures for the activation of the ATM Operational Contingency Group (AOCG) function should be developed.

7.2 Level 1 contingency plans for Category A, B and C contingency events, conforming with the Principles and including the Basic Plan Elements of the Regional ATM Contingency Plan, should be developed and implemented for all ATS units.

A template for Level 1 and Level 2 contingency arrangements is provided at ***Appendix C.***

7.3 Human performance-based training and procedures for response to ATM contingency operations for all staff providing related ATS, including ATC, Flight Information, Aeronautical Information, Aeronautical Telecommunication and ATS equipment maintenance staff should be developed and implemented.

7.4 Programs of regular desktop and inter-unit coordinated exercises of all Level 1 contingency plans should be implemented.

7.5 Processes should be implemented to ensure the outcomes of any testing, pre-activation or activation of a contingency plan or any contingency exercise are reviewed and analysed, and lessons learned incorporated in contingency procedures and training.

7.6 Details of contingency ATS routes and associated flight level allocation schemes should be published in State AIP (Section ENR 3.5).

7.7 Relevant sections of contingency plans that may have an effect on international flights should be made available on the public internet website of the ANSP, and the hyperlink provided to ICAO Asia/Pacific Regional Office for inclusion in the Regional ATM Contingency Plan.

Note: A single combined document comprising information from all relevant Level 1 contingency plans may be suitable for this purpose.

Level 2 Contingency Arrangements

7.8 Level 2 contingency arrangements should be formalized for all cases where the pre-activation or activation of a Level 1 contingency plan would impact upon ATS within the area of responsibility of a neighbouring State.

7.9 Level 2 contingency arrangements should include procedures for the tactical definition and promulgation by NOTAM of contingency ATS routes to avoid airspace affected by Category B contingency conditions.

7.10 Details of contingency ATS routes and flight level allocation scheme details should be published in State AIP.

Level 3 Sub-Regional Contingency Plans

7.11 Where practicable, each State should harmonize its Contingency ATS Route and FLAS structures with those of all neighbouring States.

Volcanic Ash Contingency Planning

7.12 States' regulatory provisions and arrangements should be reviewed to ensure that, in accordance with the guidance provided in ICAO Doc 9974 – *Flight Safety and Volcanic Ash* :

a) Aircraft operators are required to include in their safety management system (SMS) an identifiable safety risk assessment for operations into airspace forecast to be, or at aerodromes known to be, contaminated with volcanic ash

b) Safety oversight procedures are used for the evaluation of operators' capability to conduct flight operations safely into airspace forecast to be, or aerodromes known to be, contaminated with volcanic ash.

7.13 States' airspace and airport management policies and procedures should be reviewed to ensure that, in accordance with the guidance provided in ICAO Doc 9974 – Flight Safety and Volcanic Ash and the provisions of ICAO Doc 4444 – PANS-ATM, 15.8.1c and Note 2:

a) Airspace affected by volcanic ash cloud should not be 'closed'

b) Specification in NOTAM of alternate routing or other air traffic flow management (ATFM)[4] measures to manage airspace constraints arising from volcanic ash cloud should be solely for the purpose of ensuring the predictability and regularity of air traffic, and should be based on an assessment of capacity and demand in airspace affected by volcanic ash and/or or by aircraft avoiding the volcanic ash cloud

c) NOTAM specifying alternate routing or other ATFM measures related to a volcanic eruption or volcanic ash cloud should be issued separately from the ASHTAM/NOTAM issued in accordance with Annex 15, 5.1.1.1, r and u

d) Aerodromes should only be closed by NOTAM for periods of observed volcanic ash contamination of the surface of the aerodrome movement area

[4] ATFM capability for the Asia/Pacific Region is expected to be implemented under the provisions of the Asia/Pacific Regional Framework for Collaborative ATFM.

e) Airport capacity limitations of alternate aerodromes, including apron capacity, should be considered, and recommendations for the use of other alternates considered for inclusion in NOTAM (in c, above)

f) If required by State regulations, any declaration of a Danger Area or Restricted Area should be confined to the pre-eruptive or erupting volcano and the area containing its forecast or observed ejecta.

7.14 Each State should ensure that a list of ICAO registered volcanoes relevant to the State, drawn the *List of Volcanoes of the World for VAAC Use*, available at http://www.volcano.si.edu/projects/vaac-data/, is maintained at all International NOTAM Offices, with volcano name, number and nominal position.

7.15 Each International NOTAM Office should implement procedures requiring frequent checks of the *List of Volcanoes for World VAAC Use* to ensure any amended information is included in ASHTAM/NOTAM and templates.

Note: Doc 9691 Appendix E requires that another list, the List of Volcanoes of the World for VAAC Use, available at http://www.volcano.si.edu/projects/vaac-data/ and maintained by the Global Volcanism Program of the Smithsonian Institution, should be used in case of any discrepancy between the Smithsonian database and the list published in Doc 9691 Appendix E.

7.16 A series of templates should be made available for different stages of volcanic activity to assist Meteorological Watch Office (MWO) and Aeronautical Information Service (AIS) staff in expediting the process of originating and issuing relevant MET and AIS messages.

7.17 Multi-lateral Volcanic Ash Cloud Exercises should be conducted by each State at least annually. Internal desktop contingency plan exercises should include volcanic ash cloud scenarios.

7.18 States should establish a mechanism to provide regular and timely updates of information during a volcanic eruption and/or ash cloud event to ensure all stakeholders are up to date with current information, situation reports and contingency planning;

7.19 States should establish an internal crisis management centre to support the collaborative and timely sharing of information such as volcanic eruptions, or other crises that will have a significant impact on airport and/or airspace management.

Note 1: This information sharing process is supplemental to the mandatory provisions of Annex 3 and Annex 15 relating to the dissemination of volcanic eruption and ash cloud information.

Note 2: Information relating to volcanic eruption and ash cloud should be collaboratively shared through the State's CDM/ATFM processes, where established.

Promulgation and Status Reporting of State ATM Contingency Plans

7.20 National ATM Contingency Plans should be promulgated on the website of the Air Navigation Service Provider.

7.21 States should report the status of their contingency planning to the ICAO APAC Regional Office, as follows:

1. Promulgation of the national ATM Contingency Plan, together with the hyperlink to the website location of the Plan;

2. State Contingency Points-of-Contact

3. The establishment of contingency arrangements with each neighbouring State.

Note 1: Information of a sensitive nature such as that related to matters of national security need not be included in promulgated contingency plans.

Note 2: the Regional List of State Contingency Points-of-Contact is provided at ***Appendix H***.

Note 3: APANPIRG Air Navigation Deficiencies may be raised against the provisions of Annex 11 paragraph 2.30 for States that do not report promulgation of their national ATS contingency plan.

7.22 States should report the status of implementation of the performance expectations of the Regional ATM Contingency Plan at least once annually, by not later than 31 May each year, using the Regional ATM Contingency Plan Monitoring and Reporting Form.

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RESEARCH AND FUTURE DEVELOPMENT

8.1 Strategic capability to publish and activate collaborative trajectory options should be implemented through the multi-lateral cooperative design and publication in AIP of contingency routes for the avoidance of airspace affected by Category A or closed by Category C contingency events, using RNP 2 specifications (Seamless ATM Plan Category S airspace) or RNP 4 (Seamless ATM Plan Category R Airspace), or more efficient specifications that may become available.

Note: the decision to either transit or avoid airspace affected by Category A contingency events is a matter for the airspace user.

8.2 Capability for networked tactical ATFM measures should be implemented to manage access to Category A contingency airspace and regulate flows of traffic avoiding Category B or C contingency events.

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LIST OF APPENDICES

APPENDIX A: ATM CONTINGENCY PLANNING PRINCIPLES

1. All ATS units, including ATC Sectors, Units, Centres and supporting Flight Information and Briefing Offices should have a Level 1 Contingency Plan to ensure the safe transit of international traffic in the event of disruption or withdrawal of ATS, or unsafe airspace conditions such as volcanic ash cloud, nuclear emergency or national security responses.

2. The overriding principle is that safety has primacy over efficiency and optimal levels and routes;

3. Contingency Operations will necessitate lower than normal airspace capacity to ensure safety.

4. System and ATC service redundancy is the most effective contingency capability.

5. All Contingency Plans should define the following where applicable:

   - A Contingency Route Structure supported by a Flight Level Allocation Scheme (FLAS) and minimum navigation and height-keeping (e.g. RVSM or non-RVSM) capability for access;

     Note: Contingency Route Structures and/or FLAS need not be defined where the Contingency Plan states that all routes and/or levels remain available during contingency operations.

   - Provisions for tactical definition and coordination of additional routes/FLAS and priority for access to accommodate selected non-scheduled operations such as humanitarian, medical evacuation and flood and fire relief (FFR) flights;

   - Priority determination for routine scheduled and non-scheduled flights;

   - Flights excluded from operations in contingency airspace, and minimum navigation and height keeping (RVSM) capability required for access to the contingency airspace;

   - Specified minimum longitudinal spacing between consecutive aircraft entering the contingency airspace on non-separated ATS contingency routes;

   - Contingency communication arrangements including means of communication within contingency airspace and communications transfer arrangements for aircraft entering and leaving the airspace;

   - Details of delegation of air traffic services arrangements (if any);

   - Contingency points of contact

6. Level 2 Contingency Arrangements (arrangements between neighbouring administrations) should be included in bi-lateral or multi-lateral agreements between States in all cases where activation of any Level 1 Contingency Plan will impact upon a neighbouring State's ATSU.

7. Level 1 Contingency Plans should include, either in detail or by reference, any relevant Level 2 Contingency Arrangements.

8. Close cooperation between neighbouring administrations, together with supporting mechanisms for the tactical definition and promulgation of contingency routes for the avoidance of Category B and C contingency airspace.

9. Collaborative Air Traffic Flow Management Measures should be the first priority response to Category A contingency events, and for the management of deviating traffic during Category B and C events.

10. Contingency routes must be vertically separated whenever lateral route separation is less than the minimum specified by the State for contingency operations.

11. Contingency Flight Level allocation scheme planning should include consideration of allocating the optimum flight levels to routes used by long haul aircraft, depending on the traffic density on the route, wherever practicable.

12. Contingency ATS routes should provide minimum lateral separation of 100 NM between aircraft that are not vertically separated under a FLAS, except where the minimum aircraft navigational capability specified in the contingency plan permits reduced lateral separation specified in ICAO Doc 7030 *Regional Supplementary Procedures* Section 6.2 or ICAO Doc. 4444 *PANS-ATM*.

    States should specify any necessary buffers to minimum lateral separation requirements where meteorological phenomena may require aircraft to deviate from the ATS route to maintain flight safety. Information on the buffers should be provided in operational information provided on pre-activation or activation of the contingency plan.

13. Minimum longitudinal spacing between aircraft operating on the same contingency route and not vertically separated should be 15 minutes or 120 NM. However, this may be reduced to 10 minutes or 80 NM in conjunction with application of the Mach number technique where authorized by the relevant authority and agreed in the appropriate LOA or other Contingency Arrangement.

14. Contingency ATS routes and FLAS, and contingency procedures, should be agreed between geographically grouped neighbouring States to form sub-regional contingency plans.

15. Contingency ATS routes should be published in State AIP to permit the storing of route details in airspace users' navigation databases.

16. Airspace classifications for ICAO Classes A, B and C airspace should remain unchanged during contingency operations to facilitate managed access to the airspace in accordance with the contingency plan. Classes D and E airspace may be reclassified as Class C or higher where necessary to preclude VFR operations.

17. Define ground and airborne navigation requirements if necessary

18. Alternate aerodromes should be specified where necessary in Level 1 contingency plans for airport control towers and terminal airspace.

19. Aircraft operators are required by ICAO Annex 6 – *Operation of Aircraft* to implement appropriate mitigation measures for volcanic ash in accordance with their safety management system (SMS), as approved by the State of the Operator/Registry.

20. Airspace affected by volcanic ash cloud should not be closed to international civil aviation.

21. Amended ATS routes, whether published or promulgated ad-hoc, may be prescribed as part of the air traffic flow management (ATFM) response to expected demand and capacity imbalance caused by aircraft avoiding volcanic ash cloud.

22. Aerodromes should only be closed by NOTAM for periods of observed volcanic ash contamination of the surface of the aerodrome movement area;

23. Closure of airports affected by volcanic ash deposition should be supported by a safety assessment conducted in collaboration between airport operator, aircraft operators and the air navigation service provider, in accordance with their respective safety management systems.

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APPENDIX B: BASIC PLAN ELEMENTS

Element 1: Administration

a) Record of signatories, version control and records of amendment.

b) Definition of the objectives, applicable airspace and operations, and exclusions.

Element 2: Plan Management

c) List of States and FIRs affected, and the agreed methods of notification in the event of pre-activation, activation and termination of the plan.

Contingency events may arise with insufficient advance notice to permit pre-activation of contingency plans

d) Details of the arrangements in place for management of the plan, including:

i. provisions for a Central Coordinating Committee to authorize and oversee the activation of the plan and arrange for ATS restoration in the event of an extended outage;

ii. ATM Operational Contingency Group for 24 hour coordination of operational and supporting activities under the plan, and

iii. the terms-of-reference, structure and contact details for each.

e) Details of testing, review and reporting actions:

i. Schedule of desktop and simulator testing;

ii. Post-activation review (PAR) requirements:

- Completion of a preliminary PAR report within 28 days of any activation or testing of contingency plans, including any recommendations to address deficiencies and implement improvements in contingency plans, arrangements, procedures and training.

- A more comprehensive PAR report should be prepared for major contingency events, or any contingency event involving an air safety incident investigation.

  A full PAR analysis of major events could take many months to complete.

- Input to the PAR from all parties affected by or involved in the response to the contingency is actively sought and considered;

- Bi-lateral or multi-lateral PAR for activation or testing of Level 2 contingency arrangements;

iii. Timely reporting to ICAO and other affected States of anticipated or experienced disruptions requiring activation of contingency plans.

Note: Annex 11 states that: States anticipating or experiencing disruption of ATS and/or related supporting services should advise, as early as practicable, the ICAO Regional Office and other States whose services might be affected. Such advice should include information on associated contingency measures or a request for assistance in formulating contingency plans.

f) Inclusion of contingency plans/procedures in ATS training and refresher training programs.

Element 3: Airspace

g) Procedures and determinants for implementation and activation of Special Use Airspace including, where necessary, Restricted or Prohibited Areas in territorial airspace, or Danger Areas over the high seas.

h) Criteria for airspace classification changes and associated separation and CNS requirements

i) Collaborative Trajectory Options for Category A, B and C events, and for Large Scale Weather Deviations (LSWD)

Element 4: ATM Procedures

j) Details of re-routing to avoid the whole or part of the airspace concerned, normally involving establishment of:

i. Strategic and Tactical Collaborative Trajectory Options providing additional routes or route segments with associated conditions for their use; and/or

ii. a simplified route network through the airspace concerned, together with a Flight Level Allocation Scheme, to ensure that a standard minimum vertical separation is applied where less than a specified minimum lateral separation exists between routes.

k) Details of how domestic traffic, departing and arriving flights and SAR, humanitarian and State aircraft flights will be managed during the contingency period.

l) Procedures for transition from normal services levels to contingency services, and resumption of normal service.

m) Procedures for joining or departing a contingency route.

n) Details of reduced levels of service, if any, within the affected airspace.

o) Establishment of arrangements for controlled access to the contingency area to prevent overloading of the contingency system, utilizing allocated airspace entry times or, where ATFM capability exists, tactical ATFM measures.

p) Procedures for adjacent service providers to establish longitudinal spacing at the entry point, and to maintain such separation through the airspace;

q) Reassignment of responsibility for providing air traffic services, to the extent possible, in non-sovereign airspace and to international aircraft transiting sovereign airspace; and/or

r) Coordination and communications transfer procedures for aircraft entering and leaving the affected airspace.

Element 5: Pilot/Operator Procedures

s) Requirements for flight plan submission during the contingency period, including contingency route planning requirements, and arrangements if airspace is restricted or not available and no contingency route is available;

t) Emergency procedures, including In-flight requirements for broadcast of position and other information, and for continuous listening watch, on specified pilot-pilot and GUARD VHF frequencies;

u) Requirements for display of navigation and anti-collision lights;

v) Requirements for climbing and descending well to the right of the centreline of specifically identified routes;

w) Requirements for all operations to be conducted in accordance with IFR, including operating at IFR flight levels from the relevant Table of Cruising Levels in Appendix 3 of Annex 2, except where modified by a Flight Level Allocation Scheme.

Element 6: Communications Facilities and Procedures

x) Provision and operation of adequate air-ground communications, AFTN and ATS direct speech links;

y) Specification of radio frequencies to be used for particular contingency routes.

z) Log-on and connection management for CPDLC aircraft, where appropriate;

aa) Use of ADS-C automatic position reporting in lieu of voice position reporting to ATS.

Element 7: Aeronautical Support Services including AIS and MET

bb) AIP Information regarding the Contingency Planning, and notification by NOTAM of anticipated or actual disruption of air traffic services and/or supporting services, including associated contingency arrangements, as early as practicable and, in the case of foreseeable disruption, not less than 48 hours in advance

cc) Reassignment to adjacent States of the responsibility for providing meteorological information and information on status of navigation aids.

Element 8: Contact Details

dd) Contact details for the RCC responsible for the affected FIR, and coordination arrangements.

ee) Contact details of adjacent States ANSPs and other international organisations participating in the contingency plan.

ff) Prior notification requirements for adjacent FIR activation of Level 2 contingency arrangements.

Note: The first priority response to any short notice contingency response should be the immediate handling of the air situation, followed by the activation of the contingency plan.

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APPENDIX C: CONTINGENCY PLAN TEMPLATE

Air Traffic Management Contingency Plan

[ATS UNIT NAME]

Version X.X

Effective: [DD Month YYYY]

TABLE OF CONTENTS

SIGNATORIES

FOREWORD

(EXAMPLE)

1.1 This Contingency Plan forms part of the overall national contingency planning for [STATE], in accordance with the provisions of Annex 11 to the Convention on Civil Aviation, ICAO Doc 9462 *ATS Planning Manual* and Doc 9673 *Asia and Pacific Regions Air Navigation Plan*, and the *Asia/Pacific Region ATM Contingency Plan*. The Plan, and any activation of the Plan, is authorized by [AUTHORITY].

1.2 The Plan provides for the safe continuation of international air traffic through the [XXXX] FIR during periods when ATS may be disrupted or unavailable, or when airspace may be affected by volcanic ash cloud, radioactive cloud, severe weather events or military activity.

1.3 The Plan has been developed in close cooperation and collaboration with airspace users, military authorities and civil aviation authorities responsible for adjacent FIRs.

1.4 The Plan will be activated by NOTAM as far in advance as is practicable. In the event that such prior notification is impracticable the Plan will be activated by the designated authority using the most expeditious alternative means available.

1.5 The Plan serves as the formal agreement between the States listed in paragraph 2.1, when authorized by their signatory ***OR*** The Plan is supported by [OPERATIONAL LOA or SECTIONS XX XX XX OF THE OPERATIONAL COORDINATION LOA BETWEEN XXXX AND XXXX].

1.6 [THE FOLLOWING SECTIONS/APPENDICES OF THIS PLAN ARE INCLUDED IN THE OPERATIONAL LOA or OPERATIONAL COORDINATION LOA or MOU BETWEEN XXXX AND XXXXXX]

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RECORD OF AMENDMENTS

Amendment Number	Effective Date	Date Entered	Entered By	Paragraph/ Reference

ATM CONTINGENCY PLAN FOR [ATS UNIT]

OBJECTIVE

1.1 The Air Traffic Management (ATM) Contingency Plan for the [FIR/ATS Centre/ATS UNIT] details arrangements to ensure the continued safety of air navigation in the event of partial or total disruption of air traffic services in the [AIRSPACE/SERVICE DESCRIPTION] in accordance with ICAO Annex 11 ─ *Air Traffic Services*. The Contingency Plan provides the ATS procedures and contingency route structure using published ATS routes, where practicable, that will allow aircraft operators to transit the [AIRSPACE DESCRIPTION] during periods of limited or no ATS.

[DESCRIBE HERE THE SCOPE OF THE PLAN, E.G. IF THE PLAN RELATES ONLY TO THE TRANSIT OF INTERNATIONAL AIR TRAFFIC]

[ATS UNITS, CENTRES, STATES AND FIRS AFFECTED]

2.1 In the event that the [AUTHORITY] activates this Contingency Plan, the civil aviation authorities of the [XXXX ADJACENT ATS UNITS, CENTRES, STATES OR FIRS AFFECTED] will be notified in accordance with the [LETTER OF AGREEMENT, MEMORANDUM OF UNDERSTANDNG OR OTHER CONTINGENCY ARRANGEMENT]. The adjacent [ATS UNITS, CENTRES STATES OR FIRS] directly affected by this Contingency Plan are as follows:

a) [STATE]

[FIR/ACC/ATS UNIT]

[FIR/ACC/ATS UNIT]

b) [STATE]

[FIR/ACC/ATS UNIT]

[FIR/ACC/ATS UNIT

c) [STATE]

[FIR/ACC/ATS UNIT]

[FIR/ACC/ATS UNIT

d) [STATE]

[FIR/ACC/ATS UNIT]

[FIR/ACC/ATS UNIT

e) [STATE]

[FIR/ACC/ATS UNIT]

[FIR/ACC/ATS UNIT]

2.2 The contact details of the civil aviation authorities, organizations and ATS units are contained in **Appendix X.** These details should be regularly reviewed, and relevant information provided to the [AUTHORITY] as soon as practicable**.**

MANAGEMENT OF THE CONTINGENCY PLAN

3.1 The contingency measures set out in this Plan are applicable in cases of foreseeable events caused by unexpected interruptions in ATS caused by natural occurrences or other circumstances, which, in one way or another, may impair or totally disrupt the provision of ATS and/or of the related support services in the [AIRSPACE].

3.2 The following arrangements have been put in place to ensure that the management of the Contingency Plan provides for [INTERNATIONAL IF SO LIMITED] flights to proceed in a safe and orderly fashion through the [AIRSPACE].

Central Coordinating Committee

3.3 The Central Coordinating Committee (CCC) function shall oversee the conduct of the Contingency Plan and in the event that the [SERVICE] is disrupted for an extended period, make arrangements for and facilitate the temporary relocation of the [SERVICE] to the [ALTERNATE FACILITY OR ATS UNIT/CENTRE] and the restoration of [SERVICE]. The terms of reference for the CCC will be determined by the [AUTHORITY].

3.4 The Central Coordinating Committee is includes representation from the following:

1)[REGULATORY AUTHORITY OR ORGANIZATION]

2)[AIR NAVIGATION SERVICE PROVIDER]

3)[MILITARY AUTHORITY]

4)[OTHER RELEVANT NATIONAL AUTHORITY]

5)[AIRSPACE USER REPRESENTATIVE/S]

6)[AIRPORT AUTHORITIES]

7)[METEOROLOGICAL AUTHORITY]

8)[AIRPORT AUTHORITY]

9)[OTHER RELEVANT AUTHORITIES/AGENCIES[

3.5 Terms of Reference for the CCC and the contact details of its members are provided in **Appendix X**.

3.6 The CCC shall oversee the conduct of the Contingency Plan and in the event that the [SERVICE] is disrupted for an extended period, make arrangements for and facilitate the temporary relocation of the [SERVICE] to the [ALTERNATE FACILITY OR ATS UNIT/CENTRE] and the restoration of [SERVICE].

3.7 Under the circumstances described and when deemed necessary by the [AUTHORITY] (OR Under the circumstances described in its Terms of Reference and when deemed necessary) and as soon as practicable in advance of, or after the commencement of a contingency event causing disruption to [AIRSPACE/ATS SERVICE] has occurred, the [AUTHORITY] shall convene the Central Coordinating Committee, by the most expeditious means appropriate for the situation, e.g. by telephone or web-based conference.

Note: This depends on the scale of the plan. E.g. a remote regional control tower would not necessarily require re-convening of a CCC

ATM Operational Contingency Group

3.8 The ATM Operational Contingency Group (AOCG) function will be convened by the CCC with a primary responsibility to oversee the day to day operations under the contingency arrangements, and coordinate operational ATS activities, 24 hours a day, throughout the contingency period. The terms of reference of the AOCG will be determined by the CCC. The AOCG will include any necessary specialist input from the following disciplines:

- Air Traffic Control;
- Aeronautical Telecommunication (COM);
- Aeronautical Meteorology (MET);
- Aeronautical Information Services (AIS);
- ATS equipment maintenance service provider

3.9 The AOCG functions shall include:

viii) review and update of the Contingency Plan as required;

ix) keep up to date at all times of the contingency situation;

x) organize contingency teams in each of the specialized areas;

xi) keep in contact with and update all affected airspace and system users, customers and other relevant stakeholders.;

Note: Annex 11 provides guidelines for coordination of contingency matters with ICAO

xii) exchange up-to-date information with the adjacent ATS authorities concerned to coordinate contingency activities;

xiii) notify the designated organizations of the contingency situation sufficiently in advance and/or as soon as possible thereafter;

xiv) take necessary action for issuing NOTAMs according to this plan or as otherwise determined by the particular contingency situation. Where the contingency situation is sufficiently foreseeable vance the relevant NOTAMs will be issued 48 hours in advance of the contingency event s. NOTAM templates are provided in **Appendix X**.

xv) maintain an activity log using the form in **Appendix X.**

3.10 Terms of Reference for the CCC and the contact details of its members are provided in **Appendix X**.

Plan Testing and Review

3.11 The Plan shall be tested in desktop exercises, where necessary including telephone or web-based conference facilities, at least once per [TIMEFRAME].

3.12 ATC simulation testing of the plan should occur at least once per [TIMEFRAME], and whenever required by the [AUTHORITY].

3.13 A full review of the Plan shall be conducted at least once per [TIMEFRAME]. Provisions for the review of airspace, ATS route, co-ordination and communications details of the Plan shall be included in relevant ATS airspace, data and facility implementation plans.

3.14 A preliminary post-activation review (PAR) report shall be completed within [XX] days following completion of testing or resumption of normal operations. A more comprehensive report shall be completed and forwarded to [AUTHORITY] in any case where an air safety incident investigation related to the pre-activation or activation of the Plan has been conducted, or as otherwise determined by the [AUTHORITY].

CONTINGENCY ROUTE and FLIGHT LEVEL STRUCTURE

4.1 In the event of disruption of the ATC services provided by [ATS UNIT, CENTRE OR FIR], contingency routes will be specified to ensure safety of flight and to facilitate limited flight operations commensurate with the prevailing conditions. Existing ATS routes form the basis of the contingency routes to be used, and a flight level allocation scheme (FLAS) introduced to minimize potential points of conflict. and to limit the number of aircraft operating simultaneously in the system under reduced air traffic services. The contingency route structure [FOR INTERNATIONAL FLIGHTS if necessary] is detailed in **Appendix X.** Additional unpublished contingency routes may be developed tactically by the AOCG and promulgated by NOTAM as and when circumstances require, such as in the case of volcanic ash cloud, radioactive cloud or severe weather event. [INSERT IF RELEVANT, As and where dictated by circumstances domestic flights and international flights that have not yet departed may be temporarily suspended until a full assessment of the prevailing conditions has been determined and sufficient air traffic services restored. A decision to curtail or restart these operations will be made by the CCC.

4.2 Aircraft on long-haul international flights and special operations (e.g. Search and Rescue (SAR), State aircraft, humanitarian flights, etc), shall be afforded priority for levels at FL290 and above. Domestic and regional operators should plan on the basis that FL290 and above may not be available.

4.3 International operators affected by the suspension of all operations from [STATE OR FIR] airports will be notified by the relevant airport authority when operations may be resumed, and flight planning information will be made available pertaining to that airport. International flights that have received such approval may be required to flight plan via domestic routes to join international contingency routes.

4.5 International operators may elect to avoid the [AIRSPACE] by using ATS routes

[DESCRIBE ATS ROUTES OR ADJACENT AIRSPACE AS PER AGREEMENT].

AIR TRAFFIC MANAGEMENT AND CONTINGENCY PROCEDURES

Reduced ATS And Provision of Flight Information Services (FIS)

5.1 During the contingency period ATS including ATC may not be available, particularly communications and ATS surveillance services. In cases where services are not available, a NOTAM will be issued providing the relevant information. The contingency plan provides for limited flight information and alerting services to be provided by [ATS UNIT/S OR CENTRE/S].

5.2 [DESCRIBE ANY DIVISION OF RESPONSIBILITY OF ADJACENT ATS UNITS OR CENTRES FOR SERVICE PROVISION IN THE CONTINGENCY AIRSPACE]. [DESCRIBE THE LEVEL OF SERVICE AVAILABLE]. A chart depicting the airspace arrangement is provided in **Appendix X**.

ATS Responsibilities

5.3 During the early stages of a contingency event, ATC may be overloaded and tactical action may be taken to re-clear aircraft on alternative routes not included in this Plan.

5.4 In the event that ATS cannot be provided in the [AIRSPACE] a NOTAM shall be issued indicating the following:

a) time and date of the beginning of the contingency measures;

b) airspace available for landing and overflying traffic and airspace to be avoided;

c) details of the facilities and services available or not available and any limits on ATS provision (e.g., ACC, APPROACH, TOWER and FIS), including an expected date of restoration of services if available;

d) information on the provisions made for alternative services;

e) Applicable ATS routes, AIP-published contingency routes, or tactically defined contingency routes;

f) any special procedures to be followed by neighbouring ATS units not covered by this Plan;

g) any special procedures to be followed by pilots; and

h) any other details with respect to the disruption and actions being taken that aircraft operators may find useful.

5.5 NOTAM templates are provided at **Appendix X**.

5.6 In the event that the [XXXX International NOTAM Office is unable to issue the NOTAM, the alternate International NOTAM Office at [INSERT ALTERNATE] and/or [INSERT ALTERNATE] will take action to issue the contingency NOTAM upon notification by the [AUTHORITY].

Aircraft [SEPARATION OR SPACING]

5.7 Aircraft separation criteria, where applicable, will be in accordance with the *Procedures for Air Navigation Services-Air Traffic Management* (PANS-ATM, ICAO Doc 4444) and the *Regional Supplementary Procedures* (ICAO Doc 7030).

5.8 The minimum longitudinal [SEPARATION/SPACING] will be 15 minutes. However, this may be reduced to 10 minutes in conjunction with application of the Mach number technique where authorized by the [AUTHORITY] and agreed in the appropriate LOA or other Contingency Arrangement.

5.9 The contingency route structure provides for lateral [SEPARATION/SPACING] of 100 NM. In cases where the lateral spacing of contingency routes is less than 100NM, and for crossing routes, a minimum vertical [SEPARATION/SPACING] of [1000/2000] ft will be applied.

Priority for Flight Levels

5.10 Where possible, aircraft on long-haul international flights shall be afforded priority for cruising levels assigned in accordance with the (FLAS).

Airspace Classifications

5.11 Depending on the degree of disruption airspace classifications [OTHER THAN CLASS X, Y, Z – STATE ANY OTHER CONDITIONS RELATING TO NON-CONTINUOUS AIRSPACE, ETC] may be changed to reflect the reduced level of services. Changes to airspace classification will be notified by NOTAM.

Aircraft position reporting

5.12 The primary means of communication will be by VHF or HF radio except for aircraft operating Automatic Dependent Surveillance - Contract (ADS-C) and Controller-Pilot Data Link Communications (CPDLC) systems. When CPDLC has been authorized for use by the relevant ATC authority this will become the primary means of communication, with HF as secondary. ADS-C shall replace any requirement for voice position reporting to ATC for aircraft so equipped, and in this case CPDLC or HF will be the secondary means of communication.

5.13 Traffic Information Broadcast by Aircraft (TIBA) procedures shall apply in [DESCRIBE AIRSPACE/CIRCUMSTANCES]. Details of TIBA procedures and communications requirements are provided in [Attachment B to Annex 11 to the Convention on Civil Aviation *or* (STATE) AIP SECTION XXX] reproduced in **Appendix X.**

5.14 TIBA frequencies shall be as follows:

- [DESCRIPTION OF AIRSPACE] – [XXX.XX] MHz;
- [DESCRIPTION OF AIRSPACE] – [XXX.XX] MHz;
- [DESCRIPTION OF AIRSPACE] – [XXX.XX] MHz;
- [DESCRIPTION OF AIRSPACE] – [XXX.XX] MHz;

Exclusions

5.15 [SPECIFY EXCLUDED FLIGHTS E.G. VFR, NON SCHEDULED, MILITARY, ETC] shall not operate in the [DESCRIBE AIRSPACE] during contingency operations, except for [SPECIFY FLIGHTS E.G. SAR, FFR, MEDICAL EVACUATION ETC] and any other flights as authorized by the [AUTHORITY].

Procedures for ATS Units

5.16 The ATS units providing ATC services will follow their unit emergency operating procedures and activate the appropriate level of contingency procedures in line with [THIS PLAN (*where it also serves as the formal LOA*) or THE OPERATIONAL LETTER OF AGREEMENT or MOU, ETC]. These procedures include the following:

a) Where ATS provided by the [ATS UNIT, CENTRE, FIR OR STATE] may be reduced or disrupted by a short-notice contingency event, ATC will inform pilots of the emergency condition and advise if it is likely that the ACC will be evacuated and ATS suspended. In the event of it becoming necessary to evacuate the ACC building, the unit evacuation procedures will be activated, and time permitting, controllers will make an emergency evacuation transmission on the radio frequency in use providing pilots with alternate means of communication;

b) during the period the contingency procedures are in effect, flight plan and other aircraft movement messages must continue to be transmitted by operators to the [ATS UNIT, CENTRE, FIR OR STATE] via the AFTN using normal procedures;

c) on notification by [AUTHORITY], the ATS authorities operating the [NEIGHBOURING ATS UNITS, CENTRES, FIRS OR STATES] will activate the contingency procedures in accordance with [THIS PLAN (*where it also serves as the formal LOA*) or THE OPERATIONAL LETTER OF AGREEMENT or MOU, ETC];

d) prior to entry to the [AFFECTED AIRSPACE] during contingency operations prior authorization must be obtained from [AUTHORITY], and flights must comply with the ATC [CLEARANCE/ROUTE, FLIGHT LEVEL] and communications instructions issued by the ATC authority responsible for the airspace immediately adjacent to the contingency airspace.

e) Coordination of aircraft boundary estimates and flight levels by the adjacent ATC authority responsible for aircraft entering the [AFFECTED AIRSPACE] shall be in accordance with [THIS PLAN (*where it also serves as the formal LOA*) or THE OPERATIONAL LETTER OF AGREEMENT or MOU, ETC].

f) the ACC responsible for aircraft entering the [AFFECTED AIRSPACE] will instruct pilots to maintain the last flight level assigned and speed (MACH number if applicable) while operating in the [AFFECTED AIRSPACE];

g) the ACC responsible for aircraft entering the [AFFECTED AIRSPACE] will not authorize any change in route, flight level or speed unless specifically authorized by the ATS unit normally responsible for the affected airspace, or under [THIS PLAN (*where it also serves as the formal LOA*) or THE OPERATIONAL LETTER OF

AGREEMENT or MOU, ETC].

h) the ACC responsible prior for aircraft entering the [AFFECTED AIRSPACE] will inform aircraft that they must establish contact with the first ATS unit after transiting the [AFFECTED AIRSPACE] not less than [XX] minutes before the estimated time of entry to the [NEXT AIRSPACE/FIR],

i) aircraft may also chose to avoid the [AFFECTED AIRSPACE] by flight planning via published ATS routes, or via any alternative contingency ATS routes promulgated by NOTAM issued by the controlling authorities of the adjacent FIRs.

j) [DETAIL ANY ROUTE OR AIRSPACE –SPECIFIC ARRANGEMENTS]

Transition To and From Contingency Operations

5.17 During times of uncertainty when airspace closures seem possible, aircraft operators should be prepared for a possible change in routing while en-route, familiarization of the alternative routes outlined in this Contingency Plan, as well as those which may be promulgated by a State via NOTAM or AIP.

5.18 In the event of airspace closure that has not been promulgated, ATC should, if possible, broadcast to all aircraft in their airspace, what airspace is being closed and to stand by for further instructions.

5.19 ATS providers should recognize that when closures of airspace or airports are promulgated, individual airlines might have different company requirements as to their alternative routings. ATC should be alert to respond to any request by aircraft and react commensurate with safety.

Transfer of control and coordination

5.20 Unless otherwise specified in [THIS PLAN (*where it also serves as the formal LOA*) or THE OPERATIONAL LETTER OF AGREEMENT or MOU, ETC] transfer of control and communication should be at the common FIR boundary between ATS units.

PILOTS AND OPERATOR PROCEDURES

Filing of flight plans

6.1 Flight planning requirements detailed in [STATE] AIP continue to apply during contingency operations, except where modified by the contingency ATS routes and FLAS specified by ATC and/or in NOTAM.

Overflight approval

6.2 Aircraft operators must obtain over-flight approval from the [AUTHORITY] prior to operating flights through the [AFFECTED AIRSPACE]. During the period of activation of this Contingency Plan the adjacent ATS authority will provide normal ATC clearances for aircraft to enter the [AIRSPACE]. The adjacent ATS authority is not responsible for coordination or provision of overflight clearances for the [AIRSPACE]. The operator must ensure any required overflight approval has been obtained.

CNS Capability

6.3 Flights operating through the [AFFECTED AIRSPACE] shall be equipped with the following minimum communications, navigation and surveillance capability:

a) [SPECIFY]

b) [SPECIFY]

c) [SPECIFY]

d) SPECIFY]

Pilot operating procedures

6.4 Pilots will continue to make or broadcast routine position reports in line with normal ATC reporting procedures.

6.5 Pilots of aircraft operating in the [AFFECTED AIRSPACE] during contingency operations shall comply with the following procedures:

a) all aircraft proceeding along the ATS routes established in this Contingency Plan will comply with the instrument flight rules (IFR) and will be assigned a flight level in accordance with the flight level allocation scheme applicable to the route(s) being flown as specified in **Appendix X**;

b) flights are to flight plan using the Contingency Routes specified in **Appendix X**, according to their airport of origin and destination;

c) aircraft are to operate as close as possible to the centre line of the assigned contingency route;

d) a continuous communications watch shall be maintained on the specified contingency frequency as specified in **Appendix X**.

e) aircraft position reports and other information as necessary shall be broadcast in accordance with TIBA procedures defined in AIP [STATE];

f) aircraft navigation and anti-collision lights shall be displayed;

g) except in cases of emergency or for reasons of flight safety, pilots are to maintain during their entire flight within [AFFECTED AIRSPACE], the last assigned flight level, mach number and SSR transponder code. If no transponder code has been assigned, aircraft shall squawk code [XXXX].

h) aircraft are to reach the flight level last assigned by the responsible ACC at least [XX] minutes before entering the [AFFECTED AIRSPACE] or as otherwise instructed by the ATC unit acting in accordance with the operational Letter of Agreement or other Contingency Arrangement;

i) pilots are to include in their last position report prior to entering the [AFFECTED AIRSPACE], the estimated time over the entry point of the [AFFECTED AIRSPACE] and the estimated time of arrival over the relevant exit point;

j) pilots are to contact the next adjacent ACC as soon as possible, and in any event not less than ten (10) minutes before the estimated time of arrival over the relevant exit point from the [AFFECTED AIRSPACE];

k) pilots are to strictly adhere to the ICAO Traffic Information Broadcasts by Aircraft (TIBA) procedures, reproduced in **Appendix X**, on the specified VHF and HF frequencies listed in **Appendix X**. When necessitated by emergency conditions or flight safety requirements, pilots are to transmit blind on these frequencies, their current circumstances and the commencement and completion of any climb and descent or deviation from the cleared contingency route;

l) whenever emergencies and/or flight safety reasons make it impossible to maintain the flight level assigned for transit of [AFFECTED AIRSPACE], pilots are to climb or descend well to the right of the centerline of the contingency route, and if deviating outside the [AFFECTED AIRSPACE], to immediately inform the ACC unit responsible for that airspace. Pilots are to broadcast details of any level change including aircraft identification, aircraft position and route, vacated flight level, intended flight level, flight level passed and cruising flight level maintained on [FREQUENCY];

m) pilots are to maintain own longitudinal separation of 15 minutes from preceding aircraft at the same cruising level; and

n) not all operational circumstances can be addressed by this Contingency Plan and pilots are to maintain a high level of alertness when operating in the contingency airspace and take appropriate action to ensure safety of flight.

Interception of civil aircraft

6.6 Pilots need to be aware that a contingency routing requiring aircraft to operate off normal traffic flows may result in interception by military aircraft. Aircraft operators must therefore be familiar with international intercept procedures contained in ICAO Annex 2 *–Rules of the Air*, paragraph 3.8 and Appendix 2, Sections 2 and 3.

6.7 Pilots are to comply with instructions given by the pilot of the intercepting aircraft. In such circumstances, the pilot of the aircraft being intercepted shall broadcast information on the situation.

6.8 If circumstances lead to the closure of the [AFFECTED AIRSPACE] and no contingency routes are available, aircraft will be required to remain clear of the [AFFECTED AIRSPACE]. As much warning as possible will be provided by the appropriate ATS authorities in the event of the complete closure of airspace.

6.9 Pilots shall continuously guard the VHF emergency frequency 121.5 MHz and should operate their transponder at all times during flight, regardless of whether the aircraft is within or outside airspace where secondary surveillance radar (SSR) is used for ATS purposes. Transponders should be set on the last discrete code assigned by ATC or select code [XXXX] if no code was assigned.

COMMUNICATION PROCEDURES

Degradation of Communication - Pilot Radio Procedures

7.1 When operating within the contingency airspace, pilots should use normal radio communication procedures where ATS services are available. Where limited or no ATS is available communications will conducted be in accordance with the procedures in this Plan, or as otherwise notified by NOTAM.

7.2 If communications are lost unexpectedly on the normal ATS frequencies, pilots should try the next applicable frequency, e.g. if en-route contact is lost then try the next appropriate frequency, that is, the next normal handover frequency. Pilots should also consider attempting to contact ATC on the last frequency where two-way communication had been established. In the absence of communication with ATC, the pilot should continue to make routine position reports on the assigned frequency, and also broadcast positions in accordance with the TIBA procedures.

Communication frequencies

7.3 A list of frequencies to be used for the contingency routes and the ATS units providing FIS and air-ground communication monitoring for the [AIRSPACE] is detailed at **Appendix X.**

AERONAUTICAL SUPPORT SERVICES

Aeronautical Information Services (AIS)

8.1 [DETAIL THE AVAILABILITY OR ALTERNATE ARRANGEMENTS FOR AIS]

Meteorological Services (MET)

8.2 [DETAIL THE AVAILABILITY OF METEROLOGICAL SERVICES AND THE METHODS OF DISTRIBUTION OF MET INFORMATION DURING CONTINGENCY OPERATIONS.]

SEARCH AND RESCUE ALERTING

Notification and Coordination

9.1 The SAR authority responsible for the [AFFECTED AIRSPACE] is the [XXXXX] Rescue Coordination Centre (RCC)

IDD: XXXXXXXXXX

Fax: XXXXXXXXXX

AFTN: XXXXXXXX

9.2 [INSERT SAR ALERTING ARRANGEMENTS AS NECESSARY. MAY INCLUDE CONSIDERATION OF NEIGHBOURING ATS UNITS PROVIDING FULL FLIGHT FOLLOWING, OR LIMITED TO RESPONSE TO IN-FLIGHT EMERGENCIES].

SUB-PLANS

LIST OF APPENDICES

Appendix X – Contact Details

Appendix X – Coordinating Bodies

Appendix X – Specimen NOTAMs

Appendix X – International Route Structure During Total Disruption

Appendix X – Chart of Contingency Routes

Appendix X – Contingency Frequencies for Control and/or Flight Monitoring

Appendix X – Flight Planning

Appendix X – Traffic Information Broadcasts by Aircraft Procedures

Appendix X – ICAO Interception Procedures

Appendix X – Recording and Reporting Form

Appendix X – Guidance for using the template

APPENDIX D – ACTIONS IN THE EVENT OF VOLCANIC ERUPTION OR VOLCANIC ASH CLOUD

The following pages are extracted from ICAO Doc 9766 – *Handbook on the International Airways Volcanic Watch (IAVW)*

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Part 4

INTERNATIONAL AIRWAYS VOLCANO WATCH

OPERATIONAL PROCEDURES FOR THE DISSEMINATION OF INFORMATION ON VOLCANIC ERUPTIONS AND ASSOCIATED VOLCANIC ASH CLOUDS IN AREAS WHICH COULD AFFECT ROUTES USED BY INTERNATIONAL FLIGHTS, AND NECESSARY ARRANGEMENTS PRIOR TO A VOLCANIC ERUPTION

4.1. PROCEDURES PRIOR TO A VOLCANIC ERUPTION

4.1.1 In order to permit efficient application of the measures noted in 4.2 to 4.8, States responsible for flight information regions (FIRs) in which there are active or potentially active volcanoes in proximity to routes used by international flights should make arrangements to ensure that:

a) active or potentially active volcanoes are instrumentally and visually monitored (e.g. by seismological means supplemented by other information available) by designated volcano observatories supported by appropriate authorities, resourcing and quality management systems;

b) systems and channels of communication are in place to make available appropriate meteorological data on volcanic plume height or resuspended ash (in particular radar data, but also lidar, satellite remote sensing and visual observations by trained meteorological observers);

c) 24-hour contact details are shared between the area control centre/flight information centre (ACC/FIC), meteorological watch office (MWO) and volcano observatories and relevant volcanic ash advisory centre (VAAC);

d) information on increasing volcanic activity, volcanic eruption[1] or volcanic ash cloud in areas which could affect routes used by international flights, available from one or more observing sources, such as vulcanological, seismological, geological, meteorological, or the police/military networks and domestic aviation, is passed **immediately** to the ACC/FIC and the MWO concerned;

Note.— Where information comes from supplementary sources such as the research community, States are strongly encouraged to make arrangements consistent with the appropriate scientific protocols as advised by the International Union of Geodesy and Geophysics (*IUGG).*

e) the State international NOTAM office personnel are familiar with the issuance of ASHTAMs[2] (or NOTAMs for volcanic ash);

f) information, preferably supplemented by charts, concerning volcanoes in the FIRs for which the State is responsible is included in the State aeronautical information publication in accordance with Annex 15, Appendix 1, Section ENR 5.3.2; and

g) air traffic management (ATM) contingency arrangements in respect of volcanic ash are made and promulgated, as necessary, for air routes crossing FIRs for which the State is responsible, in coordination with adjacent FIRs.

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1 The term “eruption” in Part 4 of this document refers to the start or continuation of an eruption, or its cessation.
2. The ASHTAM is a special series NOTAM specifically for volcanic activity.

4.1.2 States must promulgate a requirement for pilots to make and transmit a special aircraft observation, in accordance with Annex 3, 5.5 h), in the event that pre-eruption volcanic activity or a volcanic eruption is observed or a cloud of volcanic ash is encountered or observed which may affect the safety of other aircraft operations, and to record a special air-report in accordance with Annex 3, 5.9. In addition, the International Air Transport Association (IATA), the International Federation of Air Line Pilots' Associations (IFALPA) and the International Council of Aircraft Owner and Pilot Associations (IAOPA) should bring this requirement to the attention of pilots and airline operating centres and highlight its significance for the international airways volcano watch (IAVW) and the importance of transmitting these observations in a timely manner.

Note.— Pre-eruption volcanic activity in this context means unusual and/or increasing volcanic activity which could presage a volcanic eruption.

4.1.3 It is essential that the foregoing arrangements be made in every State concerned and their efficacy continually maintained. In the case of volcanic ash, the hazard to jet transport aircraft is greatest within the first few hours following an eruption; hence speed of notification between all links in the chain of communication is critical. States may wish to consider drawing up letters of agreement between the parties involved, in particular, the civil aviation and meteorological authorities and the vulcanological agency, to record the agreed responsibilities of each party.

4.1.4 In order to assist States in enhancing the coordination between the different States' authorities/agencies involved in the IAVW, a sample letter of agreement covering the coordination and responsibilities between meteorological authorities, ATS authorities and vulcanological authorities for the provision and exchange of information relevant to volcanic ash is provided in Appendix A.

Note 1.— Consistent with the Hyogo Framework for Disaster Risk Reduction 2005-2015, States may wish to consider the above as part of an integrated suite of arrangements for other related volcanic hazards, such as ashfall on airports, populated areas and agricultural zones, shipping hazards, volcanic tsunami, and rainfall that may induce dome collapse, lahar activity or slope failure.

Note 2.— Given the variation between States in capacity and the cross-border nature of the volcanic ash hazard, all States are encouraged to take note of arrangements in the surrounding regions, and where appropriate and invited, to assist in any reasonable manner.

4.2 ACTION TO BE TAKEN BY THE STATE VOLCANO OBSERVATORY IN THE EVENT OF A VOLCANIC ERUPTION

4.2.1 In the event of significant pre-eruption volcanic activity, a volcanic eruption occurring or a volcanic ash cloud being formed over a volcano under its vigilance, the State volcano observatory should take the following actions:

a) immediately forward the available information to its associated ACCs, MWOs and VAACs by telephone to verbally inform them of the significant activity, and then follow up with a faxed or e-mailed volcano observatory notice for aviation (VONA). This will enable rapid notification of air traffic control (ATC) authorities about operationally critical information. VONA may also be distributed directly to interested operators in accordance with local arrangements; and

b) maintain an up-to-date contact list of relevant agencies and conduct routine testing of the agreed dissemination pathway.

Note 1.— The key role of State volcano observatories in providing timely reports of volcanic unrest and eruptions to the aviation sector has been well established within the framework of the IAVW. Each State is required to provide information on volcanic activity to its associated ACCs, MWOs and VAACs in accordance with Annex 3.

Note 2.— The map of VAAC areas of responsibility is shown in Part 2. A list of State volcano observatories, ACCs, MWOs and FIRs is given in Part 5.

Note 3.— The VONA has been developed for State volcano observatories (or equivalent scientific agencies) to disseminate critical, operationally relevant information about volcanic activity.

Note 4.— A State may wish to further strengthen coordination among the agencies involved in dissemination and exchange of information relevant to volcanic ash, including the issuance of VONA, by drawing up a letter of agreement between the civil aviation and meteorological authorities and the volcanological agency. A sample letter of agreement is provided in Appendix A.

4.2.2 The VONA is used to report significant changes in activity of a volcano such as:

a) escalation of precursory unrest;

b) eruption onset;

c) significant ash emission; and

d) eruption cessation.

4.2.3 Along with basic volcano information (name, identifying number and location), the VONA is a brief summary of volcanic activity and observations about ash emission (or lack thereof). The VONA is intended for aviation users and not scientists.

4.2.4 The VONA includes fields for the current and previous volcano level of alert color codes for aviation, which is a green-yellow-orange-red ranking that explicitly addresses airborne ash hazards (see Table 4-4). Color codes help dispatchers, pilots and air traffic controllers to quickly ascertain the status of numerous volcanoes as they plan and execute flights over broad regions of the globe. The volcano level of alert color codes for aviation are a key component of the global standardization of information provided by volcanological agencies to aviation users.

4.2.5 A State volcano observatory should issue a VONA under the following circumstances:

a) when volcano level of alert color code is changed; or

b) within a color-code level when an ash-producing event or other significant change in volcanic behavior occurs.

4.2.6 Although it is recommended that State volcano observatories assign volcano level of alert color codes for aviation, if they do not, a VONA may still be issued leaving the color-code fields blank.

4.2.7 A VONA is to be disseminated to the requisite ACCs, MWOs and VAACs using the following media:

a) e-mail;

b) fax;

c) telephone; or

d) public website.

4.2.8 In accordance with *ICAO's Policies on Charges for Airports and Air Navigation Services* (Doc 9082), the costs associated with the transmission of information from State volcano observatories to their associated ACCs, MWOs and VAAC are subject to cost recovery. Guidance on cost recovery by State volcano observatories is provided in Appendix G.

4.3 ACTION TO BE TAKEN BY THE ACC IN THE EVENT OF A VOLCANIC ERUPTION

In the event of significant pre-eruption volcanic activity, a volcanic eruption occurring or a volcanic ash cloud being reported in areas which could affect routes used by international flights, the ACC/FIC responsible for the FIR concerned, on receiving information of the occurrence, should take the following actions:

a) Pass this information **immediately** to aircraft in flight which could be affected by the volcanic ash cloud and advise ACCs in relevant adjacent FIRs. Issue an ASHTAM or a NOTAM through the State International NOTAM Office (NOF), in accordance with Annex 15, Chapter 5, giving details of the pre-eruption activity, volcanic eruption and ash cloud, including the name and geographical coordinates of the volcano, the date and time of the eruption, the flight levels and routes or portions of routes which could be affected and, as necessary, routes temporarily closed to air traffic. Include in the address list for ASHTAMs or NOTAMs concerning volcanic activity the associated MWO (see Part 2 of this document), all VAACs and the SADIS WIFS gateway at EGZZVANW.

Note 1.— In issuing an ASHTAM or a NOTAM concerning significant pre-eruption volcanic activity, or for volcanic eruptions ***not*** *producing ash plumes, it is recommended that the ASHTAM or NOTAM text include the following actual wording, as appropriate:*

"INCREASED VOLCANIC ACTIVITY REPORTED FOR VOLCANO (NAME AND LAT/LONG) AIRCRAFT ADVISED TO EXERCISE CAUTION UNTIL FURTHER NOTICE AND MAINTAIN WATCH FOR ASHTAM/NOTAM/ SIGMET FOR AREA".

or

"VOLCANO (NAME AND LAT/LONG) ERUPTED (DATE/TIME UTC) BUT NO ASH PLUME REPORTED, AIRCRAFT ADVISED TO AVOID FLYING WITHIN ... KM OF THE VOLCANO UNTIL FURTHER NOTICE, MAINTAIN WATCH FOR ASHTAM/NOTAM/SIGMET FOR AREA".

Use of such language in an ASHTAM or a NOTAM ensures that large volumes of airspace are not rendered unavailable to aircraft unnecessarily until such time as a volcanic ash plume/cloud is actually reported, or observed from satellite data.

Note 2.— In order to ensure speedy transmission of initial information to aircraft, the first ASHTAM or NOTAM issued may simply contain information that an eruption and/or ash cloud has been reported and the date/time and location. It is not necessary to await further detailed information; this may be included in subsequent ASHTAMs or NOTAMs as it becomes available.

Note 3.— Volcano level of alert colour codes for aviation should be used by some vulcanological agencies to report volcanic activity information (see 4.2.4). In States where the volcano level of alert colour codes for aviation have been introduced by the vulcanological agency, it is highly desirable to include the reported colour code in ASHTAMs or NOTAMs issued for volcanic activity.

b) Activate contingency arrangements, including the implementation of alternative routes bypassing the area likely to be affected by the volcanic ash cloud, in coordination with ACCs and FICs responsible for adjacent FIRs.

c) Advise the associated MWO(s) and VAAC of the volcanic eruption and/or the existence of volcanic ash cloud (including the forwarding of all special air-reports in accordance with existing provisions in Annex 11, 4.2.3) and maintain continuous coordination with the MWO to ensure consistency in the issuance and content of ASHTAMs or NOTAMs and SIGMETs.

d) Cancel the ASHTAM or NOTAM as soon as it is considered that the volcano has reverted to its normal state and the airspace is not contaminated by volcanic ash.

4.4 ACTION TO BE TAKEN BY THE NOF IN THE EVENT OF A VOLCANIC ERUPTION

4.4.1 In the event of significant pre-eruption volcanic activity, a volcanic eruption occurring or a volcanic ash cloud being reported in areas which could affect airspace in the FIRs of the State in which the NOTAM Office (NOF) is designated, the NOF should issue an ASHTAM (or a NOTAM for volcanic activity) based on information provided by the ACC responsible for the FIR concerned. The ASHTAM or NOTAM must be cancelled, in consultation with the ACC, as soon as it is considered that the airspace is not contaminated by volcanic ash. Include in the address list for ASHTAM or NOTAM concerning volcanic activity the associated MWO (see Part 2 of this document), all VAACs and the SADIS WIFS gateway at EGZZVANW.

4.4.2 In addition to addressing the ASHTAM (or NOTAM) to other NOFs for whom the information is of direct operational significance, the NOF should include in the address list the VAAC responsible for the FIRs concerned. The States responsible for FIRs in which there are active volcanoes and the AFTN switching centres designated to receive NOTAM or ASHTAM are listed in Table 4-1.

As an example, an ASHTAM issued by the Tegucigalpa NOF would be sent to VAAC Washington as follows:

ZCZC
GG KWBCYMYX
170630 MHTGYNYX
VAMH0001 MHTG 04170630

ASHTAM

A. CENTRAL AMERICAN FIR
B. 04170555
C. VOLCAN SAN CRISTOBAL.14004-02
D. 124211N0870024W
E. YELLOW ALERT
F. SFC/11000FT
G. E/SE
H. VOR/DME MGA A317 TUKOR CNL
I. VOR/DME MGA A317 TUKOR RTE AVBL. ALT RTE
MGA VOR/DME A502 BERTA GABOS A317.
VOR/DME/CAT/ABVL
J. INSTITUTO NACIONAL DE ESTUDIOS TERRITORIALES. DPTO. DE SISMOLOGÍA
K. GNE AVIATION CTN WIND 60KM/H E/SE FM VOLCANO

NNNN

A similar example, this time showing a NOTAM issued by Guayaquil NOF, would be sent to VAAC Washington as follows, showing the three sections of the message:

1 ZCZC USUAL AFTN HEADER ENVELOPE
GG KWBCYMYX
151840 SEGUYNYX

2 A0623/00 NOTAMN ACTUAL NOTAM
Q) SEGU/QWWXX/IV/NBO/W/000
/250/0128S 07826W030
A) SEGU
B) 0002151830
C) 0002171830
E) SIGNIFICANT VOLCANIC ACT
TUNGURAHUA VA MOV W.
AWY RESTRICTIONS AND ALT
RTE NOTIFIED BY ATC

3 NNNN USUAL AFTN ENDING
ENVELOPE

4.4.3 In case of a need to issue a NOTAM regarding volcanic ash deposition at an aerodrome, the following guidelines are suggested:

a) in cases when a forecast of impending ash deposition is available, a NOTAM should be issued stating the time period when ash is expected to commence at an aerodrome;

b) a NOTAM should be issued when ash reaches an aerodrome or begins to accumulate on the ground at an aerodrome. The NOTAM should report if the aerodrome is still open for operation;

c) a new NOTAM should be issued every 4 hours while deposition is occurring or present in the air at the aerodrome, or more frequently as needed for occurrence of heavy ash deposition. If a friction test of runway surfaces has been made with a mu-meter, that value and the time it was made should be reported; and

d) a final NOTAM should be issued when clean-up activities are completed and operations have resumed.

4.4.4 Since volcanic ash deposition at an aerodrome is a phenomena which could prompt the issuance of an aerodrome warning, close coordination is recommended between each NOF and the aerodrome meteorological office(s) in its area of responsibility concerning the issuance of such warnings.

4.5 ACTION TO BE TAKEN BY THE MWO IN THE EVENT OF A VOLCANIC ERUPTION

4.5.1 On receipt from the ACC/FIC of information concerning a volcanic eruption and/or the existence of a volcanic ash cloud, the MWO should take the following steps:

a) notify the VAAC designated to provide advice on volcanic ash trajectories for the FIR for which the State is responsible that a volcanic eruption and/or ash cloud has been reported, provide available relevant details and request advisory information on the extent and trajectory of volcanic ash. In particular, special air-reports of pre-eruption volcanic activity, a volcanic eruption, volcanic ash cloud or aircraft encounter with volcanic ash received by MWOs should be transmitted to their associated VAACs, WAFC London SADIS at the address specified in Appendix B according to the region containing the area affected and WAFC Washington at KWBCYMYX;

Note 1.— The area of responsibility of the VAACs and the MWOs to which volcanic ash advisory information is to be sent are given in the ICAO regional air navigation plans and in Part 2 of this document.

Note 2.— The contact numbers that the MWOs should use to notify volcanic eruptions/volcanic ash cloud to the VAAC are given in Table 4-2.

b) as soon as practicable, advise the associated ACC/FIC whether or not the volcanic ash cloud is identifiable from satellite images/data and, if possible,

c) provide regular information based on advice received from the VAAC on the horizontal and vertical extent of the cloud and the trajectory of the cloud; and

d) issue a SIGMET message for volcanic ash for a validity period of 6 hours in alphanumerical message format and, if in a position to do so, in graphical format based on the advisory information provided by the VAAC concerned. Update SIGMET information at least every 6 hours. Include in the SIGMET address all VAACs, WAFC London at the address specified in Appendix B according to the region containing the area affected, WAFC Washington at KWBCYMYX and the regional OPMET data bank(s) responsible. Maintain continuous coordination with the associated ACC/FIC to ensure consistency in the issuance and content of SIGMETs, and ASHTAMs or NOTAMs. SIGMET messages for volcanic ash issued outside the EUR Region to be transmitted to the EUR Region should be addressed in accordance to the EUR FASID Table MET 2B as follows:

Source	**Responsible EUR Gateway and Address to be used**	
AFI	France	LFZZMAFI
MID	Austria	LOZZMMID
ASIA	UK	EGZZMASI
CAR	UK	EGZZMCAR
NAM	UK	EGZZMNAM
NAT	UK	EGZZMNAT
PAC	UK	EGZZMPAC
SAM	UK	EGZZMSAM

Note 1.— The associated ACC/FIC should automatically be on the address list for all SIGMETs issued by the MWO.

Note 2.— In order to ensure speedy transmission of initial information to aircraft, the first SIGMET issued may simply contain information that an ash cloud has been reported and the date/time and location. It is not necessary to await further detailed information before issuing the first SIGMET. Such information may be included in subsequent SIGMETs as it becomes available.

4.5.2 In the event that the MWO becomes aware of the occurrence of pre-eruption activity, a volcanic eruption or ash cloud from any source other than its associated ACC/FIC, that information should be passed **immediately** to the associated ACC/FIC. The procedures in 4.5.1 should then be followed, as necessary.

4.5.3 In the event that a meteorological office becomes aware of the occurrence of pre-eruption activity, a volcanic eruption or ash cloud from any source, the information should be passed **immediately** to its associated MWO for onward transmission to the ACC/FIC.

4.6 ACTION TO BE TAKEN BY VAACs IN THE EVENT OF A VOLCANIC ERUPTION

4.6.1 On receipt of information from an ACC, MWO, volcano observatory or any other source[3] that a volcanic eruption has been reported and/or a volcanic ash cloud has been observed in the FIR for which the MWO is responsible, the VAAC should:

a) initiate the volcanic ash computer trajectory/dispersion model in order to provide advisory information[4] on volcanic ash trajectories to the MWOs, ACCs and, to the extent possible, to the operators[5] concerned;

b) review satellite images/data of the area for the time of the event to ascertain whether a volcanic ash cloud is identifiable and, if so, its extent;

c) prepare and issue advisory information on the extent and forecast trajectory of the volcanic ash cloud, in alphanumerical message format, as shown below, and graphical format[6] (using the PNG format) for transmission to the MWOs, ACCs and, to the extent possible, the operators[3] concerned in the VAAC area of responsibility, to WAFC London at the address specified in Appendix B according to the region containing the area affected, WAFC Washington at KWBCYMYX, and other VAACs. Advisory information on volcanic ash issued outside the EUR Region to be transmitted to the EUR Region should be addressed in accordance with EUR FASID Table MET 2B (see 4.5.1 c).

The volcanic ash advisory message should contain the following information:

message type
— VOLCANIC ASH ADVISORY

issue time, date and name of issuing VAAC
— time (UTC), day/month/year; volcanic ash advisory centre issuing advisory

name of volcano and volcano reference number
— volcano name (if known) and reference number (International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI))

the State or area in which the volcano is located and the latitude/longitude
— name of State or area (e.g. oceanic) and latitude/longitude of volcano

source(s) of information
— volcano agency (see Appendix E) or special air-report, etc.

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3. When initial notification of the eruption is received from a source other than an ACC/MWO, this information should be passed **immediately** by telephone to the relevant ACC and/or MWO. Thereafter, the procedures in a) to h) should be followed.

4 On some occasions, the volcanic ash advisory could be the first information received by ACC/FIC concerning hazardous conditions which may be encountered by an aircraft in flight. The VAAC has the option to issue a volcanic ash advisory without forecast as a first piece of information to quickly warn the ACC/FIC. The first advisory will, as soon as possible, be followed by a volcanic ash advisory with complete forecast information included.

5. Advisory information from VAACs is intended to assist MWOs in the preparation of the SIGMET. However, in order to provide operators with the earliest possible advance information on volcanic ash, an AFTN address (EGLLSITV) has been provided on the SITA network to which VAACs may send their advisories for onward distribution to operators by SITA. SIGMETs for volcanic ash will, of course, be disseminated in accordance with the relevant regional air navigation plan OPMET exchange tables.

6. Volcanic ash advisories in graphical format will be included on the London and Washington satellite broadcasts. An example of the graphical format is given in the Appendix 1 to Annex 3.

details of eruption
— time (UTC), day/month/year of the eruption

details of ash cloud
— vertical extent in flight levels and horizontal extent in kilometres (nautical miles) and boundary of ash cloud in degrees and minutes

trajectory of ash cloud
— indication of direction and speed of movement of ash cloud at selected flight levels in broad descriptive terms

forecast movement of ash cloud
— forecast boundaries of ash cloud in degrees and minutes at selected flight levels for 6, 12 and 18 hours following time of issuance of advisory message

next advisory
— expected time of issuance of next advisory.

In order for the VAAC to initiate the monitoring of volcanic ash from satellite data and the forecast of volcanic ash trajectories, MWOs are expected to notify the relevant VAAC immediately on receipt of information that a volcanic eruption has occurred or volcanic ash has been observed in the FIR for which they are responsible in accordance with 4.5.1 a). In particular, any special air-reports of pre-eruption volcanic activity, a volcanic eruption or volcanic ash cloud, received by MWOs, should be transmitted without delay to the associated VAAC and to other addresses in accordance with 4.5.1 a);

d) monitor subsequent satellite information to assist in tracking the movement of volcanic ash cloud;

e) continue to issue updated advisory information to MWOs, ACCs and operators[7] concerned at least at 6-hour intervals, and preferably more frequently, until such time as it is considered that the volcanic ash cloud is no longer identifiable from observations, no further reports of volcanic ash are received from the area and no further eruptions of the volcano are reported;

Note.— If volcanic ash is not identifiable from satellite data and the VAAC has reasonable doubts about the existence of volcanic ash in the atmosphere, it should be indicated in the REMARKS section of the volcanic ash advisory.

f) maintain regular contact with other VAACs, as necessary, and the Smithsonian Institution Global Volcanism Network, in order to keep up to date on the activity status of volcanoes in the VAAC area of responsibility. In the specific case of reception of information regarding an aircraft encounter with volcanic ash (Annex 3, 5.9 refers), the information should be sent to the Smithsonian Institution Global Volcanism Network and to ICAO in order to keep up to date the database for encounters between aircraft ash clouds (Doc 9691, Appendix D refers). To that end the following e-mail addresses should be used:

gvn@volcano.si.edu
iavwopsgsec@icao.int;

g) undertake a collaborative decision analysis and forecasting process when volcanic ash is approaching an adjacent FIR outside of a VAAC's area of responsibility;

Note.— Collaborative decision analysis and forecasting procedures are described in 4.10.

7. Advisory information from VAACs is intended to assist MWOs in the preparation of the SIGMET. However, in order to provide operators with the earliest possible advance information on volcanic ash, an AFTN address (EGLLSITV) has been provided on the SITA network to which VAACs may send their advisories for onward distribution to operators by SITA.

h) in cases where a volcanic ash cloud is expected to approach within 300 NM of the boundary of another VAAC area of responsibility, the first (primary) VAAC will initiate the operational procedures for the coordination and may request transfer of responsibility between VAACs for volcanic ash events; and

Note 1.— Standardized operational procedures for the coordination and transfer of responsibility between VAACs for volcanic ash events are provided in Appendix C.

Note 2.— To facilitate VAACs' rapid access to volcanic ash advisories issued by other VAACs, Table 4.3 provides a listing of the WMO bulletin headers, for each product (volcanic ash in the advisory in the alphanumeric and graphical format, respectively) being used by the VAACs.

i) in the event of long-lived volcanic ash clouds no longer being identifiable on satellite imagery, use the method of "gradual" advisory cessation by extrapolating forecast ash boundaries such that the previous 6-, 12- and 18-hour forecasts become the current analysis position in 6-and 12-hour forecasts respectively, with no ash boundary specified for the 18-hour forecast.

Note 1.— The above procedure (which is reducing the outlook period of 6 hours at each issue) should be applied unless remote sensing data or air-reports suggest there has been an error in the forecasts issued.

Note 2.— To provide rapid access to eruption source parameters data for immediate use by forecasters in ash transport and dispersion models, a preliminary spreadsheet of eruption source parameters of the world is available at http://www.icao.int/safety/meteorology/iavwopsg.

4.6.2 In the event of interruption of operation of one VAAC, its functions should be carried out by another VAAC or another meteorological centre, as designated by the VAAC Provider State concerned. The back-up procedures agreed by the VAACs given in Appendix D should be applied in order to provide the VAAC services as needed.

4.6.3 For those VAACs which have not yet implemented a computer volcanic ash dispersion forecast model, on receipt of information from an MWO or any other source in its area of responsibility that a volcano has erupted and/or volcanic ash cloud has been reported from the FIR for which the MWO is responsible, the VAAC should immediately contact VAAC Washington at the following 24-hour contact numbers:

Tel.: +1 (301) 683-1401
Fax: +1 (301) 683-1405

to request initiation of the United States Volcanic Ash Forecast Transport and Dispersion (VAFTAD) model and the provision of the necessary trajectory forecasts. Alternatively, VAACs may interactively run a dispersion model via the Internet at the following web site: http://www.arl.noaa.gov/index.php. This site also contains a number of model runs of hypothetical volcanic eruptions, generally of recently active volcanoes or those suspected to become active. If for any reason VAAC Washington is unable to respond or contact cannot be achieved, recourse should be made to VAAC London, VAAC Montreal or VAAC Toulouse at the 24-hour contact numbers given in 4.5.1 to run their dispersion models.

4.7 ACTION TO BE TAKEN BY OPERATORS IN THE EVENT OF A VOLCANIC ERUPTION

In the event of an eruption, operators should request their pilots to report, when appropriate, any observation related to a volcanic ash cloud including the absence of visible ash and all other relevant information such as observational conditions. The operator should then forward this information to the association VAAC in a timely manner.

Note.— Visible ash is defined in the Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds *(Doc 9691).*

APPENDIX E – EXAMPLES OF VOLCANIC ASH CLOUD CONTINGENCY PLAN

The following pages provide examples of Volcanic Ash Cloud Contingency Plans provided by the U.S. Federal Aviation Administration (FAA).

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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
Anchorage Air Route Traffic Control Center

ZAN ORDER 1900.2H

Effective Date:
January 3, 2011

SUBJ: EMERGENCY PLAN FOR VOLCANIC ERUPTIONS AFFECTING ALASKAN AIRSPACE

1. PURPOSE: This order revises procedures established by ZAN Order 1900.2G, Emergency Plan for Volcanic Eruptions Affecting Alaskan Airspace. This order establishes the notification procedures in the event of increased volcanic activity.

2. DISTRIBUTION: This order is distributed to the Air Traffic Manager's Library, Watch Desk Library and ZAN-540.

3. CANCELLATION: This order cancels ZAN Order 1900.2G, effective February 15, 2010.

4. EFFECTIVE DATE: January 3, 2011.

5. BACKGROUND: Volcanic eruptions and subsequent ash drift/fallout have caused delays and damage to aircraft and equipment. There is a continuing possibility of further eruptions, particularly in the Cook Inlet and Aleutian Chain areas of Alaska, and the Kamchatka Peninsula and Kurile Islands of the Russian Far East. Notification of activity could be received from several sources, which include the Alaska Volcano Observatory (AVO), the Regional Operations Center (ROC), the Regional Air Operations Center (RAOC), the Anchorage Volcanic Ash Advisory Center (VAAC), the Tokyo VAAC, the Kamchatkan Volcanic Eruption Response Team (KVERT), Sakhalin Volcanic Eruption Response Team (SVERT), airline operators, pilot report, other FAA facilities, or the general public.

6. RESPONSIBILITIES: Upon receiving notification of an eruption or possible eruption:

a. The Watch Supervisor must:

(1) Verify the occurrence of volcanic activity with the AVO at (907) 786-7497. Additional contact numbers can be found in Appendix E of this document and the Alaska Interagency Plan for Volcanic Ash Episodes.

(a) Non Eruptive event (Cook Inlet – Augustine/Iliamna/Redoubt/Spurr)

(i) If the AVO advises there is increased seismic or other precursory activity of a Cook Inlet volcano, but an eruptive event has ***not*** occurred, issue an Increased Volcanic Activity NOTAM (See Appendix A, Example 1), and notify personnel and facilities listed in 6.a.(2).(a). If the aviation color code has been elevated to "orange" or "red" notify personnel and facilities listed in 6.a.(2).(b) of this order as well.

(b) Non eruptive event (All other volcanoes)

(i) If the AVO advises there is increased seismic or other precursory activity of any volcano from anywhere other than Cook Inlet, but an eruptive event has ***not*** occurred, issue an Increased Volcanic Activity NOTAM (See Appendix A, Example 1), and notify personnel and facilities listed in 6.a.(2)(a) of this order.

(2) If a volcanic eruption is verified by the AVO, the Watch Supervisor must take the following action:

(a) All volcanoes, notify:

- The Center Weather Service Unit (CWSU) Meteorologist who will issue an Urgent Pilot Report (UUA). (See Appendix B.) If an eruption occurs when the CWSU meteorologist is not on duty, the WC must issue the UUA, contact the Alaskan Aviation Weather Unit (AAWU) and if required, contact a CWSU Meteorologist to report immediately to Anchorage Air Route Traffic Control Center (ARTCC).
- FLM/Controller-in-Charge (CIC).
- Regional Operations Center (ROC).
- Traffic Management Unit (TMU).

(b) Cook Inlet volcano or other volcanic eruptions affecting air traffic within ZAN FIR, notify:

- Anchorage ARTCC Air Traffic Manager (ATM).
- Anchorage ARTCC Staff Manager.
- Traffic Management Officer (TMO).
- Operations Manager (OM) of affected area.
- Flight Service Station (FSS) closest to the volcanic activity.
- Anchorage Approach (A11) Watch Supervisor.
- Service Operations Center (SOC).
- Air Traffic Control System Command Center (ATCSCC).

(c) In accordance with 14 CFR Section 91.137(a) (1), and after coordination with Western Service Center (see JO 7210.3V ZAN SUP 2), issue an FDC Flight Restriction NOTAM (TFR) if it is determined that the volcanic event could endanger airborne aircraft and occupants. (See Appendix A, Example 2).

(d) Designate a Weather Coordinator (WC) if necessary.

(e) Issue a Volcanic Ash Advisory NOTAM, including the aviation color code "orange" or "red", if any ash may be present. (See Appendix A, Example 3). (See Appendix C for AVO Alert Levels).

(f) When requested by AVO, assist them in relaying and/or obtaining information from KVERT through coordination with Petropavlovsk-Kamchatsky ACC.

b. FLM/CIC must:

(1) Ensure that Pilot Reports (PIREPs) are solicited by controllers and recorded on a PIREP form.

NOTE: *Pilots may forward PIREPs regarding volcanic activity using the format described in the Volcanic Activity Reporting Form (VAR), see Appendix D.*

(2) Disseminate NOTAM, PIREP, TFR, MIS, SIGMET and current conditions information to controllers on duty.

c. Traffic Management Unit must:

(1) Provide assistance to the Watch Supervisor as needed.

(2) Evaluate the areas impacted by volcanic activity to determine if any Traffic Management Initiatives (TMIs) are required.

(3) Prior to initiating TMIs, advise the Watch Supervisor and FLM/CIC.

(4) Coordinate TMIs with affected facilities and the ATCSCC.

(5) Monitor the affected area and any resulting TMIs, and modify as needed.

(6) Request AVO to participate in Telcons to provide volcanic activity updates as needed.

d. Controllers must:

(1) Ensure that all aircraft in the affected area are aware of the most current information available concerning the volcanic eruption and any resultant ash dispersal.

(2) With pilot concurrence, suggest headings or reroutes around known ash or possible ash cloud locations.

(3) Assist VFR aircraft to the extent possible in avoiding known ash cloud locations.

(4) Solicit PIREP information and record on a PIREP form. Forward this information to the FLM/CIC.

(5) Broadcast information received relating to the volcanic event/ash drift.

7. APPENDICES:

a. Appendix A: Volcano NOTAM Examples

b. Appendix B: Urgent Pilot Report Example

c. Appendix C: Aviation Color Code and Ground-Based Hazard Charts

d. Appendix D: Volcanic Activity Reporting Form (VAR)

e. Appendix E: AVO Points of Contact and Web Addresses

Bob Watkins
Air Traffic Manager

APPENDIX A

VOLCANO NOTAM EXAMPLES

Templates are located on the share drive at: S:\ZAN_AT\OPSSHARE\VOLCANO NOTAMS

EXAMPLE 1: Increased Volcanic Activity NOTAM

PLEASE ISSUE THIS INTERNATIONAL NOTAM WITH THE FOLLOWING TEXT (INCLUDE AVIATION COLOR CODE IF EITHER "ORANGE" OR "RED"):

_____ / ____ ZAN FI/T /ZAN/ VOLCANIC ACTIVITY ADVISORY FOR _____name_____ VOLCANO AK/__(latitude and longitude of volcano)__ /ALASKA VOLCANO OBSERVATORY HAS REPORTED INCREASED VOLCANIC ACTIVITY IN THE VICINITY OF _____name____ VOLCANO WHICH INDICATES THE POSSIBILITY OF A VOLCANIC ERUPTION. (AVIATION ALERT COLOR CODE __(orange/red)__ IS IN EFFECT). AIRCRAFT SHOULD REMAIN ALERT FOR POSSIBLE ERUPTION, STEAM OR ASH CLOUDS AND REPORT ANY SIGHTINGS TO ATC IMMEDIATELY. CONTACT ANCHORAGE ARTCC AT 907-269-1103 FOR ADDITIONAL INFORMATION.

EXAMPLE 2: FDC Flight Restrictions NOTAM

PLEASE ISSUE THE FOLLOWING TEMPORARY FLIGHT RESTRICTION (TFR):

FDC ___ /_____ ZAN AK. FLIGHT RESTRICTIONS ___(name)_____ VOLCANO, AK. EFFECTIVE IMMEDIATELY UNTIL FURTHER NOTICE. PURSUANT TO 14 CFR SECTION 91.137 (A) (1). TEMPORARY FLIGHT RESTRICTIONS ARE IN EFFECT FROM SURFACE TO ___(affected altitude)__ WITHIN __(number of nautical miles)__ NAUTICAL MILE RADIUS OF ___(fix/radial distance or latitude/longitude)__. PILOTS ARE ADVISED TO EXERCISE EXTREME CAUTION WHEN OPERATING NEAR THIS RESTRICTED AREA PARTICULARLY WHILE DOWNWIND FROM THE VOLCANO. CHECK CURRENT CWA, SIGMET AND PIREP INFORMATION. ANCHORAGE /ZAN/ ARTCC 907-269-1103 IS THE FAA COORDINATION FACILITY. WIE UNTIL UFN.

EXAMPLE 3: Volcanic Ash Advisory NOTAM

This type of NOTAM should be issued, including the aviation color code, when advised the volcano status has been upgraded to "ORANGE" or "RED" and ash may be present. If a "RED volcano is subsequently downgraded to "ORANGE" but ash may be present, the NOTAM should be modified to reflect the change in color code. This NOTAM should be cancelled when the volcano is further downgraded to "YELLOW" or "GREEN," or when ash is no longer expected to be present. If the volcano remains restless and no ash emissions are present or expected, issue the NOTAM shown in Appendix A, Example 1.

A0294/07 - VOLCANIC ADVISORY FOR KLYUCHEVSKOY VOLCANO, KAMCHATKAN PENINSULA, RUSSIA, 5603N16039E. EFFECTIVE IMMEDIATELY UNTIL FURTHER NOTICE. KLYUCHEVSKOY VOLCANO HAS BEEN IN AN ACTIVE STATE. HAZARDOUS EMISSIONS OF VOLCANIC ASH HAVE INTERMITTENTLY COMPLICATED AIR TRAVEL IN THE AREA. ANY IMPACT ON AIRCRAFT OPERATIONS IS DESCRIBED IN CURRENT SIGMET, CWA OR PIREP INFORMATION. AIRCRAFT SHOULD REMAIN ALERT FOR POSSIBLE ASH CLOUDS AND REPORT ANY SIGHTINGS TO ATC. AIRCRAFT OPERATORS SHOULD CONTINUALLY EVALUATE OPERATION IN THE SIGMET AREA. AVIATION ALERT COLOR CODE (ORANGE/RED) IS IN EFFECT. FLIGHT INTO VOLCANIC ASH MAY CAUSE ENGINE DAMAGE/FAILURE AND ABRASION DAMAGE TO AIRFRAME AND WINDSHIELD SURFACES. ANY AIR CARRIERS, INCLUDING FOREIGN AIR CARRIERS THAT OBSERVE OR EXPERIENCE ANY DIFFICULTIES RESULTING FROM AN ENCOUNTER WITH VOLCANIC ASH, PLEASE NOTIFY ATC IMMEDIATELY IN ACCORDANCE WITH FAR 121.561 AND ICAO, ANNEX 3, PARAGRAPH 5.5 (SPECIAL AIRCRAFT OPERATIONS), AND ANNEX 6 PARAGRAPH 4.4.3 (HAZARDOUS FLIGHT CONDITIONS). CONTACT ANCHORAGE ARTCC, 907-269-1103 FOR ADDITIONAL INFORMATION. WIE UNTIL UFN.

APPENDIX B

FORMAT FOR VOLCANO URGENT PIREP (UUA) WHEN CWSU IS NOT STAFFED

If a pilot report is received on a volcanic eruption and the presence of ash is suspected or confirmed, prepare an Urgent PIREP (UUA) in the following format:

UUA/OV ___(CDB or ANC)___ /TM ___(time in four digits UTC)___ /FL ___(in three digits or UNKN)___ /RM AN ERUPTION OF ___(name of volcano)___ OCCURRED AT _____ UTC. EXTENT OF PLUME IS NOT IMMEDIATELY KNOWN. A CWA OR SIGMET WILL BE ISSUED WHEN MORE INFORMATION BECOMES AVAILABLE. (ZAN)

For ease of PIREP input and dissemination, use the following location identifiers when recording volcanic activity:

ANC - for all volcanoes in Cook Inlet and Southeast Alaska.

CDB - for all volcanoes in Western Alaska, the Aleutian Chain, Kamchatka Peninsula and the Kurile Islands.

APPENDIX C

ALASKA VOLCANO OBSERVATORY
AVIATION COLOR CODES

To more concisely describe the level of concern about possible or ongoing eruptive activity from an Alaskan volcano, the Alaska Volcano Observatory (AVO) uses the following color-coded classification system. Definitions of the colors reflect AVO's interpretations of the behavior of the volcano. Definitions are listed below, followed by general descriptions of the typical activity associated with each color.

Aviation Color Code Used by USGS Volcano Observatories

Color codes, which are in accordance with recommended International Civil Aviation Organization (ICAO) procedures, are intended to inform the aviation sector about a volcano's status and are issued in conjunction with an Alert Level. Notifications are issued for both increasing and decreasing volcanic activity and are accompanied by text with details (as known) about the nature of the unrest or eruption, especially in regard to ash-plume information and likely outcomes.

Color	Description
GREEN	Volcano is in typical background, noneruptive state or, *after a change from a higher level,* volcanic activity has ceased and volcano has returned to noneruptive background state.
YELLOW	Volcano is exhibiting signs of elevated unrest above known background level or, *after a change from a higher level,* volcanic activity has decreased significantly but continues to be closely monitored for possible renewed increase.
ORANGE	Volcano is exhibiting heightened or escalating unrest with increased potential of eruption, timeframe uncertain, **OR** eruption is underway with no or minor volcanic-ash emissions [ash-plume height specified, if possible].
RED	Eruption is imminent with significant emission of volcanic ash into the atmosphere likely **OR** eruption is underway or suspected with significant emission of volcanic ash into the atmosphere [ash-plume height specified, if possible].

ALASKA VOLCANO OBSERVATORY
VOLCANIC ALERT LEVELS FOR GROUND-BASED HAZARDS

Volcano Alert Levels Used by USGS Volcano Observatories

Alert Levels are intended to inform people on the ground about a volcano's status and are issued in conjunction with the Aviation Color Code. Notifications are issued for both increasing and decreasing volcanic activity and are accompanied by text with details (as known) about the nature of the unrest or eruption and about potential or current hazards and likely outcomes.

Term	Description
NORMAL	Volcano is in typical background, noneruptive state or, *after a change from a higher level,* volcanic activity has ceased and volcano has returned to noneruptive background state.
ADVISORY	Volcano is exhibiting signs of elevated unrest above known background level or, *after a change from a higher level,* volcanic activity has decreased significantly but continues to be closely monitored for possible renewed increase.
WATCH	Volcano is exhibiting heightened or escalating unrest with increased potential of eruption, timeframe uncertain, **OR** eruption is underway but poses limited hazards.
WARNING	Hazardous eruption is imminent, underway, or suspected.

APPENDIX D

VOLCANIC ACTIVITY REPORTING FORM (VAR)

Date _____

SECTION 1 - Transmit to ATC via radio

1. Aircraft Identification	
2. Position	
3. Time (UTC)	
4. Flight level or altitude	
5. Position/location of volcanic activity or ash cloud	
6. Air temperature	
7. Wind	
8. Supplementary Information (Brief description of activity including vertical and lateral extent of the ash cloud, horizontal movement, rate of growth, etc., as available).	

Mark the appropriate box(es).

SECTION 2 - Complete and forward

9. Density of ash cloud	☐ wispy	☐ moderately dense	☐ very dense
10. Color of plume or cloud	☐ white ☐ black	☐ light gray	☐ dark gray
11. Eruption	☐ continuous	☐ intermittent	☐ not visible
12. Position of activity	☐ summit ☐ multiple	☐ side ☐ not observed	☐ single
13. Other observed features of eruption	☐ lightening ☐ ash fallout	☐ glow ☐ mushroom cloud	☐ large rocks ☐ none
14. Effect on aircraft	☐ communications ☐ pilot static ☐ windows	☐ navigation systems ☐ windscreen ☐ none	☐ engines ☐ other
15. Other effects	☐ turbulence ☐ ash deposits	☐ St. Elmo's Fire	☐ fumes
16. Other information deemed useful			

Forward completed form via mail to:
Global Volcanism Program
NHB-119
Smithsonian Institution
Washington, DC 20560

Fax to:
Global Volcanism Program
(202) 357-2476

APPENDIX E
AVO POINTS OF CONTACT AND WEB ADDRESSES

AVO PRINCIPLE CONTACTS AND PHONE NUMBERS:

24 Hour Access:	907-786-7497
AVO Duty Scientist:	907-632-2275
AVO Scientist-In-Charge	907-632-2276

VOLCANO INFORMATION WEBSITES:

SIGMET/AIRMET Information:	http://aawu.arh.noaa.gov/
NOTAM Information:	https://www.notams.faa.gov
PIREP Information:	http://aawu.arh.noaa.gov/pireps/webPirep.htm
Anchorage VAAC:	http://aawu.arh.noaa.gov/vaac.php
Alaska Volcano Observatory:	http://www.avo.alaska.edu/
Ash Fall and Marine Advisories:	http://cwsu.arh.noaa.gov/
HYSPLIT Trajectories: (Alaska Volcanoes)	http://ready.arl.noaa.gov/READY_traj_alaska.php
Temporary Flight Restrictions:	http://tfr.faa.gov/tfr2/list.jsp
PUFF Model:	http://pafc.arh.noaa.gov/puffweb2/puffweb.php
KVERT (Current Volcanic Activity):	http://www.kscnet.ru/ivs/kvert/current/index_eng.php
NOAA Satellite & Information Service: (Split Window Loops/Kamchatka)	http://www.ssd.noaa.gov/VAAC/BEZY/SPLT/sploop.html
NOAA Satellite & Information Service: (Split Window Loops/Aleutians)	http://www.ssd.noaa.gov/VAAC/ALEUT/SPLIT/splitloop.html
NOAA Satellite & Information Service: (Aleutian Islands Volcano Watch)	http://www.ssd.noaa.gov/VAAC/aleut.html
NOAA Satellite & Information Service: (Kamchatka Volcano Watch)	http://www.ssd.noaa.gov/VAAC/kamchatka.html
Volcanic Ash Transport & Dispersion: (VAFTAD)	http://www.arl.noaa.gov/ready/ash.html
Tokyo VAAC	http://ds.data.jma.go.jp/svd/vaac/data/index.html

ORDER

U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

ZOA AT 7110.??

Oakland Air Route Traffic Control Center
Fremont, California

SUBJ: OAKLAND ARTC CENTER VOLCANIC ASH AND TRAFFIC MANAGEMENT UNIT PACOTS TRACK GENERATION PROCEDURES

1. **PURPOSE**. This order establishes procedures for Volcanic Ash Information dissemination, handling airborne aircraft and generating the PACOTS Tracks when Volcanic Ash is present.

2. **DISTRIBUTION**. This order is distributed to Flight Data, Traffic Management and Oceanic personnel at Oakland Center as well as selected offices in the Western-Pacific Regional Office.

4. **BACKGROUND**. Volcanic Ash (VA) has caused engine failure on airborne aircraft and poses a serious risk to aircraft. This Order establishes procedures to be used when Volcanic Activity affects or will have an impact on Oakland ARTCC.

6. **PROCEDURES**.

a. When Flight Data receives Volcanic Ash Advisories (VAA) or other volcanic information, it shall immediately be distributed to the Operational Manager In Charge (OMIC).
b. The OMIC, as a top priority, shall determine the affected airspace and distribute the information to TMU and the affected Areas.
c. Volcanic Activity Contact and Information Websites are listed in Appendix 2.
d. If Volcanic Ash is present that indicates the current PACOTS Tracks may be affected, TMU must take the following actions:
    (1) Plot the current affected area to determine the affected area and altitudes. Consider how the forecasted ash cloud drift (6, 12 and 18 hour forecasts) will affect traffic.
    (2) Volcanic Ash plumes at F240 and below are not a factor for PACOTS Tracks.
    (3) Issue a NOTAM advising of the potential risk if a PACOTS track is affected by Volcanic Ash (VA). A sample NOTAM is included in Attachment 1.
    (4) Determine if published PACOTS tracks are affected by the VA.
        (a) If the published PACOTS are affected consult with the Oceanic FLM.
        (b) If aircraft for the affected PACOTS are airborne it will be necessary for the controller to issue advisories of the Ash Plume to the aircraft. This will likely cause aircraft to request re-routes away from the VA.
        (c)If time permits, have the ATCSCC schedule a teleconference with the International Operators, Japan ATMC and Anchorage ARTCC. The telecon would ideally be at least 1 hour from the current time to allow the operators to get the correct personnel on the telecon, however timing may not permit advance notification to the operators.
        (d)When conducting a Volcanic Ash Telecom send a High Priority email to the Oceanic Critical Event Contact List advising of the telecom details.
        (e) On the telecom discuss the VA plume and options for managing the traffic. Get operator feedback and develop a plan.

Distribution: All ZOA AT Personnel, AWP-503 **Initiated By:** ZOA-520

ZOA AT 7110.22G

Note: ICAO Documents require Operators to have an SMS process in place to determine if it is safe to fly through airspace contaminated by VA.

(i) How will airborne aircraft be managed?

(ii) Do the published PACOTS need to be republished in a different location.

(iii) Instead of moving PACOTS Tracks an alternative is to publish an additional avoidance Track(s) and issue a NOTAM that states that certain Tracks may be affected by VA. A sample NOTAM is included in Appendix 1.

(5) Determine if future PACOTS tracks will be affected by the VA.

(a) Volcanic Ash plumes at F240 and below are not a factor for PACOTS Tracks.

(b) Determine the PACOTS Track effective times and ensure the VAA ash plume forecast covers all of the effective times of the PACOTS Track. If necessary, delay PACOTS generation until the VAA forecast covers the entire effective times of the PACOTS Tracks being generated.

(c) Plot the VAA to determine the affected area and altitudes.

(d) Determine if PACOTS to be generated are affected by the VA.

(f) If the PACOTS will be affected by the VA:

a. consult with the Oceanic FLM, and:

b. TMU will coordinate with the ATCSCC to schedule a telecom with the International Operators, Japan ATMC, the (VAC) and Anchorage ARTCC. The telecom would ideally be at least 1 hour from the current time to allow the operators to get the correct personnel on the telecom.

c. When conducting a Volcanic Ash Telecom TMU will send a High Priority email to the Oceanic Critical Event Contact List advising of the telecom details.

(g) On the telecom discuss the VA plume and options for managing the traffic. If the determination is made that the PACOTS Tracks will be affected, suggest on the telecom that Oakland will generate the PACOTS Tracks 25 nm clear of the VAA forecast. Get operator feedback on the proposed plan and attempt to develop a consensus plan.

Note: ICAO Documents require Operators to have an SMS process in place to determine if it is safe to fly through airspace contaminated by VA.

Appendix 1

ATTN AIRCRAFT OPERATORS AND FLIGHT DISPATCHERS. DUE TO SHEVELUCH VOLCANIC ACTIVITY AIRCRAFT TRANSITING BETWEEN NORTH AMERICA AND JAPAN/ASIA SHOULD USE SMS PROCESS TO DETERMINE WHETHER TO USE PUBLISHED PACOTS TRACKS C, E, F OR M FOR PACIFIC OCEAN CROSSING. AN ALTERNATE TRACK G HAS BEEN PUBLISHED WHICH AVOIDS CURRENT FORECAST FOR ASH CLOUD MOVEMENT. OPERATORS MAY ALSO ELECT TO FLY A USER PREFERRED ROUTE IN PLACE OF A PACOTS TRACK. QUESTIONS REGARDING FLIGHT PLANNED ROUTES CAN BE DIRECTED TO THE OAKLAND OCEANIC SUPERVISOR AT (510) 745-3342

ZOA AT 7110.22G

Appendix 2

VOLCANIC POINTS OF CONTACT AND WEB ADDRESSES

AVO PHONE NUMBERS:
24 Hour Access: 907-786-7497
AVO Duty Scientist: 907-632-2275
AVO Scientist-In-Charge 907-786-7488

VOLCANO INFORMATION WEBSITES:
SIGMET/AIRMET Information: http://aawu.arh.noaa.gov/

NOTAM Information: https://www.notams.faa.gov/

PIREP Information: http://aawu.arh.noaa.gov/index.php?tab=4&hour=3

Anchorage VAAC: http://vaac.arh.noaa.gov/

Alaska Volcano Observatory: http://www.avo.alaska.edu/

Ash Fall and Marine Advisories: http://cwsu.arh.noaa.gov/

HYSPLIT Trajectories: http://ready.arl.noaa.gov/READY_traj_alaska.php
(Alaska Volcanoes)

Temporary Flight Restrictions: http://tfr.faa.gov/tfr2/list.jsp

PUFF Model: http://avo-volcview.wr.usgs.gov/puff/main.pl

KVERT (Current Volcanic Activity): http://www.kscnet.ru/ivs/kvert/index_eng.php

NOAA Satellite & Information Service: http://www.ssd.noaa.gov/VAAC/kamchatka.html
(Split Window Loops/Kamchatka)

NOAA Satellite & Information Service: http://www.ssd.noaa.gov/VAAC/ALEUT/SPLIT/splitloop.html
(Split Window Loops/Aleutians)

NOAA Satellite & Information Service: http://www.ssd.noaa.gov/VAAC/aleut.html
(Aleutian Islands Volcano Watch)

NOAA Satellite & Information Service: http://www.ssd.noaa.gov/VAAC/kamchatka.html
(Kamchatka Volcano Watch)

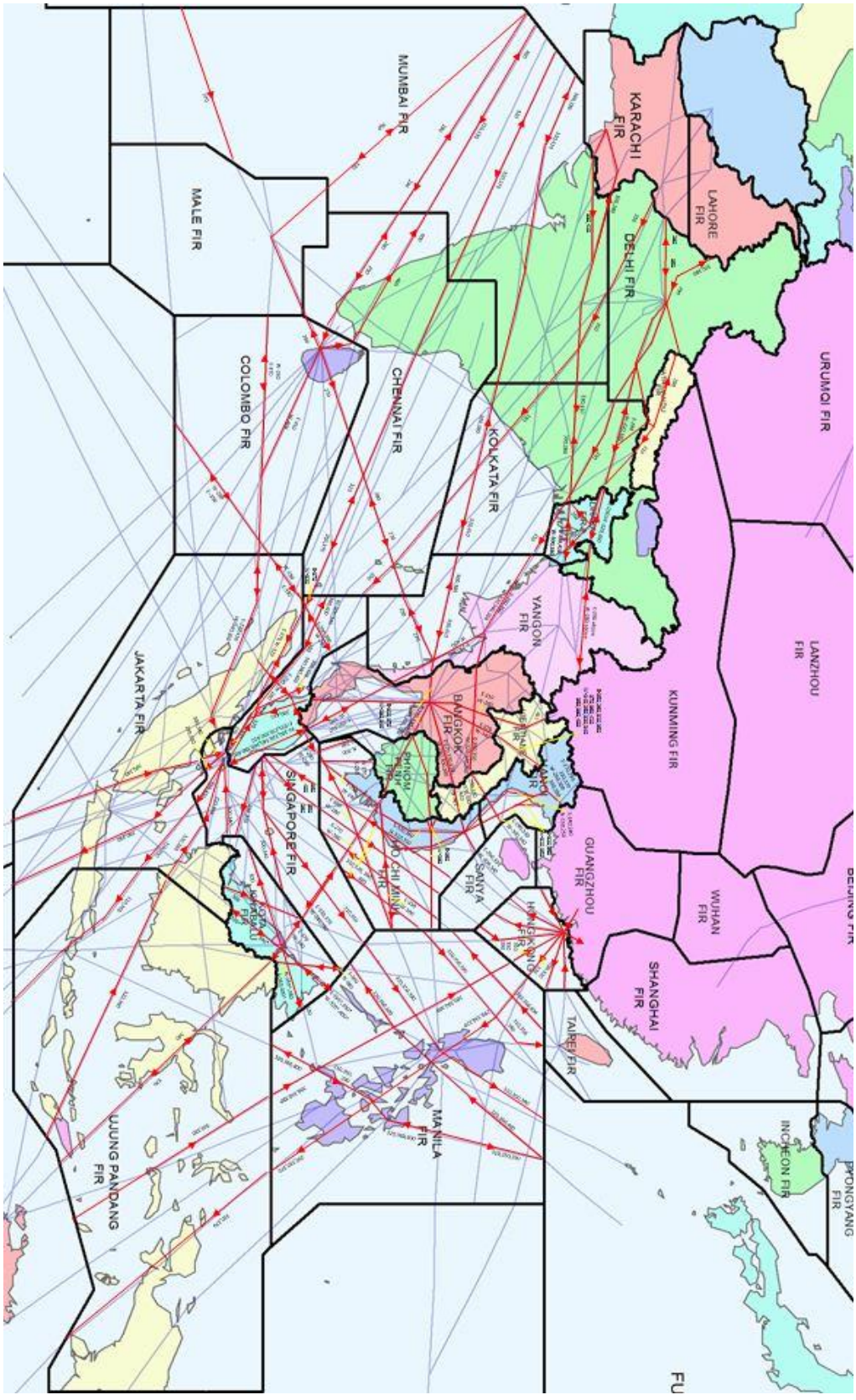
Volcanic Ash Transport & Dispersion: http://www.arl.noaa.gov/ready/ash.html
(VAFTAD)

Tokyo VAAC: http://ds.data.jma.go.jp/svd/vaac/data/index.html

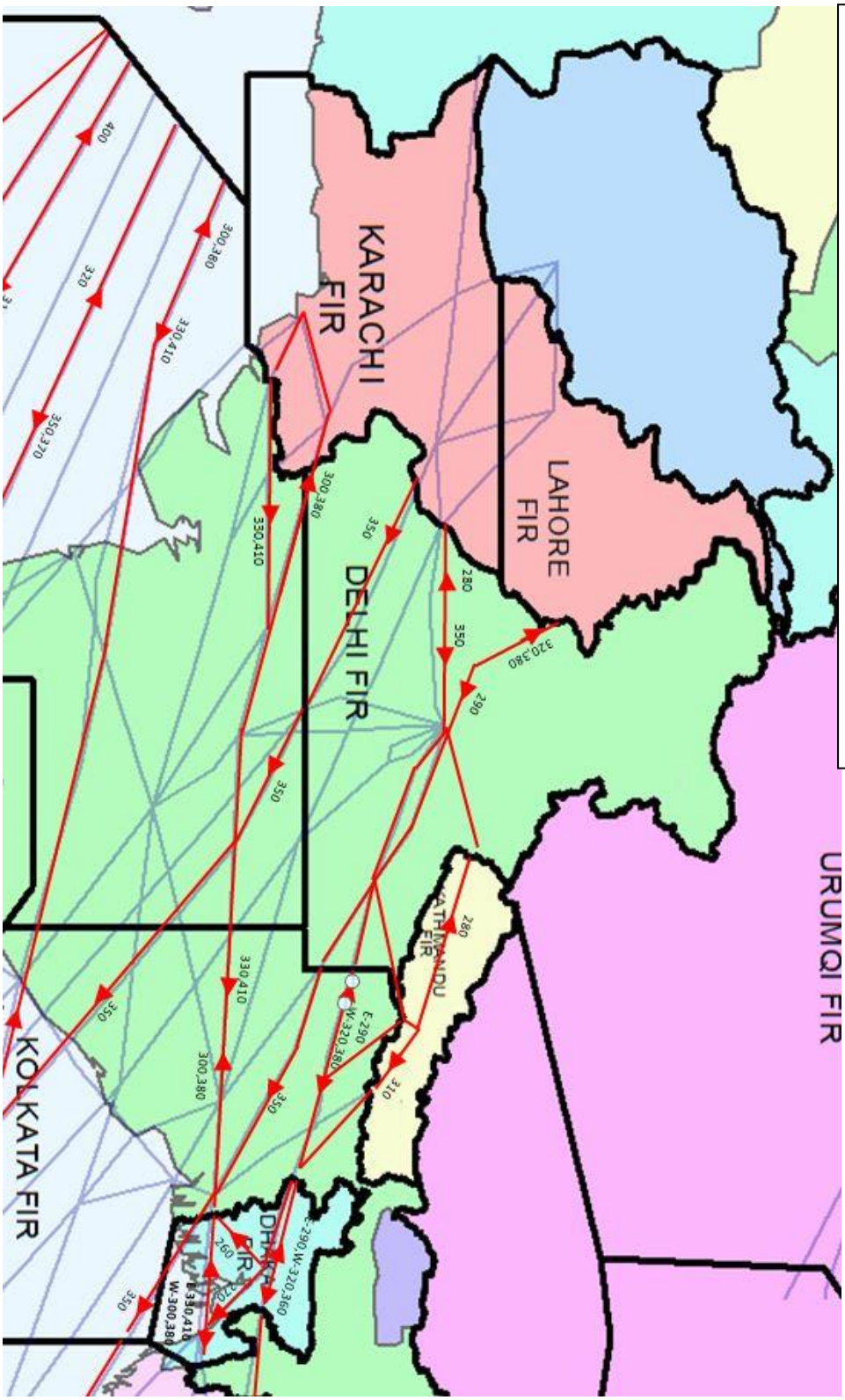
Washington VAAC: http://www.ssd.noaa.gov/VAAC/washington.html

SOUTH AND SOUTH EAST ASIA

Note: ATS contingency routes and FLAS provided in this plan are for general information and guidance only. Airspace users must refer to State AIP and NOTAM for authoritative information on ATS contingency routes and FLAS.

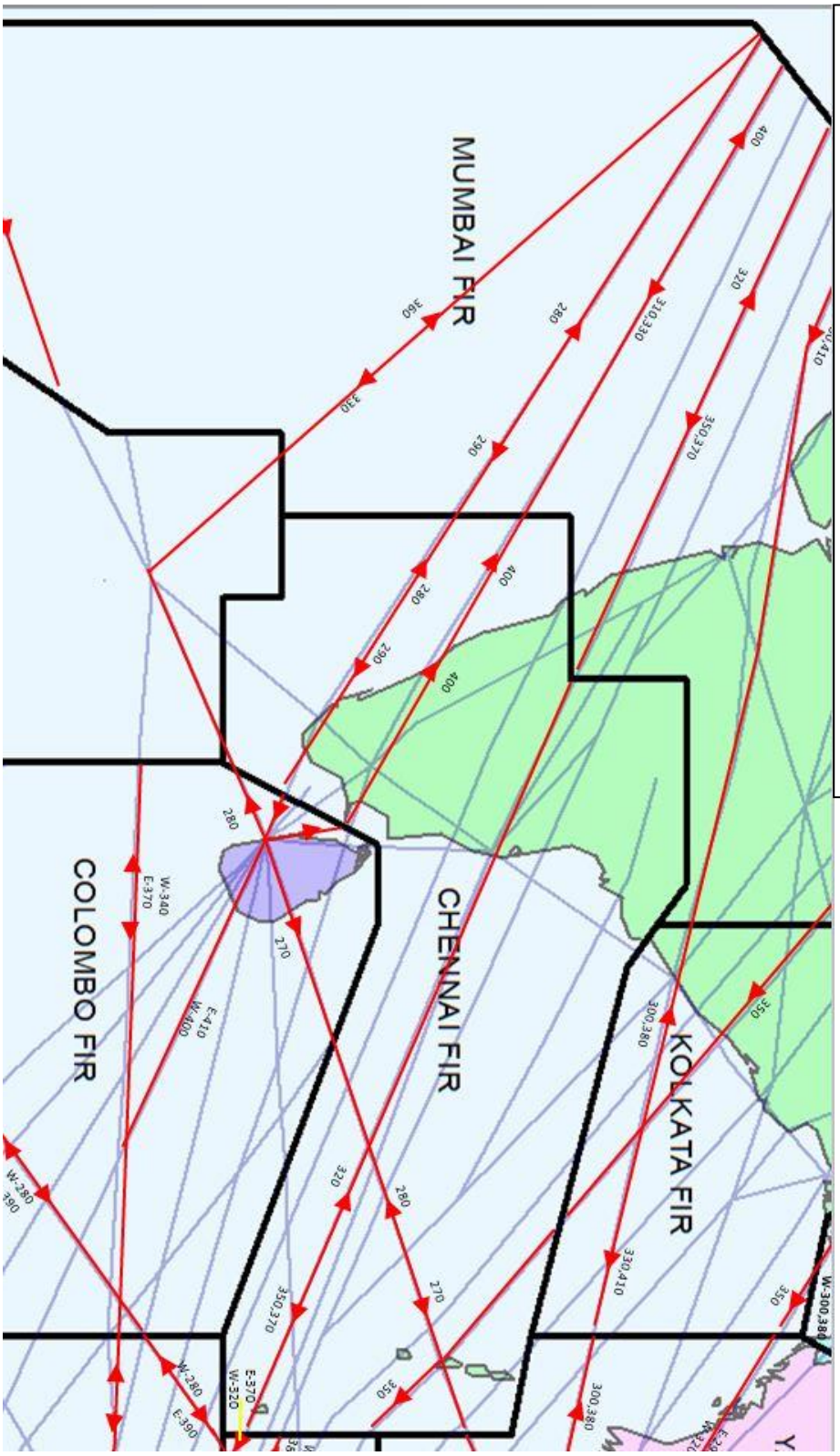


DELHI KOLKATA DHAKA FIRS



Note: ATS contingency routes and FLAS provided in this plan are for general information and guidance only. Airspace users must refer to State AIP and NOTAM for authoritative information on ATS contingency routes and FLAS.

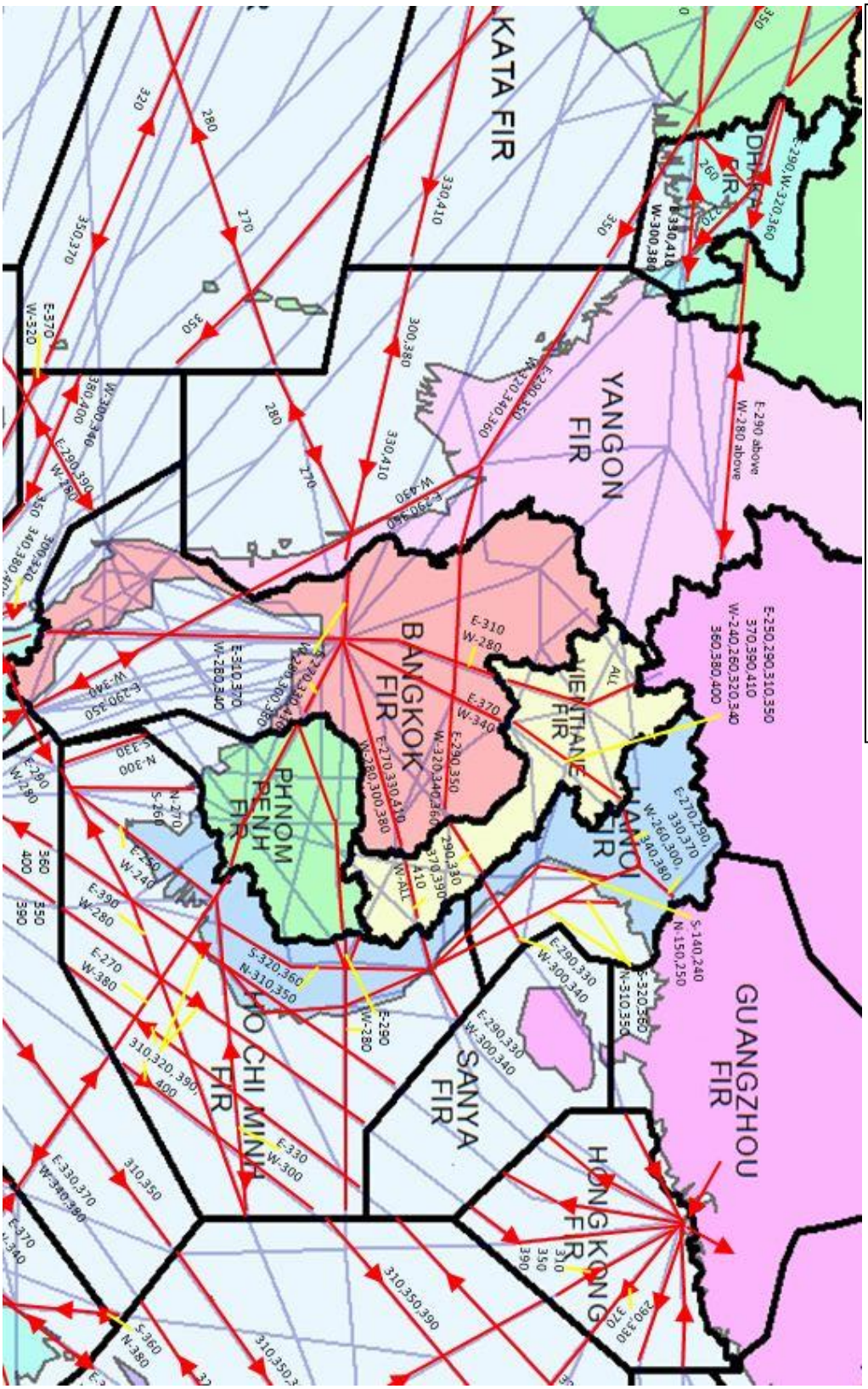
MUMBAI CHENNAI COLOMBO FIRS



Note: ATS contingency routes and FLAS provided in this plan are for general information and guidance only. Airspace users must refer to State AIP and NOTAM for authoritative information on ATS contingency routes and FLAS.

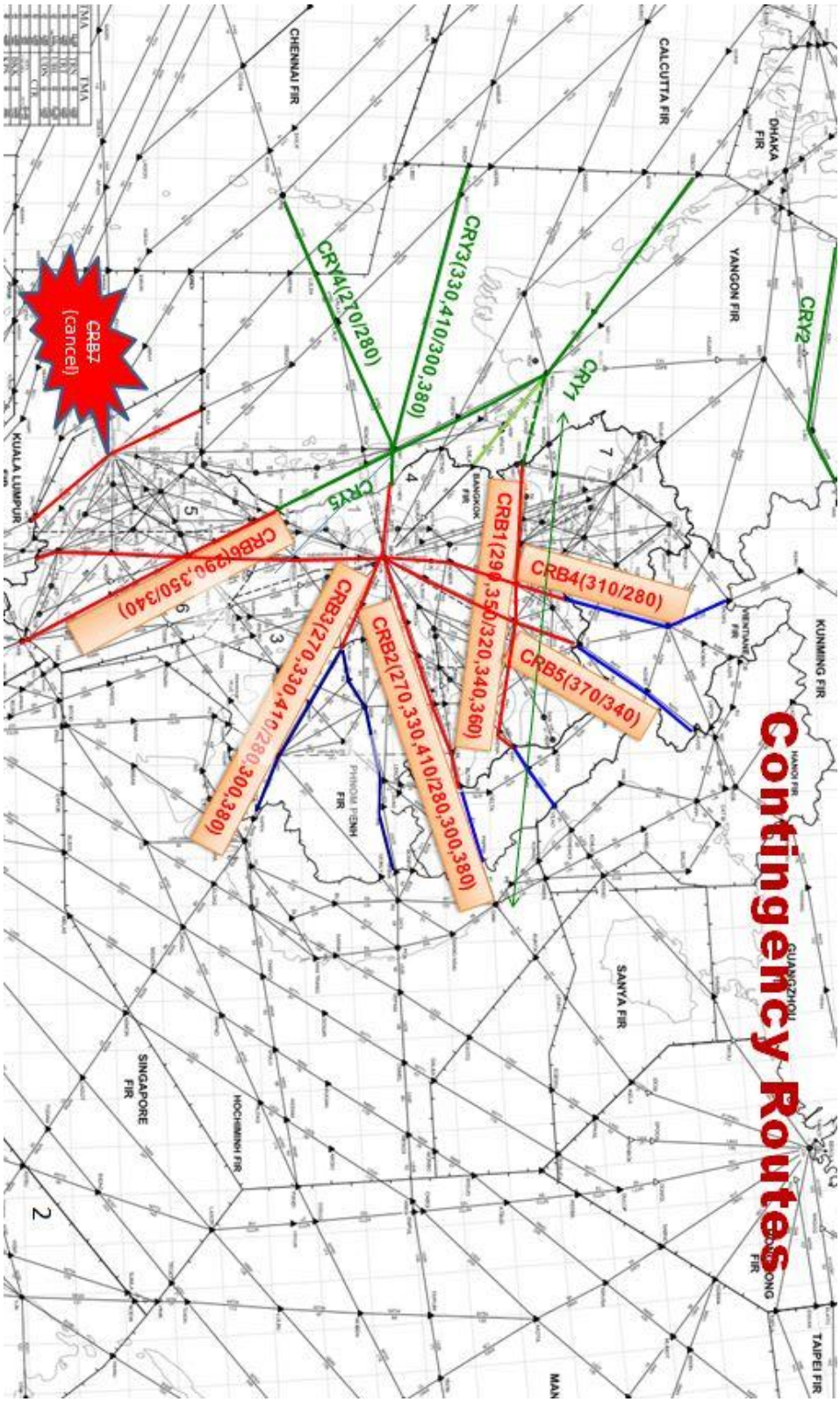
SOUTH EAST ASIA FIRS

Note: ATS contingency routes and FLAS provided in this plan are for general information and guidance only. Airspace users must refer to State AIP and NOTAM for authoritative information on ATS contingency routes and FLAS.



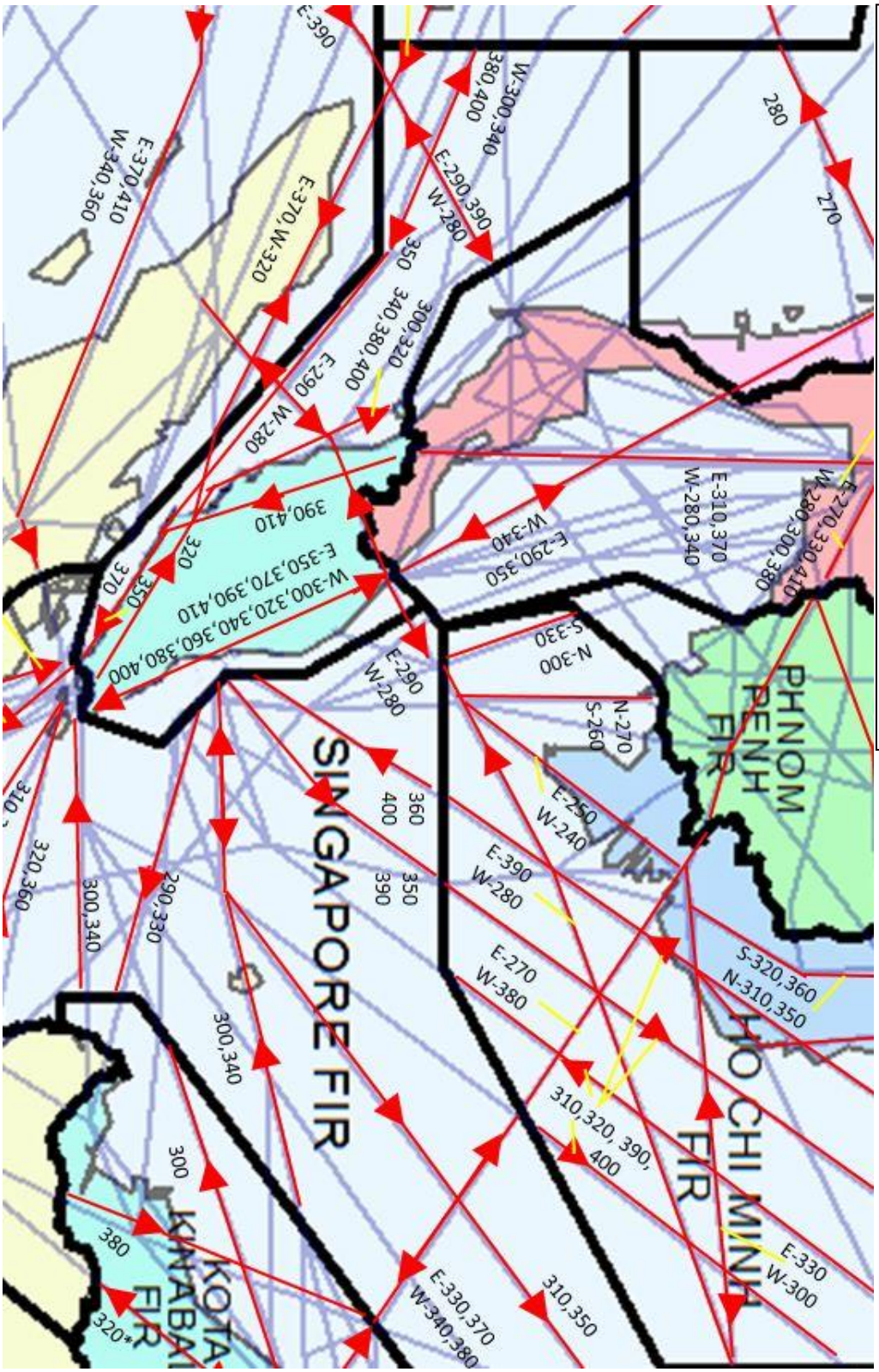
BANGKOK YANGON FIRS

Note: ATS contingency routes and FLAS provided in this plan are for general information and guidance only. Airspace users must refer to State AIP and NOTAM for authoritative information on ATS contingency routes and FLAS.



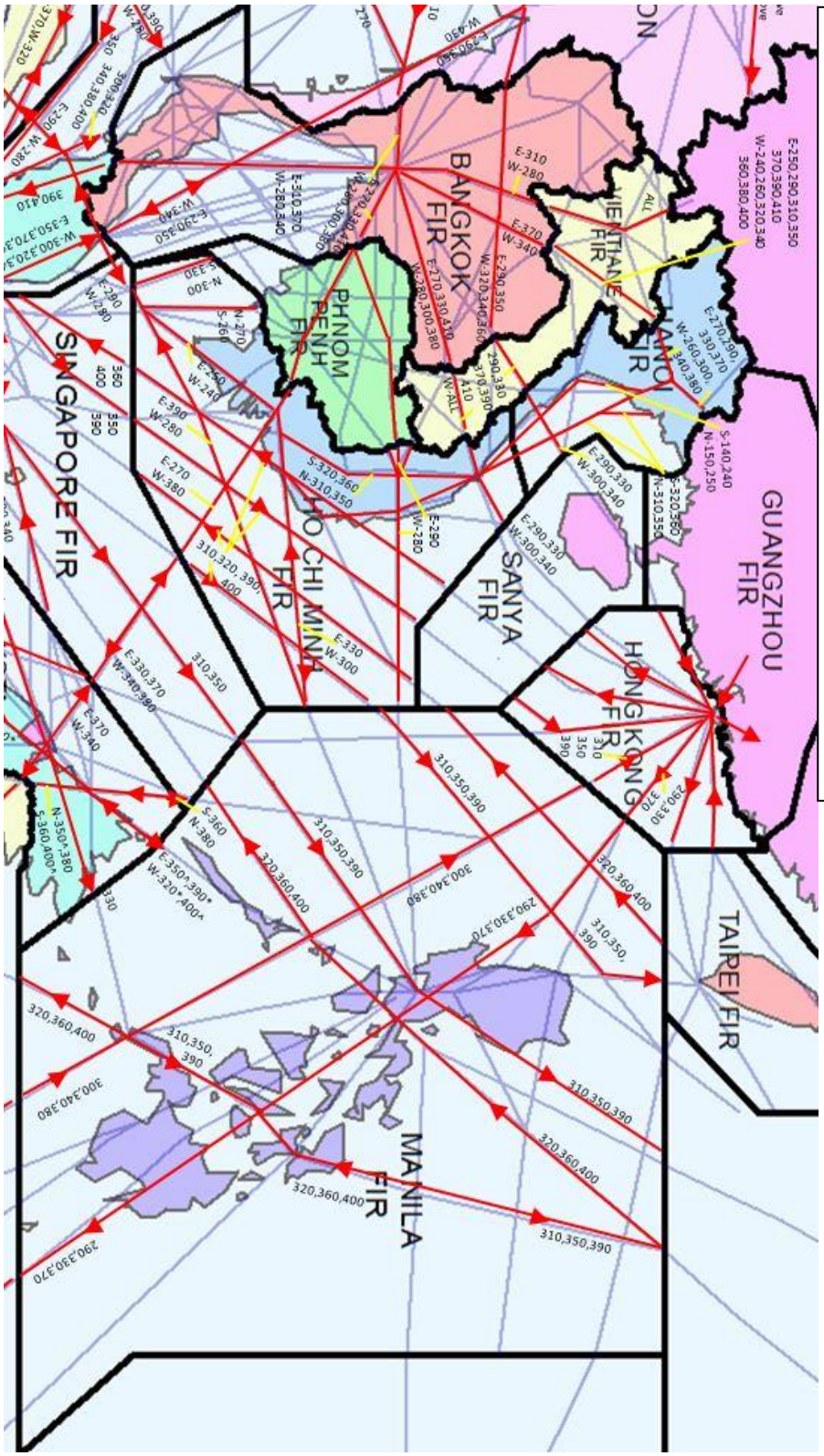
KUALA LUMPUR SINGAPORE HO CHI MINH FIRS

Note: ATS contingency routes and FLAS provided in this plan are for general information and guidance only. Airspace users must refer to State AIP and NOTAM for authoritative information on ATS contingency routes and FLAS.

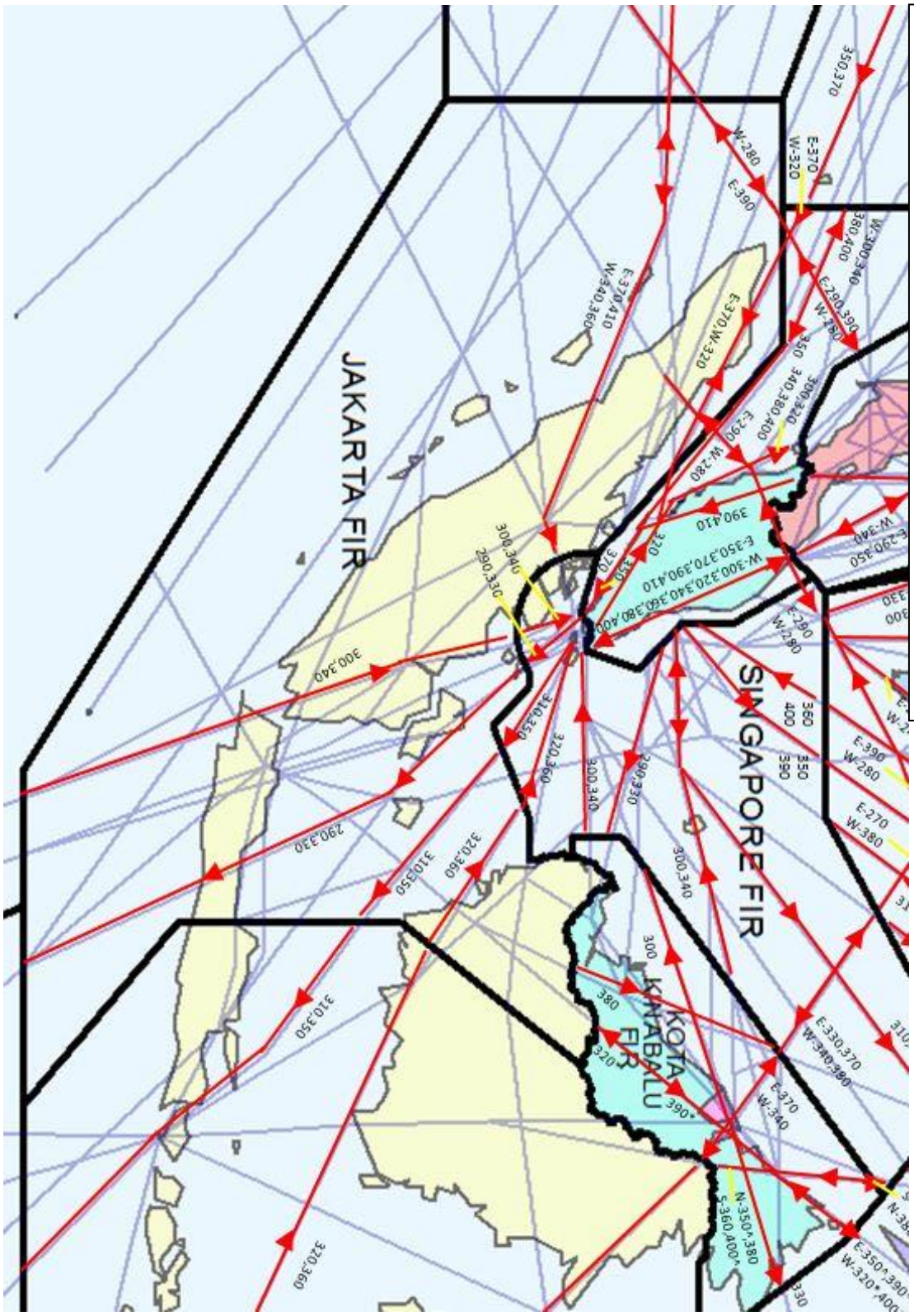


HO CHI MINH MANILA HONG KONG FIRS

Note: ATS contingency routes and FLAS provided in this plan are for general information and guidance only. Airspace users must refer to State AIP and NOTAM for authoritative information on ATS contingency routes and FLAS.

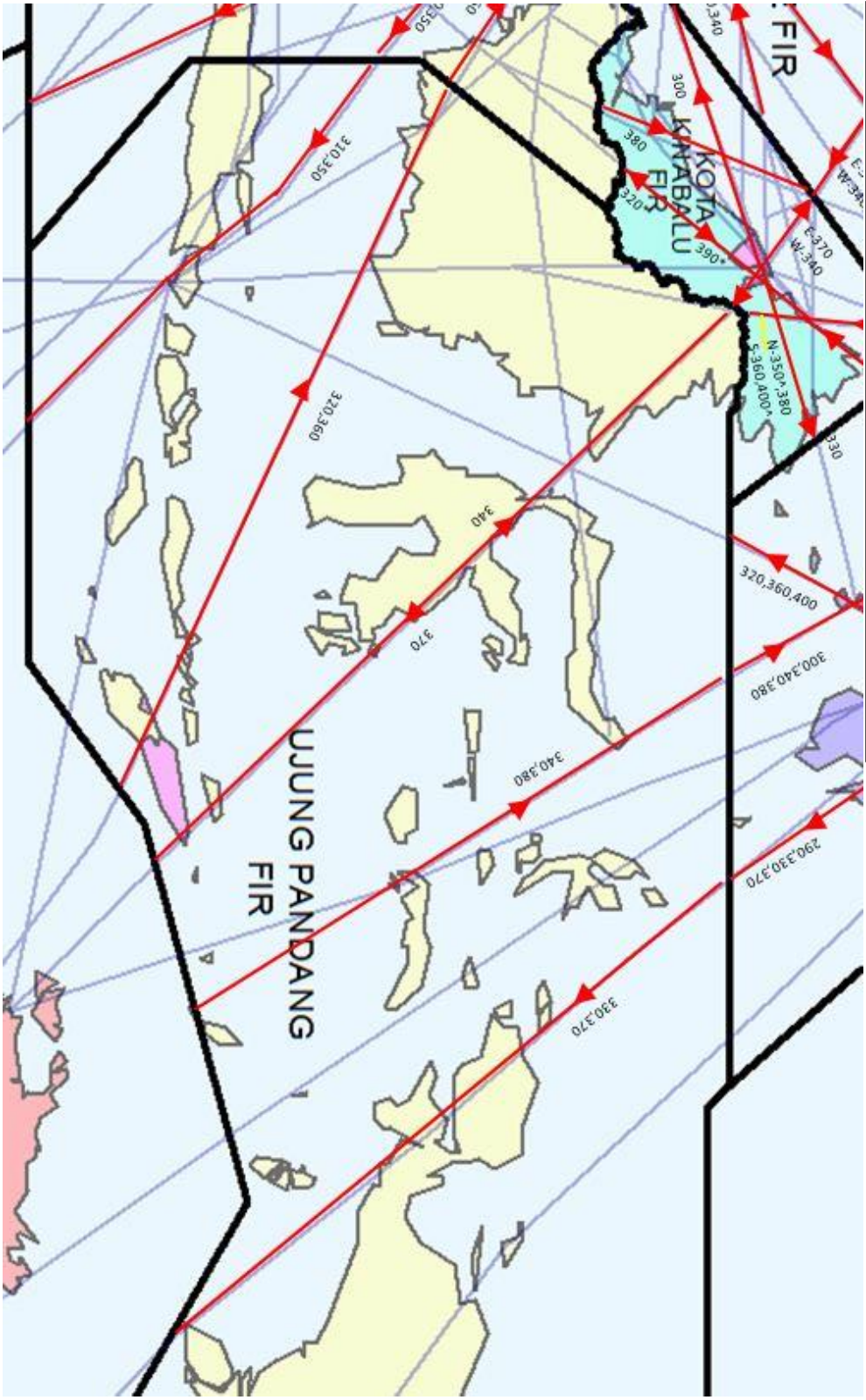


JAKARTA FIR



Note: ATS contingency routes and FLAS provided in this plan are for general information and guidance only. Airspace users must refer to State AIP and NOTAM for authoritative information on ATS contingency routes and FLAS.

UJUNG PANDANG FIR



Note: ATS contingency routes and FLAS provided in this plan are for general information and guidance only. Airspace users must refer to State AIP and NOTAM for authoritative information on ATS contingency routes and FLAS.

		Examples			Afghanistan	Australia	Bangladesh	Bhutan	Brunei Darussalam	Cambodia	China	Hong Kong, China	Macao, China	Cook Islands	DPR Korea	Fiji	French Polynesia	India	Indonesia	Japan	Kiribati	Korea, Republic of	Lao PDR	Malaysia	Maldives	Marshall Islands	Micronesia, Fed States of	Mongolia	Myanmar	Nauru	Nepal	New Zealand	Pakistan	Palau	Papua New Guinea	Philippines(working draft)	Samoa	Singapore	Solomon Islands	Sri Lanka	Thailand	Timor - Leste	Tonga	U.S.A	Vanuatu	Viet Nam	Reported States Preparedness (percentage)	Regional Preparedness (percentage)		
Reported Contingency Plan Status		1	1	0		1	1					1	1			1	1	1	1	1		1		1	1			1		1	1	1			0	1		1	1		1	1		1	X	55	**Reported Contingency Plan Status**		
Level 1 Plans																																															**Level 1 Plans**		
Level 1 Plans	Percentage of ATSU with Level 1 Plan	2	1	1		2						2	2				2	0	1				0				2		2	2				0	2		0	0		2	2			63	25			
Coordination, Testing and Review	Internal Coordination	1	1	0		1						0	0				0	1	1				1				0		1	1				0	1		1	1		1	1			73	26	Internal Coordination	**Coordination, Testing and Review**	
	Regular Testing	1	0	0		1						1	0				1	1	1				0				1		1	1				0	1		0	0		1	1			73	26	Regular Testing		
	Routine and event driven review	1	0	0		1						1	0				1	1	1				1				1		1	1				0	1		1	1		1	1			93	33	Routine and event driven review		
Category 1 and 2 Events	ATM/CNS System Failure or Degradation	1	1	1		1						1	1				1	1	1				1				1		1	1				1	1		0	1		1	1			###	36	ATM/CNS System Failure or Degradation	**Category 1 and 2 Events**	
	Staff Availability	1	1	1		1						1	0				1	1	0				0				1		0	0				0	1		0	1		1	1			60	21	Staff Availability		
	Volcanic Ash Cloud	1	0	0		1						0	0				1	0	1				1				1		1	0				1	1		0	0		0	1			60	21	Volcanic Ash Cloud		
	Earthquake	1	0	0		1						0	0				1	1	1				0				1		1	0				1	1		0	1		1	1			73	26	Earthquake		
	Inundation	1	1	0		1						0	0				1	1	0				0				1		1	0				0	1		0	1		1	1			60	21	Inundation		
	Nuclear Emergency	1	1	0		0						0	0				0	1	0				0				0		0	0				0	1		0	0		0	1			20	7	Nuclear Emergency		
	Pandemic	1	1	0		1						1	0				0	1	0				0				1		1	0				0	1		0	1		0	1			53	19	Pandemic		
	National Security	1	1	0		1						0	0				0	1	1				1				1		1	0				0	1		0	1		0	1			60	21	National Security		
DRAFT Basic Plan Elements (No. of sub-elements)	Administration (2)	2	1	0		2						0	1				2	2	2				2				2		2	2				2	2		2	2		2	2			97	35	Administration (2)	**DRAFT Basic Plan Elements**	
	Plan Management (2)	2	1	0		2						2	0				2	2	2				2				2		2	2				1	2		2	2		1	2			93	33	Plan Management (2)		
	Airspace (1)	1	1	0		1						0	0				1	1	0				1				1		1	0				0	1		0	1		0	0			53	19	Airspace (1)		
	ATM Procedures (7)	7	2	1		4						3	0				5	7	7				7				7		6	5				5	7		6	7		6	4			82	29	ATM Procedures (7)		
	Pilot/Aircraft Operator Procedures (5)	5	2	1		3						5	0				3	5	4				3				5		4	4				5	3		5	5		1	2			76	27	Pilot/Aircraft Operator Procedures (5)		
	Communications Facilities and Procedures (4)	4	2	1		2						2	0				4	4	4				4				4		4	2				2	4		1	2		2	0			68	24	Communications Facilities and Procedures (4)		
	Aeronautical Support Services (2)	2	2	0		1						0	0				2	2	2				2				2		2	2				2	1		1	2		2	1			80	29	Aeronautical Support Services (2)		
	Contact Details (2)	2	2	0		0						0	0				2	2	2				2				2		2	2				2	1		2	2		2	1			80	29	Contact Details (2)		
LEVEL 1 PLANS SCORES		**39**	**21**	**6**		**27**						**20**	**5**				**31**	**36**	**32**				**29**				**37**		**35**	**26**				*22*	**35**		**22**	**32**		**26**	**26**			**75**	**27**	**LEVEL 1 PLANS SCORES**		
Level 1 Readiness (Incomplete, Marginal or Robust)		R	M	I		M						M	I				R	R	R				M				R		R	M				*M*	R		M	R		M	M					**Level 1 Readiness (Incomplete, Marginal or Robust)**		
Level 2 Plans																																															**Level 2 Plans**		
Level 2 Inclusions	Formal Inter-State Agreements (LoA or MoU)	1	1	0		1						0	0				1	1	0				0				1		1	0				*1*	0		0	0		1	1			53	19	Formal Inter-State Agreements (LoA or MoU)	**Level 2 Inclusions**	
	Contingency Route Structure	1	0	0		1						0	0				1	0	1				0				1		0	0				*1*	1		1	1		0	0			53	19	Contingency Route Structure		
	Flight Level Allocation Scheme	1	0	0		1						0	0				1	0	1				0				1		0	0				*1*	1		1	1		0	0			53	19	Flight Level Allocation Scheme		
	Minimum Longitudinal Spacing	1	0	0		1						0	0				1	0	1				0				1		0	0				*1*	1		1	1		0	0			53	19	Minimum Longitudinal Spacing		
	Frequency Transfer Arrangements	1	1	1		1						0	0				1	0	1				0				1		1	0				*1*	1		1	1		1	0			67	24	Frequency Transfer Arrangements		
	Delegation of ATC Separation	1	1	0		0						0	0				1	0	0				0				1		0	0				*0*	1		1	0		1	0			33	12	Delegation of ATC Separation		
	Delegation of FIS and SAR Alerting Services	1	1	1		1						0	0				1	0	1				0				1		1	0				*1*	1		1	1		1	0			67	24	Delegation of FIS and SAR Alerting Services		
Level 2 Plan Scores		**7**	**4**	**2**		**6**						**0**	**0**				**7**	**1**	**5**				**0**				**7**		**3**	**0**				*6*	**6**		**6**	**5**		**4**	**1**			**54**	**19**	**Level 2 Plan Scores**		
Level 2 Plan Readiness		R	M	I		R						I	I				R	I	M				I				R		M	I				*M*	R		R	M		M	I					**Overall State Readiness**		

Level 1 Plans
0 to 15 = Incomplete
16 to 29 = Marginal
30 - 39 = Robust

Level 2 Plans
Incomplete: 0 - 2
Marginal: 3 - 5
Robust: 6 - 7

Decision 1/1 - ATM Contingency Plan Review Team Formation

That, an ATM Contingency Plan Task Force Review Team be established from the Task Force, that considered relevant portions of Level 1 (internal State) and Level 2 (Inter-State) ATM Contingency Plans, and identified areas where ATM contingency planning required improvement, in order to support the development of a Level 3 (Regional) ATM Contingency Plan, based on Basic Planning Elements agreed by the Task Force.

APPENDIX H – STATE CONTINGENCY POINTS OF CONTACT

State or Administration	Point of Contact Name/Position	Contact Phone and Email

……

APPENDIX I - ATM CONTINGENCY PLAN MONITORING AND REPORTING FORM

The following indicators are based on the Performance Improvement Plan of the Asia/Pacific Regional Contingency Plan, which should be read in conjunction with this form. The information provided will be used by the relevant Regional bodies to assess individual Administration and overall regional compliance with the Contingency Plan, and may be used by Administrations to internally evaluate their implementation status.

Indicate whether your Admininistration has:	
1. Established an ATM contingency Central Coordinating Committee, its terms of reference and procedures for activating the ATM Operational Contingency Group function.	0
2. Developed contingency plans for Category A, B and C contingency events, for all ATS units.	0
3. Developed human performance-based training and procedures for response to ATM contingency operations, for all ATS staff.	0
4. Implemented a program of regular desktop and inter-unit coordinated contingency exercises of all Level 1 contingency plans	0
5. Implemented process to review and analyze the outcomes of any testing, pre-activation or activation of a contingency plan, or any contingency exercise.	0
6. Published details of ATS contingency routes and flight level allocation schemes in AIP.	0
7. Made relevant sections of contingency plans available on the public internet website of the ANSP	0
8. Formalized Level 2 (inter-State) contingency arrangements for all relevant Level 1 contingency plans.	0
9. Harmonized, where practicable, contingency ATS routes and flight level allocation schemes with those of neighbouring States.	0
10. Ensured regulatory provisions relating to flight into airspace affected by volcanic ash are in accordance with the guidance provided in ICAO Doc 9974 - *Flight Safety and Volcanic Ash*.	0
11. Developed airspace and airport management policies and procedures for response to volcanic ash cloud, in accordance with the provisions of Doc 9974 and ICAO Doc 4444 - PANS-ATM 15.8.1c and Note 2.	0
12. Developed and maintained a list of relevant volcanoes as specified in the Smithsonian Institution *List of Volcanoes of the World for VAAC Use*, available at http://www.volcano.si.edu/projects/vaac-data/	0
13. Made available a series of templates for different stages of volcanic activity, to assist Meterological Watch Office (MWO) and Aeronautical Information Service (AIS) staff in expediting the issuance of relevant MET and AIS messages.	0
14. Conducted, at least annually, multi-lateral volcanic ash cloud exercises.	0
15. Established a mechanism to provide regular and timely updates of information to all stakeholders during a volcanic eruption and/or ash cloud event.	0
16. Established an internal crisis management centre to support the collaborative and timely sharin gof information such as volcanic eruptions	0

that will have a significant impact on airport and/or airspace management..	
17. Promulgated the national ATM contingency plan on the website of the Air Navigation Service Provider.	0
18. Reported the status of contingency planning and contingency points-of-contact to the ICAO APAC Regional Office.	0
Total (of 18)	0

……