European and North Atlantic Office

NAT SPG/41

Summary of Discussions and Conclusions of the

Forty-First Meeting of

the North Atlantic Systems Planning Group

European and North Atlantic Office ***Paris, 21 to 23 June 2005***

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LIST OF CONCLUSIONS

FOREWORD

i. Introduction

i.1 The Forty-First Meeting of the North Atlantic Systems Planning Group (NAT SPG) was held in the European and North Atlantic (EUR/NAT) Office of ICAO from 21 to 23 June 2005.

i.2 The Meeting was chaired by **Mr Ásgeir Pálsson**, the Member for Iceland. **Mr Karsten Theil**, Regional Director, EUR/NAT Office of ICAO, was the Secretary of the Meeting and was assisted by **Mr Jacques Vanier** from the EUR/NAT Office of ICAO. Assistance was also provided by **Mr Jean-Claude Bugnet**, Chief of the Joint Financing Section of the Air Transport Bureau.

i.3 The Meeting was opened by **Dr Assad Kotaite**, President of the Council of ICAO. In his opening address, the President congratulated the Group on its achievements since its establishment in 1965, specifically with regard to development of the Required Navigation Performance (RNP) concept, the Minimum Navigation Performance Specifications (MNPS) concept and Reduced Vertical Separation Minimum (RVSM). The President reminded the Group of potential differences between the States' safety oversight authorities and air navigation service providers and pointed out that a fundamental role of the Group was to act as an arbitrator in such differences. From the Agenda, the President noted the importance that had been placed on regional safety management, based on the new Annex 11 provisions, and in particular the emphasis on height monitoring to ensure the continued safety of the use of RVSM. The President wished the Group a successful outcome of its 41st Meeting. The statement by the President of the Council is reproduced in full at **Appendix A** to this report.

i.4 In his reply, the Regional Director thanked the President of the Council for attending and addressing the Meeting. He also informed the Group about changes in the working procedures of the EUR/NAT Office and assured the Group that the EUR/NAT Office would do its utmost to continue to provide full service to its work.

i.5 The Chairman informed the Group that the new Member for the United States of America was **Mr Luis Ramirez,** who replaced Mr Drazen Gardilcic and that **Mr Randy Spieran** would replace Mr Don Harris as the Member for Canada. The Group noted that Norway had expressed its regrets that it could not participate in the Meeting.

i.6 In addition to the Members of the NAT SPG and the Observer from the Russian Federation, the International Air Transport Association (IATA), the International Business Aviation Council (IBAC), the International Federation of Air Line Pilots Associations (IFALPA), the International Federation of Air Traffic Controllers' Associations (IFATCA) and the International Mobile Satellite Organization (IMSO) attended the meeting. A list of participants is at **Appendix B** to this report.

i.7 The Mathematicians' Working Group (MWG) had met at the EUR/NAT Office of ICAO from 9 to 11 May 2005 to consider the mathematical and statistical aspects of the safety of separation minima applied in the NAT Region. The Rapporteur, **Mr Stephen Kirby** of the United Kingdom, presented the MWG report in support of the assessment of current system safety performance in terms of lateral, vertical and longitudinal risk.

i.8 The Safety Management Co-Ordination Group (SMCG) had met from 1 to 3 December 2004 and from 2 to 4 May 2005. To facilitate more timely consideration of NAT system safety matters, the former Scrutiny Working Group had evolved into the Safety Management Co-ordination Group in accordance with NAT SPG Conclusion 40/19. The Rapporteur, **Mr David Nicholas** of the United Kingdom, provided the NAT SPG with their report.

i.9 The Aeronautical Communications Group (ACG) met in Gander from 30 May to 3 June 2005. The Rapporteur, **Mr Joaquim Cabral** of Portugal, provided the Group with their report.

1.10 The NAT Operations Managers were not able to meet before the NAT SPG meeting and therefore no report was available. They will be meeting in Prestwick in September 2005 and will present a report to NAT SPG/42.

i.11 The NAT Traffic Forecasting Group (NAT TFG) meets every two years and will therefore meet in 2006 and present the updates to the NAT traffic forecasts to NAT SPG/42.

i.12 The NAT Implementation Management Group (NAT IMG) had met twice since NAT SPG/40 and a report on their activities was presented to the Group.

i.13 The NAT Economic and Financial Group (NAT EFG) had met twice since NAT SPG/40 and a report on their activities and findings had been presented to the Group.

i.14 The NAT SPG expressed its appreciation to all those who had worked within the above mentioned groups for the quality of the material that they had produced.

i.15 The Group approved the following Agenda.

Agenda Item 1: Developments

- 1.1 ICAO Panels and Committees
- 1.2 Adjacent Regions
- 1.3 NAT Provider States
- 1.4 Technology

Agenda Item 2: Planning and implementation

- 2.1 NAT Implementation Management Group report
- 2.2 NAT Economic and Financial Group report
- 2.3 North Atlantic Traffic Forecasting Group report
- 2.4 Other issues

Agenda Item 3: Air navigation system review

- 3.1 Review of system safety performance
  - a) Scrutiny matters
  - b) Mathematical matters
  - c) Safety management
- 3.2 Review of systems operations
  - a) Operations managers report
  - b) Aeronautical Communications Group report

Agenda Item 4: Documentation update

- 4.1 MNPS Operations Manual
- 4.2 NAT ANP and FASID
- 4.3 On the right track DVD
- 4.4 Other documentation

Agenda Item 5: Any other business

- 5.1 Next meeting
- 5.2 Farewells

1. DEVELOPMENTS

1.1 Report on the outcome of the Thirty-Fifth Assembly

1.1.1 The Group was provided with a presentation on the ICAO Universal Safety Oversight Audit Programme (USOAP) as well as the Unified Strategy to Rectify Safety Related Differences. The roles and responsibilities of the States and of ICAO were outlined. It was stressed that ICAO auditing teams would conduct audits and provide the Civil Aviation Authorities (CAAs) with full briefings on findings, recommendations and follow-up actions. It was also pointed out that, in accordance with the outcome of the 35th Assembly, full USOAP audit reports will be made available to all concerned.

1.2 Adjacent Regions

North American (NAM) and Caribbean (CAR) Regions

1.2.1 The Group was informed that the Reduced Vertical Separation Minimum (RVSM) programme for the NAM and CAR Regions had been successfully implemented on 20 January 2005. It was pointed out that no problems had been encountered.

1.2.2 The Group was informed that work had been initiated to explore the possibility of implementing Area Navigation (RNAV) routes between the Caribbean and North American Regions, including segments through parts of the West Atlantic Route System (WATRS) area. This work would be carried out either through a new group or by the New York Oceanic Capacity Enhancement Task Force. The Group was also provided with an update on the Federal Aviation Administration (FAA) Advanced Technologies and Oceanic Procedures (ATOP) implementation programme. ATOP Build II implementation was planned for New York in May 2005 and for Anchorage in 2006. It was noted that the ATOP/Ocean21 system had begun initial operating capability at New York Center in March and was fully operational on 6 June 2005. Due in part to the capabilities provided by ATOP, combined with the apparent capabilities of aircraft operating in the WATRS area, the United States would assess the possibility of implementing RNP-10 in the WATRS airspace and would provide further information about this plan.

Arctic Ocean Interface

1.2.3 The Group was presented with information related to the air-to-ground communication constraints over the high seas areas of the Arctic Ocean and the need to transit between the Annex 2 compliant flight level allocation system used by Canada, Iceland and the United States compared to the system used by the Russian Federation in Murmansk and Magadan Flight Information Regions (FIR), which was not Annex 2 compliant. The Group noted the information and further noted that these issues were being addressed by existing groups, such as the Russian American Co-ordinating Group for Air Traffic Control (RACGAT), which had worked very effectively and productively in the past but had not met for over a year.

1.2.4 In this respect, NAT SPG invited the Russian Federation, the Unites States of America and the other stakeholders to take all necessary steps to ensure the continuation of RACGAT meetings before the end of the year 2005. All parties concerned agreed with the time frame proposed by the Group and concrete organisation actions should begin shortly after the exchange of points of contact between stakeholders.

CONCLUSION 41/1 - CONTINUATION OF "RUSSIAN AMERICAN CO-ORDINATING GROUP FOR AIR TRAFFIC CONTROL" MEETINGS

That the Russian Federation and the United States of America, together with all other stakeholders, take the necessary steps to:

a) ensure the continuation of "Russian American Co-ordinating Group for Air Traffic Control" (RACGAT) work; and

b) **convene a RACGAT meeting before the end of year 2005.**

European (EUR) Region

1.2.5 The Group was provided with an update on activities related to the Single European Sky (SES) regulations, which was being managed by the European Commission (EC). It was informed that Eurocontrol was developing several draft implementation rules on behalf of the EC. Although most of the implementation rules had no effect on the NAT Region, those related to inter-operability may have some consequences. The Group was informed that the ICAO EUR/NAT Office was being consulted regularly and that the NAT IMG would be kept informed of developments.

1.2.6 The Group was also provided with information regarding the delay in the implementation of Precision-Area Navigation (P-RNAV) in Terminal Control Areas (TMA) in Europe due to insufficient equipage. The Member for France informed the Group that a new Aeronautical Information Circular (AIC) would be promulgated, subject to the equipage rate of aircraft.

1.2.7 The Member for France also informed the Group that, as of 1 March 2005, the Civil Aviation Administration had been separated into service provision and regulatory functions.

1.3 NAT provider States

1.3.1 The Group noted that the initial phase of implementing the Northern Oceanic Transition Area (NOTA) had been successfully completed on 20 January 2005 and that it was expected that the full implementation would be completed by October 2006.

1.3.2 As regards Airspace Management issues, the Group noted the removal from publications of the Polar Track System with effect from June 2005. The Group also noted the agreement that had been reached to implement a longitudinal separation minimum of 5-minutes for climb/descend using Global Navigation Satellite Systems (GNSS) equipped aircraft subject to the development of operational procedures. This was considered to be an interpretation of the Doc 4444 provisions and had been endorsed by appropriate safety work.

CONCLUSION 41/2- IMPLEMENTATION OF 5 MIN CLIMB-DESCENT SEPARATION MINIMUM BETWEEN GNSS EQUIPPED AIRCRAFT

That the NAT Implementation Management Group develop procedures for the implementation of the 5minute climb-descent separation minimum between Global Navigation Satellite Systems (GNSS) equipped aircraft.

1.3.3 The Group noted that, in order to reduce the likelihood of operational errors, the NAT IMG had endorsed the proposal that all NAT Oceanic Air Navigation Service Providers (ANSP) should initiate, by 1 June 2005, the mandatory requirement to read back verbatim all verbal estimates, clearances, instructions or amendments to control data transmitted between adjacent Area Control Centres (ACC). In endorsing the foregoing, it was recognised that it may be necessary to amend Letters of Agreements (LoA) and that the gradual implementation of Air Traffic Services (ATS) Inter-Facility Data Communication (AIDC) should reduce the need for these read backs.

1.4 Information provided to the Air Navigation Commission

1.4.1 The Group was informed that IATA, during a presentation made by a third party to the Air Navigation Commission on 2 June 2005, had made the statement that the EUR/NAT Office had not supported the implementation of Required Navigation Performance (RNP-4) as well as 30 NM lateral and 30 NM longitudinal separation in the NAT Region. The IATA representatives to the NAT SPG informed the Group that the statement had been made by an IATA employee attending an informal briefing not associated with IATA NAT Office and was not officially representing IATA on the ANC. The statement had not been in accordance with the official IATA NAT position. The Group welcomed this last information, particularly in the light of recent programme developments in the NAT IMG, and complimented the EUR/NAT Office on its efforts in supporting the progress of this issue.

2. PLANNING AND IMPLEMENTATION

2.1 Report of the NAT Implementation Management Group

Monitoring of Reduced Vertical Separation Minimum

2.1.1 In follow up to NAT SPG Conclusion 40/2, the Group examined issues surrounding the replacement of the Strumble Height Monitoring Unit (HMU) based on information that had been gathered since NAT SPG/40 and the results of the investigations that had been carried out in relation to the cost and location of the Strumble HMU. It was determined that Strumble remained the best location for a replacement HMU because it captured a large proportion of NAT traffic. The cost of replacing the HMU was based on a single source supplier and the Rough Order of Magnitude (ROM) cost, based on the initial contacts, was estimated to be between £2.5 to £3.0 million pounds (paragraph 2.2.8 also refers).

2.1.2 The Group noted the information provided in relation to the studies on Altimetry System Error (ASE) drift. The studies were not conclusive as to the cause of ASE drift but, considering that ASE drift was an important determinant regarding the need for monitoring, this issue was relevant to the discussions of whether or not the HMU should be replaced.

2.1.3 The representative from IATA raised the issue as to whether the NAT Region needed to have its own monitoring infrastructure or whether a sufficient amount of data could be collected from Europe and North America to satisfy the ICAO requirements for monitoring as described in ICAO Doc 9574. It was IATA and IBAC's position that this was indeed the case and there was no additional safety benefit from replacing the Strumble HMU. However, user organizations were of the opinion that if the NAT Region required its own monitoring infrastructure, then consideration should be given to implementing an Aircraft Geometric Height Measurement Element (AGHME) in Gander as the cost of land lease and procurement may be less than acquiring a replacement HMU in Strumble.

2.1.4 It was pointed out that Strumble captured a significantly larger percentage of traffic than Gander, that the replacement HMU by an AGHME had associated costs that had not been detailed and that the processing of monitoring information would involve some costs. In addition, the Member for the United States indicated that they would have difficulty supporting an extra AGHME.

2.1.5 As regards using data from other regions, the Group was presented with information that indicated that obtaining the basic data needed to carry out NAT Region specific safety assessments from the North American and European Regions might not meet all NAT monitoring requirements because a significant portion of NAT traffic would not be captured by the North American or European Height Monitoring infrastructures.

2.1.6 It was noted that, in accordance with Amendment 43 to Annex 11, which would become applicable on 25 November 2005, there was a requirement to implement a monitoring programme in airspace where RVSM is applied. The programme shall include the ability to monitor directly for the Region or by entering inter-regional arrangements.

2.1.7 The Group was provided with an update on the financial situation affecting the replacement of an HMU. It was pointed out that the available funds could be used to partly finance the replacement of one HMU. The balance of funds needed could be either included in the actual costs for 2005 and recovered directly from the users or, if the amount required was not enough, it would be necessary to call for new advances from the five States mentioned in Article III, paragraph 4 of the Arrangement (Canada, Iceland, Ireland, Portugal and the United Kingdom). These advances would be reimbursed through the annual RVSM user charge over a period of time to be determined.

2.1.8 The Chief of the Joint Financing Section of the Air Transport Bureau provided the Group with an update on the financial aspects of the NAT RVSM programme. He indicated that the current charge was US$ 1.30 per crossing. He also indicated that the current arrangements could be used to finance changes to the monitoring system. The RVSM user charge would continue to be used to finance the Central Monitoring Agency (CMA).

2.1.9 The Group was provided with an update of the capabilities of maintaining the current systems. In this connection, it was noted that the Gander HMU would be cannibalised in order to maintain the Strumble HMU and it was anticipated that the latter could be maintained at least until June 2006.

2.1.10 With this in mind, it was agreed to follow on from NAT SPG Conclusion 40/2 and that the United Kingdom should proceed with the procurement of an HMU to be installed at Strumble. It was also agreed that the NAT EFG would oversee the financial management of this procurement (paragraph 2.2.10 refers).

Feasibility of implementing distance based separation

2.1.11 In follow up to the decision taken at NAT IMG/24 regarding the need to prepare a long term Air Traffic Management (ATM) development plan, the Group was presented with a proposal that would require the implementation of RNP-4, as well as the implementation of 30 NM lateral and 30 NM longitudinal separation minima. It was expected that this change would provide significant capacity gains. It was also noted that this proposal was consistent with the road map developed by industry which was assessed by the Air Navigation Commission (ANC) on 18 January 2005. The Group noted that the NAT IMG road map would be subject to review at each NAT IMG meeting and updated on the basis of inputs from its working groups

2.1.12 In arriving at the above decision, it was recalled that the NAT IMG had spent considerable time and effort toward achieving reductions in time based longitudinal separation. To date, this work had not yielded the expected efficiencies or benefits, due to time keeping anomalies and uncertainties surrounding separation gain/loss. Accordingly, it was agreed that the NAT IMG cease all work on reductions in time-based longitudinal separation standards and it was also agreed that resources should be re-directed to support reductions in distance based separation minima.

CONCLUSION 41/3 - CHANGES TO THE NAT IMG WORK PROGRAMME TO TAKE ACCOUNT OF GLOBAL PLANNING

That the NAT Implementation Management Group (NAT IMG):

a) adjust its work programme to include Required Navigation Performance – 4 (RNP), 30 NM lateral and 30 NM longitudinal separation;

b) cease work on time-based separation minima; and

c) provide the NAT SPG with regular updates.

2.1.13 In moving to a reduced lateral separation minimum of 30 NM, due account must be taken of the flight planning and routing conventions used in the NAT Region. These were based on using the geodetic grid, routes normally being anchored at intervals of 10 degrees of longitude and whole or half degrees of latitude.

2.1.14 The convention of equating a track spacing of one degree of latitude with a 60NM lateral separation using the so-called gentle-slope rule inevitably resulted in actual separation falling short of the nominal value. Just as the current 60 NM minimum equates to a track spacing of as little as 50.5 NM, a nominal separation of 30 NM may equate to a track spacing of as little as 25 NM. Insisting on an actual lateral separation of 30 NM would require a radical revision of the method of route planning currently used.

2.1.15 The Group noted that, in the case of implementing RNP/4 30/30 NM separation minima, there would be consequences in terms of risk. RNP/4 30/30 NM separation minima would increase both lateral and vertical occupancies, which would in turn increase both the lateral and vertical risk estimates. It was also noted that RNP/4 30/30 NM separation minima could speed up the gradual move of the NAT population towards the use of GNSS a pre-requisite to meet RNP-4 standard for 30/30 NM separation minima.

Proposals for amendment to the NAT SUPPs

2.1.16 The Group noted that the proposal for amendment concerning access to RVSM airspace by certain types of operations had been objected to (NAT SPG Conclusion 39/6 refers). The Group noted the suggestion that the proposal for amendment be withdrawn.

2.1.17 The Group was informed that, in follow up to NAT SPG Conclusion 39/3, the studies that had been carried out related to turn back procedures had shown that the safest procedure was to fly 500 ft, not 300 ft as is done for weather deviations. Furthermore, the United States had reviewed the harmonized establishment of a contingency offset of 15 NM, which had been approved by ICAO and which will be reflected in Amendment IV of the PANS ATM (Doc 4444). Recent declarations of intent by both Pacific and NAT Groups to implement 30/30 RNP-4 separation minima as soon as December 2005 gave cause for concern with the use of a 15 NM contingency offset. The Group noted that in accordance with the study carried out by the NAT mathematicians and a graphical presentation by the United States, it had been shown that flying the mid-point between tracks or routes was the offset option that created the greatest risk. It was also noted that the assumption that only one aircraft would be involved in a contingency at a time was flawed. Events such as 9/11 turn-backs as well as volcanic ash alerts are just two such elements that have occurred and may occur again. These situations do not necessarily involve loss of communications, but may be the result of emergencies, communication difficulties or other incidents.

2.1.18 The Group agreed with the proposal that it was necessary to quantify the extent of any problems that may occur as the result of executing the contingency (turn back) procedure. It was therefore agreed that all instances of applying the contingency procedure should be reported to the CMA. This action should be undertaken in conjunction with the Safety Management process described in paragraphs 3.1.87 to 3.1.90.

CONCLUSION 41/4 - REPORTING TURN BACKS OR AIRCRAFT EXECUTING CONTINGENCY PROCEDURES TO THE NAT CMA

That

a) all instances of aircraft executing a turn back or contingency procedure be reported to the Central Monitoring Agency (CMA); and

b) the CMA quantify the extent of any problems associated with aircraft executing a turn back or contingency procedure and provide the Safety Management Co-ordination Group with regular reports.

Strategic Lateral Offset Procedure (SLOP)

2.1.19 The Group recalled that the SLOP had been implemented throughout the NAT Region on 10 June 2004. The Group noted that the level of use of the SLOP remained very low and, in some instances was not being used correctly. It was recalled that the use of the SLOP was instrumental in containing risk in the NAT Region. It was pointed out that many pilot training facilities use the MNPS Operations Manual as the basis of information for pilot training programmes. The Group also noted that, in order to enhance the visibility of the SLOP, the current Navigation Chart providers would be asked to more clearly depict the NAT requirements. The Group endorsed the efforts to increase pilot awareness of the need to apply the SLOP. Accordingly, it was agreed that, in addition to the foregoing, the SMCG develop a methodology to rotate messages on the Organized Track System (OTS) track messages on a regular basis so as to enhance interest in the messages.

CONCLUSION 41/5 - ENHANCEMENT OF THE REMARKS ON THE OTS TRACK MESSAGE

That the NAT Safety Management Co-ordination Group develop a methodology to enhance the usefulness and user-friendliness of remarks included on the Organized Track System (OTS) track message.

High Frequency (HF) regression

2.1.20 The Group was informed that the NAT HF Regression Task Force, that had been established by NAT IMG/21, had held its second meeting in Paris from 22 to 24 February 2005. It was noted that the following issues would be analysed by the NAT SPG ACG and that recommendations would be made to the NAT SPG:

a) miscellaneous messages related to incorrect use of data link procedures,

b) traffic increase over the last two years, and

c) there appeared to be a correlation between the number of procedural errors and the lack of reduction in voice messages, considering that 40% of all traffic in the Gander Oceanic Control Area (OCA) - FIR were participating in Automatic Dependent Surveillance (ADS) – Waypoint Position Reporting (WPR) and Controller Pilot Data Link Communications (CPDLC).

2.1.21 The Group noted the necessity to put in place an equitable cost recovery mechanism that would take account of the gradual reduction in the use of HF voice. Furthermore, it would be necessary to develop a plan to finance exit costs (paragraph 2.2.5 refers).

2.1.22 The Group noted that the Task Force had refined and updated the road map that had been presented to NAT SPG/40. One important issue that stemmed from the updated road map was the proposal that data link be approved as a primary means of communications from 2008, provided voice communications, subjet to a regional safety case and regulatory approval, was available as a backup. The next step would be for data link to be approved by 2010 as a primary means of communications and that voice communications only be required in the context of the general requirement of voice communications being available for non-routine or emergency situations. After some detailed consideration the Group agreed that NAT SPG Conclusion 40/6 be superseded with the following:

CONCLUSION 41/6 - ASSUMPTIONS FOR PLANNING HF REGRESSION

That the NAT Implementation Management Group:

a) use the following assumptions as the basis for planning for high frequency (HF) regression:

i) before 2008, there will be no increase in current HF voice capacity requirements in the NAT Region for ATS purposes because of the migration to data link applications and, no substantial decline in the requirements was likely;

ii) by 2008 data link will be approved for use on an operational trial basis, as a primary means of communications (subject to Regulatory approval), with voice available for backup requirements only;

iii) by 2010, the majority of NAT Region movements will be conducted by aircraft that have a data link capability;

iv) by 2010, data link will be approved for use as a primary means of communication, with voice requirements as in vi) below;

v) by 2015, data link will be the mandated communications medium for ATS purposes in portions of the NAT Region;

vi) There will be a general requirement for voice communications in the datalink environment for emergencies and non-routine events, which could be satisfied by a number of technologies; and

b) provide NAT SPG/42 with a progress report.

2.1.23 In order to provide more certainty for the implementation of data link, the Group agreed to task the NAT IMG with initiating the necessary steps to mandate data link in parts of the NAT Region by 2015.

CONCLUSION 41/7 - MANDATING DATA LINK REQUIREMENTS

That the NAT Implementation Management Group:

a) proceed with the road map to enable mandating data link in portions of the NAT Region by 2015; and

b) report to NAT SPG/42

Mid Ocean Selective Calling System (SELCAL) check

2.1.24 It was noted that discussions had been held to dispense with the use of the mid-ocean SELCAL check by CPDLC equipped aircraft. It was also noted that it had been proposed that, once the use of data link was accepted as a primary means of communication, then the mid-ocean SELCAL check could be considered redundant, subject to the necessary regulatory approvals and amendments to ICAO Annex 2 if required. SELCAL checks would still be required for aircraft that used HF as a primary means of communications.

Data link initiatives for the NAT Region

2.1.25 The Group was informed that the Automatic Dependent Surveillance-Contract (ADS-C) and Flight Management Computer (FMC) WPR, as well as the CPDLC trials, were proceeding successfully. Approximately 40% of NAT traffic were using data link. It was also noted that the FANS Central Monitoring Agency's (FCMA) role would be expanded to provide assistance to the safety management programme.

2.1.26 In follow up to NAT SPG Conclusion 41/7, the Group was provided with an update on the results of the data link harmonization symposium and the first meeting of the Data Link Steering Group (DLSG), which had taken place in Paris from 30 March to 1 April 2005. In this connection, it was recalled that the NAT IMG, through its working structure, would be responsible for the development of NAT Regional requirements needed to support the implementation of Aeronautical Telecommunication Network (ATN) (ED110A) equipped aircraft in the NAT Region and to represent the NAT Region in the DLSG.

2.1.27 The Group was provided with an overview of the outcome of the DLSG/1 meeting. It was noted that FANS 1/A and ATN were the current realities; that there was agreement on the need for convergence; that ICAO should play a lead role in the global coordination of the convergence process; that there was a need to further clarify technical/operational issues; and that performance should be a key element in the convergence process.

2.1.28 The Group noted that the DLSG had developed a task list in order to progress its work, which was organized in the following phases:

a) establish a baseline for the current situation;

b) establish an achievable baseline for 2015;

c) develop steps to arrest divergence; and

d) develop a harmonization strategy.

2.1.29 The Group noted the proposal that the NAT SPG policy statement regarding the implementation of data link technologies (NAT SPG Conclusion 39/10 refers) should be re-evaluated considering the technological advances that had been made and that the 35th Assembly of ICAO had resolved that more emphasis should be put on implementation and less on the development of Standards and Recommended Practices (SARPs). The current policy states that the ATN was the desired goal of the future ATM system. The Group acknowledged that the situation had changed since 1992 but felt that it would be pre-mature to change the policy bearing in mind that it was based on the ICAO SARPs.

2.1.30 The Group did however support the proposal that any system that was being planned should satisfy performance, functional and interoperability requirements. The Group also supported the proposition that partial implementation of SARPs in avionics may not be cost-effective in the long run and has lead to global inter-operability problems.

2.1.31 The Group noted that a common CPDLC message set for the NAT Region had been agreed for application in Phase 4 implementation (full message set). The message set was based on the FANS 1/A avionics. It was however recognised that not all uplink messages were appropriate to an Oceanic environment and therefore some messages would never be used. The Group also noted that all downlink messages, with the exception of nine messages, would be supported; however, all messages would be presented to Air Traffic Control (ATC) for action in order to close the communications loop.

Potential for using ADS-B for oceanic in-trail climbs and descents

2.1.32 The Group was informed that the use of ADS-Broadcast (ADS-B) for in trail climbs and descents would overcome the problems associated with the use of Airborne Collision Avoidance System (ACAS) in trail climbs. Because ADS-B has a much greater range than ACAS, the ADS-B In Trail Procedure (ITP) could be initiated at greater distances between the aircraft, thereby significantly increasing the percentage of time when an aircraft could utilize this procedure. Aircraft operators who choose to properly equip would benefit by the ability to perform in-trail manoeuvres to achieve more optimum altitudes. This could result in more efficient and predictable flight profiles thereby saving fuel. The Group noted that this had been added to the NAT IMG work programme.

The use of Satellite Communication (SATCOM) voice for routine ATS communications

2.1.33 In follow up to NAT SPG Conclusion 40/8, the Group was presented with an update regarding the use of SATCOM voice for routine ATS purposes. It was pointed out that a draft road map for the implementation of SATCOM voice for ATS purposes had been developed. The Group noted that additional work was required before a recommendation could be made. Outstanding tasks included the need to propose technical changes to the existing system and to define the necessary trials to validate the operational procedures and technical solutions. In addition, it would be necessary to define the system maintenance procedures and to develop and recommend Guidance Material for crews and ATS personnel, which would eventually require the endorsement of the NAT SPG. It was noted that the NAT EFG had agreed that, considering it was expected that SATCOM voice traffic would be low, the costs should be included in the overall unit cost (paragraph 2.2.6 refers).

Flight level availability on the OTS and its design

2.1.34 The Group was informed that IATA and its member airlines would like to undertake a review of the current methodology used to plan and design the North Atlantic OTS. It was generally felt that, given the sophisticated planning tools available to airlines, the Preferred Route Message (PRM) process was no longer an efficient method of providing data to the oceanic planners. It was pointed out that modern flight planning systems were capable of reading multiple airline schedules and automatically producing PRM type data. It was noted that action had been taken to launch this project. With this in mind, it was noted that the NAT Implementation Cost Effectiveness (NICE) group could undertake the project management and data collection to be used to determine if a more efficient OTS design could be achieved.

NAT IMG Cost Effectiveness (NICE) Group

2.1.35 The Group was informed that the NICE Group continued to collect data to support simulations in order to keep all the data bases updated so that the facilities could be used when required.

Programme Co-ordination Officer

2.1.36 The Group noted that the United Kingdom continued to support the NAT Programme Coordination Office (PCO) website (www.nat-pco.org). The Group felt that the web site was important especially as it provided access to certain documents such as the MNPS Operations Manual and the different

Guidance Materials as well as an area to carry out discussions between meetings. The Group noted with appreciation that the United Kingdom would continue to manage and support the web site.

New provisions concerning Emergency Locator Transmitters (ELT)

2.1.37 The Group was informed that the requirements concerning the mandatory carriage of ELTs in all aircraft changed effective 1 January 2005. Of importance was that, in accordance with Annex 10, all ELTs shall operate on 406 MHz and 121.5 MHz simultaneously. In addition, there was a mandatory requirement for the carriage of at least one automatic ELT when operating long-range over-water, as defined in Annex 6 (Annex 6, Part 1, paragraph 6.5.3). It was also pointed out that States can designate land-masses where the carriage of one automatic ELT would be mandatory.

2.2 NAT Economic and Financial Group

2.2.1 The Group noted that the NAT EFG had concentrated on finalising the common NAT template used to report costs, reviewing issues concerning cost constraints, analysing the cost-effectiveness of service provision in the NAT Region, examining issues related to incentive pricing of communication charging and exploring ways to recover costs associated with the provision of air navigation services using new technologies.

Organizational changes and working methods

2.2.2 The Group noted that the NAT EFG had carried out a review of its working structure on the basis of its terms of reference and agreed that no changes were required. As regards the frequency of meetings, it was noted that under normal circumstances no more than two meetings per year would be required, one in the October/November timeframe and the other in April or May; however, this would be kept under constant review.

Incentive pricing schemes under the Single European Sky (SES) regulations

2.2.3 The Group noted that the NAT EFG had examined information regarding draft legislation being developed by European Commission relating to the use of incentive pricing. There would be opportunities for various pricing incentive schemes. These may include incentives to ANSP to apply for grants for fiscal reductions, incentives to deliver projects on time and the possibility to modulate charges to manage airspace demand. However, it was noted that the rules were only at a draft stage and that the final position was not yet clear.

Issues related to costs associated with the provision of data link services

2.2.4 The Group noted the concerns of the implementation groups that the lack of transparency of data link related costs made any attempt to develop a business plan and associated cost effectiveness studies very difficult. It had been concluded that, in order to satisfy the data requirements needed to carry out cost effectiveness studies, it was not necessary to have common charging but that there was a need to have an agreed upon common cost base for data link communications that could be used in evaluating future implementation scenarios. In order to address this matter, IATA member airlines would be requested to provide information on a "best estimate basis" that could be used in future studies. It was noted that this information would be reviewed at the next meeting of the NAT EFG in order to provide some guidelines to the NAT IMG.

Status of work relating to HF regression

2.2.5 The Group recognised that a number of issues concerning HF regression would need to be resolved. Some of the issues included exit costs, pension obligations, environmental issues and the

necessary infrastructure costs needed to provide limited HF services. In addition, the Group was informed of the bilateral initiatives that were taking place. In this connection, the Group strongly endorsed the notion of bilateral discussions, such as those taking place between Iceland and Ireland.

Examine issues related the SATCOM voice

2.2.6 In follow up to NAT SPG Conclusion 40/8 regarding issues of cost allocation and recovery for SATCOM voice services, it was noted that all downlink costs were borne by the user. As regards the uplink costs, it was agreed that they be included in the cost base of the communications service provider. In doing so, it was recognised that the costs involved were very small but if they increased significantly, this decision would need to be reviewed.

CONCLUSION 41/8 - COST RECOVERY OF UPLINK SATCOM VOICE COMMUNICATIONS

That the uplink Satellite Communication (SATCOM) voice service costs be included in the cost base of the communications service provider.

Cost comparison of air traffic and communications service provision in the Gander and Shanwick FIRs

2.2.7 The Group was presented with an update the cost comparison exercise in respect of the Gander and Shanwick Oceanic FIRs. Considering the value of finalising this exercise, it was noted that the NAT EFG had invited other service providers to undertake a similar exercise, the object of which was to seek the most cost effective way of providing these services. This task had been included in the proposed NAT EFG work programme.

Financial issues related to Reduced Vertical Separation Minimum monitoring

2.2.8 The Group noted that the NAT EFG had received information on the institutional and financial aspects of the existing height monitoring system joint financing arrangement (paragraph 2.1.7 refers). It was also noted that the NAT EFG had considered the following issues:

a) a final decision regarding the replacement of the Strumble HMU would be taken in June 2005;

b) any changes to the current monitoring infrastructure would have to be done in the context of the amendment to Annex 11, which has been approved and which imposed monitoring of RVSM airspace;

c) the CMA would remain in operation in the future; and

d) the existing Strumble HMU would continue to be operated at least until 30 June 2006.

2.2.9 The Group endorsed the NAT EFG proposal that the net cost of any new investment should be recovered from airline customers over the estimated useful life of the equipment using the existing RVSM cost recovery mechanism.

2.2.10 The Group was informed that the existing joint financing arrangement included a specific provision for the replacement of the existing equipment. It was agreed that some form of financial oversight by the NAT EFG was necessary. Considering the decision to proceed with the procurement of a replacement HMU at Strumble (paragraph 2.1.10 refers), it was agreed that the United Kingdom National Air Traffic Services (NATS) should provide as soon as possible the ICAO Secretariat with all necessary information regarding the amounts involved for the acquisition of the equipment and associated costs, as a result of its estimation and bidding process, with a view to make it possible for the ICAO Secretariat to:

a) consult the NAT EFG Members; and

b) approach the parties to the RVSM Joint Financing arrangement to call for the necessary advances of funds.

CONCLUSION 41/9 – ACQUISITION OF A REPLACEMENT FOR THE STRUMBLE HMU

That:

a) the United Kingdom launch a competitive bid for the acquisition of the replacement of the Strumble Height Monitoring Unit (HMU); and

b) the capital costs associated with the replacement of the Strumble HMU would be recovered from the users over the estimated useful life of the equipment, using the existing RVSM cost recovery mechanism.

Global RVSM monitoring requirements

2.2.11 The Group recognised that it was imperative that a global RVSM monitoring programme be put in place so as to ensure that safety standards were maintained and costs were contained. Accordingly the Group agreed that this be urgently addressed so that action could be taken.

CONCLUSION 41/10 – GLOBAL RVSM MONITORING REQUIREMENTS

That the ICAO Regional Director ensure that the requirements for a global reduced vertical separation minimum (RVSM) monitoring programme, that would include data and cost sharing, be addressed urgently.

Financing the expansion of regional safety management

2.2.12 The Group endorsed the initiative of the NAT EFG regarding an addition to the current RVSM joint financing arrangement to include other regional safety management issues. The Group noted that the parties to the RVSM Joint Financing Arrangement would be approached to obtain their consent to the corresponding amendment of the arrangement. The Group agreed that the NAT EFG be given the responsibility for the analysis of financial and cost recovery matters related to regional safety management issues. It also agreed that cost elements of regional safety management issues be included in the jointly financed cost base.

CONCLUSION 41/11 - FINANCIAL AND COST RECOVERY ISSUES RELATED TO REGIONAL SAFETY MANAGEMENT

That the:

a) Joint Financing Section of ICAO initiate an addition to the current Reduced Vertical Separation Minimum (RVSM) joint financing arrangement to include other regional safety management issues;

b) NAT Economic and Finance Group be responsible for the analysis of financial and cost recovery issues related to regional safety management; and

c) cost elements of regional safety management issues be included in the jointly financed cost base.

Future work of the NAT EFG

2.2.13 The Group endorsed the future work programme of the NAT EFG and noted that the following tasks would arise in the near future:

a) complete the cost comparison of service provision in the NAT Region;

b) assist the NAT IMG HF Regression Task Force with the financial implications of its work;

c) analyse financial and cost recovery issues related to regional safety related initiatives;

d) oversee the financial aspects of replacing the Strumble HMU; and

e) on the basis of input from technical experts, examine issues related to charging for data link services.

2.3 Other issues

EUR/NAT Volcanic Ash Task Force (VATF)

2.3.1 The Group was informed that, as a result of the recent Grimsvötn volcano eruption during the period of 1-5 November 2004, a task force was set up by the NAT IMG and the 46th meeting of the European Air Navigation Planning Group (EANPG). The major assignment of the task force was to develop an ATM contingency plan for the EUR Region. This assignment has been completed and the contingency plan will be delivered to the EANPG later in the year.

2.3.2 The Group was informed that, considering the potential problems that could arise as a result of a major volcano eruption, the NAT IMG had agreed that it would expand the current Iceland-United Kingdom contingency plan to include the entire NAT Region.

2.3.3 The Group noted that, in order to ensure the smooth implementation of the contingency plans developed for the EUR and NAT Regions in case of an actual volcanic eruption, regular exercises of the volcanic ash contingency plans would be conducted. These exercises would be carried out by the Volcanic Ash Advisory Centres (VAAC), with the assistance of ANSPs, Meteorological Watch Offices (MWO), Air Traffic Flow Management (ATFM) units and operators.

Issues to be reported to the International Airways Volcano Watch Operations Group

2.3.4 As a consequence of the eruption of Grimsvötn volcano, the ICAO EUR/NAT Office convened an ad hoc meeting composed of ATM and MET experts, as well as representatives of user organisations and the Volcanic Ash Advisory Centres (VAAC), to discuss issues brought to light by the eruption.. It was recalled that the International Airways Volcano Watch Operations Group (IAVWOPSG) responded to inputs affecting global planning from Regional Planning Groups and it had therefore been agreed to use the NAT SPG to advance matters.

2.3.5 The eruption was characterised by very few visual observations and consequently heavy reliance was put on atmospheric models, which form the basis for the Volcanic Ash Advisories (VAA). The VAAs predicted large parts of the NAT and EUR Regions to be contaminated by a volcanic ash cloud. This raised questions about the confidence of the forecasted extent of the ash cloud in view of the safety and economic impact for aviation because ATC would normally not issue clearances to fly in airspace where ash clouds WEre forecasted. The ad hoc meeting had agreed that, at a global level, there was a requirement to better define the threshold between hazardous and non-hazardous airspace in relation to volcanic ash. In this context it was recognised that it would be useful if operators were to encourage engine/airframe

manufacturers to make ash-susceptibility information available, this could then be factored into the dispersion models.

2.3.6 The ad hoc meeting had suggested that there was a need to get a description in the VAA of the current (+0) predicted extent of the ash cloud, when no observations were available.

2.3.7 Furthermore, the need was identified for a graphic presentation in the Facilities and Services Implementation Documents (FASID) of the FIRs included in the areas of responsibility of the VAACs in order to facilitate the selection of the FIRs affected by the VAAs.

2.3.8 It was noted that questions had been raised concerning the practicality of current global SIGMET provisions relating to volcanic ash. The need for partitioning of the affected airspace in FIRs with separate MWO responsible for the issuance of SIGMET, combined with the long outlook period, could result in a large number of extremely long messages, thus risk flooding communications channels. This could be particularly problematic in areas composed of many small FIRs, such as the EUR Region. Accordingly, it was recommended that the following changes be considered by the IAVWOPSG for inclusion in the Annex 3 provisions:

a) change the responsibility of the VAACs in order to authorise them to issue volcanic ash SIGMETs for all States in their area of responsibility; and

b) allow a single volcanic ash SIGMET to be issued for an ash cloud that covers multiple FIRs.

2.3.9 It was noted that none of the States concerned had used the ASHTAM format during this event and the "double standard" with two alternative formats (ASHTAM and NOTAM) was questioned. In view of the increased level of automation and enhancements of the NOTAM format, it was felt that the ASHTAM format was no longer needed and should therefore be reconsidered by the IAVWOPSG.

2.3.10 Concern was expressed about the duplication of some of the material contained in the "Manual" (Doc 9691) and the "Handbook" (Doc 9766) and the risk of inconsistencies due to different update procedures. It was proposed that the IAVWOPSG examine this issue.

CONCLUSION 41/12 - REVIEW OF THE GLOBAL PROVISIONS FOR THE INTERNATIONAL AIRWAYS VOLCANO WATCH

That the International Airways Volcano Watch Operations Group (IAVWOPSG) consider a review of the global provisions for the International Airways Volcano Watch in order to:

a) allow for the description of the current (predicted) extent of the ash cloud when no observations are available;

b) include in all FASIDs a graphic presentation of the Flight Information Regions (FIR) under the responsibility of each Volcanic Ash Advisory Centre (VAAC);

c) review the format of SIGMET for Volcanic Ash in order to avoid lengthy messages, which can risk flooding of air/ground voice channels;

d) change the responsibility of the VAACs in order to authorise them to issue volcanic ash SIGMETs for all States in their area of responsibility;

e) allow a single volcanic ash SIGMET to be issued for an ash cloud that covers multiple FIRs;

f) consider the usefulness of ASHTAM for volcanic ash activity;

g) recommend all VAACs to participate in exercises of regionally agreed ATM volcanic ash contingency plans, and

h) review the publication of guidance material in two documents (9691 and 9766) in order to avoid any inconsistencies.

ATM expertise in the IAVWOPSG

2.3.11 The benefits of having ATM expertise in the VAWG during the analysis of this event were obvious in view of the importance of ATM contingency planning during a volcanic ash event. It was consequently considered important to also include ATM expertise in the global planning of the IAVW by the IAVWOPSG.

CONCLUSION 41/13 - AIR TRAFFIC MANAGEMENT PARTICIPATION IN THE IAVWOPSG

That States and international organisations concerned ensure that air traffic management expertise from the EUR and NAT Regions participate in the work of the International Airways Volcano Watch Operations Group (IAVWOPSG).

Monitoring of volcanic ash clouds using weather radar

2.3.12 The Group was informed that in Iceland there was one C-band weather radar located near Keflavík airport. Although the weather radar had been designed to monitor precipitation clouds, it has been successful in detecting and monitoring volcanic clouds. The active volcanoes in Iceland are in many cases remotely located and in addition during winter months, due to extended periods of darkness, visible ash detection is limited. Therefore, the use of weather radar and other remote sensing techniques are vital. Hence, near-real-time monitoring of volcanic clouds could be achieved from the radar thus providing invaluable information for relevant meteorological centres, aviation authorities and airspace users and improved forecast accuracy of ash.

2.3.13 Due to the distance of the current single weather radar in Iceland from some of the active volcanoes, no ash plume below approximately 6 to 7 km in height can be detected for volcanoes in Southeast Iceland (e.g. Mt Grimsvötn), and below 9 km in height in Northeast Iceland (e.g. Mt Askja and Mt Krafla). A weather radar in the Eastern part of the State would lower this detection limit to a height of approximately 1 to 2 km.

2.3.14 To improve the monitoring of volcanic clouds in Iceland, the installation of a second weather radar in the Eastern part of the country should be considered. This would lead to a significant improvement in the input values into the trajectory and dispersion models and consequently improved quality in the VAAs. Accordingly, it was agreed that Iceland should study the feasibility of installing a weather radar in the Eastern part of Iceland..

CONCLUSION 41/14 - FEASIBILITY OF INSTALLING A WEATHER RADAR IN EASTERN ICELAND

That Iceland:

a) study the feasibility of procuring and installing a weather radar in the Eastern part of Iceland in order to improve volcanic ash detection, monitoring and forecasting; and

b) report their findings to NAT SPG/42.

Improved upper wind forecasts to be used in Flight Data Processing Systems (FDPS) to calculate Air Traffic Services estimates

2.3.15 The Group was informed that, in follow up to NAT SPG Conclusion 40/4, the World Area Forecast System Operations Group (WAFSOPSG) had considered the possibility of refining the temporal resolution of upper wind forecasts, in order to improve the accuracy of ATS estimates. It was noted that the WAFSOPSG/2 had agreed that it would not be feasible to draw any conclusions by June 2005, i.e. in time for the NAT SPG/41 since the studies to be undertaken by the World Area Forecast Centre (WAFC) Provider States would require more time. It was expected that the results of these studies would be made available to the WAFSOPSG/3, planned for September 2006 and therefore for NAT SPG/43 in June 2007.

3. AIR NAVIGATION SYSTEM REVIEW

3.1 Review of system safety performance

REVIEW OF THE REPORT OF THE SAFETY MANAGEMENT CO-ORDINATION GROUP

3.1.1 The Group noted that the SMCG, which had evolved from the former Scrutiny Working Group (NAT SPG Conclusion 40/19 refers), had met twice since NAT SPG/40 in order to facilitate the more timely consideration of NAT system safety matters (paragraph 3.1.45 also refers). This enabled the examination of reported occurrences for the first 10 months of the period under review to be considered some 6 months earlier than would have been possible under the previous method of working. The last 2 months of 2004 were reviewed with those of the first quarter of 2005 in May 2005.

3.1.2 It was noted that the SMCG had considered the following subjects:

a) conclusions of NAT SPG/40 regarding navigational performance in the NAT Region, including a review of subsequent progress;

b) vertical navigation performance in the NAT Region during the period 1 January 2004 to 31 December 2004;

c) lateral navigation performance in the NAT Region during the period 1 January 2004 to 31 December 2004;

d) Safety Management matters; and

e) proposals to improve the observed standard of navigational performance in the NAT Region.

3.1.3 The Group noted that the SMCG had taken action on all NAT SPG/40 Conclusions that had been addressed to it.

Vertical navigation performance in the NAT Region during the period 1 January 2004 to 31 December 2004

3.1.4 The Group was informed that the SMCG had scrutinised the altitude deviations of 300ft or more received by the CMA in an attempt to determine any trends in the operation of aircraft in the NAT Region which may have resulted in vertical errors. The CMA had gathered 56 (49*) reports of risk bearing altitude deviations in MNPS airspace. Aircraft technical occurrences, such as those caused by poor estimation of air temperature or turbulence, accounted for 13 (12*) of these deviations, while of the remainder 36 (31*) were directly attributable to crew or ATC action.

Note: Figures in brackets refer to 2003

3.1.5 The Group noted that the scrutiny process had highlighted the following major causes of risk bearing errors:

a) non-compliance with an ATC clearance or restriction 31 (23*) of which 8 resulted in entry in Oceanic airspace at an un-cleared level;

b) turbulence, ambient temperature and aircraft technical defects 8 (12*); and

c) communications difficulties, HF blackouts and crew to HF radio operator to ATC communications delays and misunderstandings 10 (11*).

3.1.6 It was noted that the number of incidents as a result of entry into Oceanic airspace at the incorrect level or without a clearance had remained unchanged and had accounted for 8 (8*) of the 31 (23*) events in (a) above. The Group agreed that further efforts were required in order to reduce the incidence of failure to receive, or in some cases to request, a clearance from domestic control, to achieve the cleared oceanic level. The Group was cognizant that some ambiguity existed as to the responsibility of the pilot or the air traffic controller to ensure that the aircraft entered the Oceanic airspace at the correct flight level. It was agreed that this ambiguity needed to be resolved.

3.1.7 The Group noted a number of instances where an aircraft had climbed in accordance with the the filed ATC Flight Plan, instead of requesting a level change with the appropriate Oceanic Area Control Centre (OAC). Invariably this had led to a Large Height Deviation (LHD) which was not detected until the next longitudinal position report. It was noted that in some instances, aircraft departed from cleared flight level owing to turbulence. The Group noted that in many cases, turbulence forecasts and/or SIGMETs were valid for the location and levels concerned, and that generally the occurrence of such conditions should not be a surprise to crews and that a re-clearance should have been sought.

3.1.8 While it was recognised that ATC clearances frequently differ from the filed route and requested flight level for perfectly valid reasons, it nonetheless created fertile ground for errors to occur and propagate. Some of these changes occurred because of standing agreements between adjacent ACCs. It was agreed that all such agreements affecting routes and levels should be standardised to the extent possible and that the information be promulgated in national Aeronautical Information Publications (AIP).

3.1.9 It was noted that incidences of misinterpretation of CPDLC data by crews had been increasing more frequently. A variety of occurrences evolved from unfamiliarity with the CPDLC procedures and consequent misunderstanding of the printed information. This was expected to become worse before improvements could be observed and the Group agreed that this issue be addressed in order to enhance awareness of this type of error and by so doing to reduce the number of occurrences attributable to CPDLC misinterpretation.

3.1.10 In addition to the medium of the "On the Right Track" DVD (paragraph 4.1.10 refers), the Group agreed that crew navigational charts and documentation would be a suitable vehicle for "Safety Alerts" to pilots, reminding them to follow their clearance and not their flight plan, or to remain at their cleared flight level except in emergency or when carrying out contingency procedures. One commercial chart provider had already agreed to publish such a message on navigation charts and it was noted that the SMCG would review and update the message on a regular basis.

CONCLUSION 41/15 - RECOMMENDATIONS TO REDUCE RISK IN THE NAT REGION

That

a) the NAT Implementation Management Group (NAT IMG) arrange to update the Controller Pilot Data Link Communications (CPDLC) guidance material to reflect the

effects of misinterpretation of CPDLC messages on safety so as to reduce the number of incidence;

b) States publish in their national Aeronautical Information Publications (AIP) the necessity to request and receive a clearance prior to entry into oceanic airspace as well as the obligation to comply with the provisions of that clearance;

c) the NAT IMG develop a proposal to eliminate the ambiguity as to whether it is the responsibility of the pilot or the air traffic controller to ensure that the aircraft enters Oceanic airspace at the correct flight level;

d) States report instances of poor or non-existent co-ordination to the NAT Central Monitoring Agency (CMA) so that co-ordinated follow-up action can be taken;

e) airspace user organisations remind pilots and dispatchers that a departure from cleared flight level must not be made until a re-clearance has been requested and received (except in an emergency or when carrying out contingency procedures);

f) the NAT IMG develop, to the extent possible, standardised inter centre transfer procedures affecting routes and levels;

g) States promulgate standardised inter centre transfer procedures in national AIPs. to facilitate flight planning; and

h) the Safety Management Co-ordination Group arrange to have navigation charts bear a "Safety Alert" to remind crews of required procedures in Oceanic airspace and arrange to update the message from time to time in order to mitigate frequently observed navigational errors.

Lateral navigation performance

3.1.11 The Group noted the results of the scrutiny of observed Gross Navigation Errors (GNE), during the period 1 January 2004 to 31 December 2004, in the NAT Region which had found that, a total of 24 (18*) errors were reported during the period under review. Of these errors, 9 (8*) occurred outside MNPS airspace. From the remaining 15 (10*), 14 (9*) were not eligible for inclusion in the risk analysis as defined at NAT SPG/17 (amended by NAT SPG/23). The remaining 1 (1*) error, was classified as a risk bearing Table "Alpha" error.

3.1.12 The number of reported errors in MNPS airspace compared with the previous 12 month period (2003) increased by 50%. It was noted that the overall number of GNEs in the whole NAT Region had increased by six compared with the previous period. Overall, the effect of the reported GNEs in 2004 produced an increase in the estimated risk compared with 2003.

3.1.13 In accordance with monitoring procedures, follow-up action had been taken for any reported error in excess of 50NM. The Group noted that this had to be undertaken for 17 of the reported occurrences. The Group also noted that action had been taken by OACs to contain the number of GNEs through timely intervention to prevent incorrect routing.

3.1.14 During the monitoring period, Gander and Shanwick OACs advised the CMA of 118 (71*) occasions when action was taken to prevent a GNE. The Group noted that this was 47 more than reported during the previous 12 month period. The following information was extracted from the available data:

a) 81 (54*) cases of crew error, or probable crew error, including 54 where a filed flight plan route was followed instead of the cleared route;

b) 11 (6*) cases considered to be attributable to ATC error;

c) 16 attributable to communications error or ambiguity.

3.1.15 The overall number of reported interventions was significantly greater than in the previous reporting year. Specifically, the Group noted an increase in the number of errors attributable to the crew. It was also noted that at least 23 of the 81 crew-related interventions involved CPDLC-equipped aircraft.

3.1.16 With regard to the application of 10 minutes longitudinal separation, it was noted that the CMA had received 5 reports of erosions of longitudinal separation in excess of three minutes compared to 6 in the preceding year.

3.1.17 The Group agreed that, by taking account of the following two matters, fairly simple steps to improve the NAT Region system safety could be achieved:

a) the protection of Digital Flight Data Recorder (DFDR) records by operators whose aircraft are involved in a Navigational Occurrence would allow the operator to undertake an investigation into the circumstances and be better placed to complete the requested investigation report. The protection of the data would require a "trigger message" to be sent by the reporting OAC Center to the aircraft operator advising them that the aircraft had been involved in an oceanic occurrence for which a report would subsequently be requested, and that the operator may therefore wish to protect the DFDR records to assist them in responding; and

b) a number of errors were reported, including a series involving the same operator, where confusion over the display of route waypoints led the crews to commit GNEs. Differences exist between the Flight Management System (FMS) displays available to the crews of Airbus and Boeing-manufactured aircraft, whereby stored waypoints may be displayed in abbreviated form. This has led to misinterpretation where manual FMS route changes were entered after a re-clearance, and occasionally at first entry when this had been carried out manually.

CONCLUSION 41/16 - AMENDMENTS TO THE MNPS OPERATIONS MANUAL

That ICAO arrange to amend the Minimum Navigation Performance Specifications (MNPS) operations manual to include the following:

a) Flight Management System (FMS)/MCDU waypoint entry and display be highlighted to operating crews, to ensure that waypoints are fully expanded when route changes are entered, or position reports read from the FMS; and

b) FMS inputs be crosschecked by both pilots at the time of entry.

REVIEW OF THE REPORT OF THE MATHEMATICIANS WORKING GROUP

3.1.18 To assist the NAT SPG in reviewing system safety performance, the NAT MWG continued its work in order to:

a) provide the NAT SPG with the estimates of lateral and vertical collision risk for the 2004 calendar year;

b) review the ongoing monitoring of the risk in NAT MNPS airspace, including the height keeping performance and large height deviations of aircraft approved to fly in that airspace; and

c) propose improvements in the methods used to estimate lateral and vertical risk.

2004 Lateral and Vertical Collision Risk Estimates

Lateral Risk

3.1.19 2004 was the second calendar year of full RVSM operation in NAT MNPS airspace. The occupancy estimates for the year were based on the full twelve months of 2004, as were the error rates used in the risk estimates. During 2004, both the OTS and random same direction occupancy values (and hence also the combined occupancies) increased compared to the previous year (2003). There had been a 4.5% increase in NAT traffic over the year (372,900 flights for 2004 and 356,300 flights for 2003).

3.1.20 The Group noted that MNPS GNEs reported in 2004 were examined in conjunction with the SMCG meeting immediately prior to the MWG meeting, in order to ensure that the two groups were in agreement over the categorisation and weighting of the events for risk assessment purposes.

3.1.21 It was reported that the weighted risk-bearing error rate was below the acceptable level as set out in the corresponding NAT MNPS lateral error rate requirement of 1.3×10^{-4}. The Group noted as well that all the lateral risk estimates made between 1999 and 2004 were below the Target Level Of Safety (TLS) for the lateral dimension, (currently set at 20×10^{-9} fatal accidents per flight hour). Lateral collision risk had reduced since the late 1990s (for recent monitoring periods only one risk-bearing GNE had been detected at the monitoring windows per monitoring period.

Review of Lateral Risk Method

3.1.22 The Group noted that MWG had investigated several ways to incorporate more recorded GNEs into the lateral risk calculation. The existing lateral error sampling method was evaluated and several possible alternative sampling methods were identified to allow preliminary estimates of the effects on lateral risk estimate. Currently, only GNEs from aircraft *exiting* NAT Oceanic airspace at the radar monitoring windows are included. Two concerns with the existing method were identified, namely errors and associated weights which would be included in each combination of Oceanic Control Areas (OCA), as well as inbound/outbound errors. It was noted that further refinements to the analysis would be necessary.

3.1.23 While the goal would be to include all GNEs within NAT MNPS into the risk calculation, it was accepted that not all mid-ocean GNEs were reported. Thus, if a risk estimate were to be made using all reported GNEs of greater than 50 NM in NAT MNPS airspace the risk estimate would be an underestimate of the true risk. It was noted that, until such time that reporting of all known GNEs in the NAT would occur, this option could not be implemented. Accordingly, the Group agreed that for the 2005 risk assessments, Reykjavik inbound errors should be included with appropriate adjustments to error weights and to traffic count and flight duration. As a check to this, the Group recommended that:

a) the assumption be examined that operations and procedures in Reykjavik FIR are identical to those at Gander and Shanwick for the purposes of producing/detecting GNEs; and

b) a full units examination be carried out on the new weights.

CONCLUSION 41/17 – INCLUDING REYKJAVIK FIR IN GNE REPORTING

That:

a) Iceland:

i) provide the NAT Central Monitoring Agency (CMA) with reports on Gross Navigation Errors (GNE) that they observe;

ii) examine the assumption that operations and procedures in Reykjavik are identical to those at Gander and Shanwick for the purposes of producing/detecting GNEs; and

b) the Mathematicians Working Group carry out a full units examination on the new weights.

Estimating the Mean Crossing Time in the NAT

3.1.24 During the course of the discussion regarding lateral error sampling methods, the need to re-estimate the mean crossing time of the NAT Region was re-iterated. This value was influenced by the aircraft types populating the NAT Region therefore reflecting their cruising speeds and relative sizes. This information must be combined with information on the routes flown in the NAT Region. Thus, there was a need for a census of routes flown to help produce distributions of NAT flying times for one or more areas of NAT Region airspace. It was noted that the Enhanced Traffic Management System (ETMS) data could be used for such an analysis (the ETMS projects the position of the aircraft based on the last known clearance).

Evidence of Strategic Lateral Offsets

3.1.25 A key parameter which was used in calculations of vertical and longitudinal risk was the lateral overlap probability, $P_y(0)$ [1] (risks increase in direct proportion to this value). The value had been re-estimated twice during the past five years because it was dependent on the lateral navigational accuracy of the NAT traffic population. The number of aircraft navigating with GPS as a proportion of the NAT fleet had generally increased with time. GPS allowed much improved navigational position keeping, and so the lateral distribution about the centreline of a given track had changed over time, and the core of the distribution had tightened up.

3.1.26 It was noted that, effective with 10 June 2004, the Strategic Lateral Offset Procedure (SLOP) came into effect in the NAT Region. Several surveys had been performed using ADS equipped aircraft and a sample of Centralised ADS (CADS) data from 1 July to 31 October 2004, inclusive. The analysis had shown that the proportion of ADS-fitted flights flying offsets as recommended in mid-ocean was approximately 3% for Boeing aircraft and 4% for Airbus aircraft. Furthermore, the 1 NM right offset was significantly more popular than the 2 NM right offset. A proportion of ADS-fitted flights flew to the left of track centreline; this constituted less than 1% of the flights in the sample.

3.1.27 The Group was informed that some operators flew a larger proportion of offsets than others. For Airbus aircraft, US Airways, Air France and British Midland flew a greater proportion of offsets as recommended than the average operator. For Boeing aircraft, Air France and KLM showed the highest take-up of lateral offsets. Some operators were observed not to fly any offsets.

[1] Py(0) is pronounced ‘pee-why-zero’. This is the probability that two aircraft that are on the same track are in lateral overlap.

3.1.28 The Group noted that several tables showing the take-up of lateral offsets by operator had been produced. It was agreed that these tables would be made available to the pilot trainers of operators. Furthermore, the observer for IATA agreed to disseminate de-identified copies of the tables to the airlines.

CONCLUSION 41/18 – DISSEMINATION OF TABLES SHOWING USAGE OF THE SLOP

That:

a) the NAT Safety Management Co-ordination Group disseminate the tables of Strategic Lateral Offset Procedures (SLOP) usage to pilot training facilities; and

b) IATA disseminate the tables amongst its membership.

3.1.29 The take-up of lateral offsets was disappointing. Nevertheless, it was considered that the timing of the data sample using ADS equipped aircraft could be crucial in evaluating the procedural take up and that improvements might be expected after allowing time for the training cycle to take effect. Therefore, another study of this kind using a sample from the end of 2005 could prove or disprove this assumption. It was also recognised that changes from CADS to local ADS reporting could render the process so difficult to carry out that it could preclude further analysis.

3.1.30 Another analysis on the take up of lateral offsets was made based on a 50-day sample of radar data (January to March 2005) on a particular track segment in the WATRS area. The aircraft positions were recorded by a radar on Bermuda, which had shown the lateral deviations about track centreline of all the aircraft on track A523. This totalled 834 aircraft. For the 50-day sample, about 80% of aircraft flew the track centreline. About 18% flew either a 1 NM or 2 NM offset, in accordance with the recommended procedure. About 2% flew left of track centreline. This represented a marginal improvement on results from a similar study carried out using data from early 2004. Commercial operators appeared to adopt the procedure more often than International General Aviation (IGA), with 78% electing the centreline and in excess of 21% offsetting according to the recommended procedure, whereas about 96% of IGA flew the track centreline.

Strategic Lateral Offsets Procedure Article – ICAO Journal publication

3.1.31 The Group noted with satisfaction the publication in the ICAO Journal (Volume 60, Number 3 2005) of an article by Mr. Steve Kirby (the *Rapporteur* of MWG) on the strategic lateral offset procedure. It was hoped that this article would help to publicise the procedure and increase the take-up of lateral offsets.

Lateral Overlap Probability, Py(0)

3.1.32 It was recalled that NAT SPG Conclusion 40/16 required that a new estimate of $P_y(0)$ be made. In light of the evidence that few flights were using lateral offsets, the Group noted that the study had been postponed. Nevertheless, the postponement was used as an opportunity to examine other methods to re-estimate $P_y(0)$ subsequent to there having been a significant take-up of lateral offsets. The Group stated that NAT SPG Conclusion 40/16 remained extant.

3.1.33 The Group was informed that a plot of the lateral Cross Track Error (CTE) distribution from the Gander radar yielded some interesting features. In particular, there were several distinct peaks. A similar CTE sample from Irish radars produced a much more peaked distribution. Because any significant increase in the peak of the CTE distribution would result in a significant increase in the lateral overlap probability and therefore the vertical and longitudinal risk estimates, the Group agreed that the sample be analysed in more detail by the MWG.

CONCLUSION 41/19 – INVESTIGATION OF THE LATERAL ERROR DISTRIBUTION

That the Mathematicians Working Group analyse in greater detail the differences in the lateral cross track error measured by Gander and Shannon radars.

Vertical Risk

3.1.34 The Group noted the vertical occupancy estimates for the twelve months of 2004 based on the traffic weighted average of the United Kingdom 20°W estimates, the Canadian 40°W estimates and the traffic weighted average of both Canadian and United Kingdom 30°W estimates. The estimates were based on data for the 4th and 15th days of each month. Total vertical risk was estimated by summing technical risk and operational risk. In the past, technical risk had been a small proportion of the total vertical risk, and operational risk the larger.

3.1.35 The estimate of vertical technical risk for 2004 was 0.7×10^{-9} fatal accidents per flight hour, compared to the TLS for vertical technical risk of 2.5×10^{-9}. The estimate was much less than the TLS.

3.1.36 The operational element of vertical collision risk was determined from two components. The first component was the estimate of time spent by aircraft at uncleared flight levels or when incorrectly cleared to a flight level. The second component was for uncleared level changes, which used the number of levels crossed without a clearance or without following published contingency procedures, including the speeds at which the levels were crossed. This data was analysed for the monitoring year.

3.1.37 As with the lateral GNEs, the vertical Large Height Deviations (LHD) reported to the CMA during 2004 were examined in conjunction with the SMCG to agree on the classification for risk estimation purposes. A large decrease in the time spent at uncleared flight levels was noted compared to 2003, although the total number of deviations reported (i.e., the sum of risk-bearing and non-risk-bearing) had actually increased.

3.1.38 The random and OTS combined vertical collision risk due to operational errors for 2004 was estimated to be above the TLS, but this estimate was around half of that for 2003. There were many fewer minutes flown at the wrong flight level in 2004, which accounted for the significant part of the drop. In addition, it appeared that the risk mitigation put in place since NAT SPG/40 appeared to be giving positive results. Although the NAT system was considered to be safe to operate in, it was noted that the risk estimate had been above the TLS for five of the previous six years. Therefore, it was agreed that efforts to contain and reduce vertical operational risk should continue.

3.1.39 It was noted that in 2003's risk estimate, a single LHD was responsible for a significant proportion of the risk. The Group recalled that, as a result of an HF blackout the aircrew utilised the 'no communications' procedures. The procedure utilised, however, was not the approved one. It was recognised that the adoption of a common procedure throughout the NAT region would likely have eliminated this error. The Group was informed that, in follow up to NAT SPG Conclusion 39/12, proposals for amendment to the NAT *Regional Supplementary Procedures* (SUPPS) (Doc 7030) addressing the above issue were being processed.

CONCLUSION 41/20 - REDUCTION IN RISK DUE TO OPERATIONAL ERRORS

That:

a) the NAT Implementation Management Group determine additional mitigation to reduce risks due to operational errors;

b) all concerned ensure that the necessary mitigation is put in place in order to reduce risk due to operational errors; and

c) the Central Monitoring Agency (CMA) be informed of instances of the implementation of new mitigation and report the effects to the NAT SPG.

Alternative Means of Reducing Vertical Operational Risk

3.1.40 The Group considered that the alternative means of reducing vertical operational risk by focussing on the reduction of $P_y(0)$ through the SLOP and by reducing time spent at wrong flight levels through initiatives from the SMCG would contribute to risk reduction. Nevertheless, other means must be found as well. However, in doing so, the existing interdependency between the vertical, lateral and longitudinal risk equations needed to be taken into account. It was noted that modifying a parameter value in one dimension would affect risk in the other dimensions.

3.1.41 The Group was informed that vertical risk modelling for the South China Sea was being carried out to determine whether a height deviation resulted in exposure to same or opposite direction traffic, and the differing degrees of risk from each. It was noted that there may be an opportunity to draw on the risk modelling experience from that region and apply it to the NAT Region. The Group agreed that the MWG should investigate the modelling used in the South China Seas as well as in other parts of the world

CONCLUSION 41/21 - INVESTIGATION OF VERTICAL RISK MODELLING

That the Mathematicians Working Group investigate vertical risk modelling used in other parts of the world.

Partitioning risk estimation for the NAT Region

3.1.42 The Group noted that the partitioning of the vertical risk estimate already happened. Contributions from the OTS and random tracks were estimated separately and combined at the end (and weighted according to the proportion of traffic in each partition) to produce the risk estimate for NAT MNPS airspace. Although alternative or additional partitioning was possible it was noted that the combined risk estimate was unaffected by partitioning. Therefore, it was considered that, currently, there was no need for further partitioning, although this could change in the future.

Estimating the NAT population

3.1.43 The Group was informed that from studies that had been carried out, it had been realised that there was no proper estimate of the number of unique airframes flying in the NAT Region each year. With this in mind, the Group was informed that a comprehensive estimate of the NAT population for the calendar year of 2003 had been done which had shown that the population estimates for 2003 were: 4862 civil airframes, 1474 military airframes and 6336 unique airframes. These were lower bound estimates for the number of unique airframes in the NAT Region. The analysis had focussed on the number of movements by operator and by aircraft type. The study revealed that an aircraft type that may be very common, in terms of number of airframes, might not account for a corresponding number of movements. This provided a different view of the interpretation of traffic measurements.

MWG Work Programme

3.1.44 The Group noted that the MWG would convene for one day immediately after the SMCG meeting in Autumn 2005. This would be a valuable means of reviewing progress against its work programme. The next annual risk assessment to be carried out by the MWG would be by April 2006 to

permit a timely report to NAT SPG/42. It was considered that the MWG meet immediately after the SMCG in Paris.

SAFETY MANAGEMENT

3.1.45 The Group was informed that, in follow up to NAT SPG Conclusion 40/13 a), a safety management workshop had been held in Brest, France. It was noted from the results of the workshop that the current method of reporting risk could be confusing to outsiders with little knowledge of the processes used in the NAT Region to report risk against an agreed Target Level of Safety (TLS). Accordingly, the Group felt that clearer guidance was required on how to organise NAT Region safety management.

3.1.46 The Group noted that the NAT IMG, in the context of the concept of regional safety management, felt that some overlap with the MWG and the SMCG existed and that this needed to be clarified.

3.1.47 It was recalled that, on the one hand, the NAT CMA remained the focal point for collection, analysis and dissemination of results of safety management data and that, on the other hand, the SMCG, should organise its work and cooperation with the NAT CMA on the basis of an established list of ATM related incidents to be analysed, including a hierarchy.

3.1.48 The SMCG should also develop a methodology for analysis by the NAT CMA of the ATM related incidents; including a safety categorization of the incidents. It was agreed that the SMCG would recommend to the NAT SPG the means to be used to issue the results of the analysis to NAT ACCs, national authorities and users. The methodology should revise the current one used to evaluate the health of the NAT ATM system. Finally, it was agreed that the SMCG would provide the annual meeting of the NAT SPG with a report of the ATM related incidents of the previous year.

CONCLUSION 41/22 - REGIONAL SAFETY MANAGEMENT PROCESS

That the Safety Management Co-Ordination Group (SMCG):

a) establish :

(i) a list of ATM related incidents to be analysed, including a hierarchy ;

(ii) a common form to be used to report ATM related incidents to the CMA ;

(iii) the means to be used to issue this form to the NAT CMA ;

(iv) the list of correspondents in charge of ATM related incidents in NAT Centres and national authorities ;

(v) a methodology for analysis by the NAT CMA of the ATM related incidents ;

(vi) a safety categorization of the incidents after analysis.

b) report to the next NAT IMG meeting any difficulty encountered in the application of the above programme ;

c) prepare its year 2005 report before NAT SPG 42, accordingly.

Regional safety management

3.1.49 The NAT SPG has been exercising safety management principles for many years. It is part of the process of analyzing, implementing and monitoring the performance of separation minima throughout the airspace. It is embodied in the collision-risk methodology which dissects the proposed change into essential elements, recommends change to relevant aspects of the system, projects the result for comparison to an operational threshold, introduces the change in a controlled manner, then examines the airspace periodically to assess its health against the agreed threshold. This is a firm foundation from which to continue practicing safety management.

3.1.50 The SMCG has sought to adopt a more formalised and consistent safety management process to its work, and this process was still being refined. The introduction of one professional safety manager into the Group in December 2004 had been of great assistance in reshaping the SMCG for the future. The Group requested, however, that one further safety manager be co-opted so as to reinforce the objectives and processes of the Group, and to ensure that at least one safety manager was available for meetings or consultation as necessary.

3.1.51 The Group examined the composition of the SMCG and felt that additional expertise was required, particularly in the fields of safety management and aircraft operations. IATA and IFALPA indicated that they would make the necessary arrangements to ensure that an Airbus pilot would participate in the work of the SMCG. The Group also noted with appreciation that representation from New York OAC would be made available.

3.1.52 The Group noted the continued failure to meet the Target Level of Safety in the vertical dimension and proposed that consideration be given to means of supplementing both the classification and evaluation of reported occurrences, in order to:

a) recognise that incomplete reporting affects and potentially underestimates mathematical determination of risk;

b) provide indicators that are of more value to operational staff;

c) extract more operationally useful information from occurrence reports;

d) establish a more formal and systematic collection and analysis of data; and

e) identify and compare present trends with those of the past

3.1.53 The role of the SMCG was clearly expanding, and to deliver an effective service to both the NAT SPG and the wider North Atlantic user community it was essential that it used available resources and functions cohesively all the time, and not only twice a year when it meets formally. The proposal was made to involve appropriately-located members of the SMCG with occurrence investigations in their own region under the auspices of the SMCG rather than their own employer, to raise the profile of the SMCG, feed resulting reports back to the SMCG via the CMA, and to liaise with their own State authorities as necessary. While this has possible resource implications for the individual members of the SMCG there was little doubt that the expanded role of the SMCG impacted on both the participant members and the NAT CMA, which also faced a widening of its remit and a growing workload. The resource implications of the development of the SMCG should be addressed sooner rather than later to avoid constricting its development and potential.

3.1.54 The development and adoption of a formal safety management protocol for the SMCG needs to utilise the best of existing aviation safety management systems supplemented by any additional elements considered appropriate in the Oceanic context.

Recommendations to improve the observed standard of navigational performance in the NAT Region

3.1.55 As a result of recommendations made by the 2004 Scrutiny Group – the predecessor of the Safety Management Co-ordination Group – the objective of promoting good navigational performance practices in the North Atlantic airspace has been emphasised. Nevertheless the Group held the view that this should continue to be encouraged by all appropriate and affective means.

3.1.56 The Group was addressing this objective proactively, by a number of methods:

a) the adoption of safety management techniques in the assessment of occurrences, in order to ensure consistency of analysis, identification of all relevant factors, improved and more operationally useful error-classification, and proper feedback to the operator and other involved agencies;

b) extraction of more operationally useful information from every report and subsequent analysis;

c) consideration of improved trend analysis methods;

d) consideration of means to make system risk estimation more effective and expressing that risk in ways that will enhance operational understanding;

e) using crew navigational documentation to highlight the current principle error identified by the SMCG and, by the publication thereof to emphasise to crews the cause of the greatest number of errors in the preceding half-year; and

f) by holding the autumn SMCG meeting at a location other than Paris, the Group intends to raise its profile in the NAT community and thereby increase understanding of its objectives and activities. Portugal had kindly agreed to host the November 2005 meeting in Santa Maria. All spring meetings will be held in Paris.

CONCLUSION 41/23 - EVOLUTION OF THE SMCG

That the NAT Safety Management Co-ordination Group (SMCG):

a) continue the evolution into a safety management team and adopt a standard occurrence analysis process;

b) consider supplementary methods of measuring and expressing system risk assessment , building on the foundation of the existing methodology;

c) the NAT SPG approve the objectives and working methods for the SMCG while authorising it to act as appropriate to mitigate identified causes of error in a timely manner, unconstrained by the annual NAT SPG meeting; and

d) each year in the autumn, the SMCG should meet at a location around the NAT Region where observers from the hosting State may attend sessions of the meeting and participate by invitation whereas the spring meeting be held in Paris.

Regional Safety cases

3.1.57 The Group was presented with a proposal to manage regional safety cases that may be required to implement reductions in separation or new technology. It was recognised that the States themselves have the responsibility to ensure that safety requirements are met but that service providers actually implement systems and that, in a region such as the North Atlantic, there would be requirements for regional safety cases. The Group agreed that the most efficient mechanism to address this issue was the NAT IMG itself. It was therefore agreed that the NAT IMG, using its planning machinery would develop safety cases as required in support of the implementation of reductions in separation or new technology. It was also agreed that the NAT IMG would provide the NAT SPG with regular updates.

CONCLUSION 41/24 - DEVELOPMENT OF REGIONAL SAFETY CASES

That the NAT IMG, in association with affected parties, oversee the development of regional safety cases.

3.2 Review of system operations

AIR TRAFFIC MANAGEMENT

North Atlantic Operations Managers' Meeting

3.2.1 The Group was informed that because of administrative difficulties, Norway had not been able to host the NAT OPS Managers Meeting as scheduled. It was further noted that the United Kingdom would host the OPS Managers meeting in Prestwick in September 2005 and that they would provide a report to NAT SPG/42.

COMMUNICATIONS

Review of HF Network Operations

3.2.2 It was recalled that, for many years, ARINC had been coordinating SELCAL code assignments worldwide on behalf of ICAO. Whenever a duplicate SELCAL was detected by any NAT Region aeronautical station, a message was sent to ARINC alerting them of the situation. Recently, ARINC advised all stations to stop sending these messages, as the SELCAL system used only four letters and, due to the increasing number of aircraft, it was not possible to avoid code duplications. To replace the aforementioned procedure, it was noted that radio stations had agreed to notify each other of duplicate SELCAL codes and that this procedure should be included in the HF Guidance Material.

3.2.3 The Group was informed that, because of the replacement of the Piarco Radio equipment, New York radio had assured the HF communications within Piarco FIR. It appeared that pilots assumed that, as they were in contact with a NAT Region radio station, they did not have to request an Oceanic clearance from Santa Maria Oceanic Area Control Centre and many flights stopped complying with the procedure. As a consequence, most of the Oceanic clearances for these flights were being delivered by the Aeronautical Station only after the FIR boundary position report. To overcome the problem, it was agreed that, for as long as New York assumed HF communications in Piarco FIR, the New York radio operators receiving a position report within Piarco FIR and estimating Santa Maria OAC boundary should advise the flight to call Santa Maria radio and request an Oceanic clearance.

3.2.4 The Group was informed about wrong frequency assignments, which were being done through a CPDLC uplink. This situation was causing some difficulties and extra workload, especially when the messages were up linked after the frequencies had been assignment by radio operators.

3.2.5 The Group was also informed that no aircraft were complying with the procedures published in the Data Link Guidance Material, and were thereby not carrying out the initial contact for frequency allocation and SELCAL check. This situation had only recently appeared but had raised some operational and safety issues and had lead to operational problems, because it was not possible to establish contact with the aircraft due to lack of information being provided to the radio operators. It was noted that procedures were being put in place to overcome the issues that had been identified.

3.2.6 The Group noted with satisfaction that the current network operations had improved significantly as a result of the publication of the HF Guidance Material. It was noted that no major problems existed.

3.2.7 The Group was provided with information about the efforts by Iceland and Ireland to develop cooperative arrangements for communications service provision. It was noted that a trial would be carried out with the purpose of identifying the synergies that may exist between both service providers and then analysing them to identify what benefits might accrue from formal arrangements for joint communications service provision in the NAT Region. The proposed operational trial would involve tactical work sharing across the Shanwick/Reykjavik OCA boundaries by pre-agreement between Iceland Radio and Shanwick Radio. The division of communications responsibility would be allocated between the stations on a dynamic basis depending on such factors as orientation and loading of NAT Tracks, projected NARTEL Network frequency loading, HF propagation and staff resources.

3.2.8 It was anticipated that a number of benefits should accrue from these new arrangements. The principal ones were:

a) better HF traffic distribution / less HF congestion;

b) improved Network efficiency / better message delivery times;

c) improved service to customers and stakeholders;

d) better utilisation of stations' staffing resources; and

e) mitigation of affects of HF propagation difficulties.

3.2.9 It was noted that the Aeronautical Communications Group (ACG) would present the results from this trial to NAT SPG/42. It was also noted that there were ongoing negotiations with Norway to include the Bodø Radio Station in the process.

Review documentation

3.2.10 The Group noted that some information on the HF Guidance Material needed to be updated. It was further noted that all concerned would provide the rapporteur of the ACG with the necessary information so that he could update the Guidance Material and arrange to have it posted on the NAT-PCO web site.

Traffic analysis

3.2.11 The Group was presented with the consolidated report of the analysis of the 2004 network message volume traffic. The total amount of HF and GP VHF contacts for the year of 2004 was 3.306.847 messages, distributed amongst all Aeronautical Stations: 74 % was by HF and 26% was by VHF frequencies. For each Aeronautical Station, the percentage of traffic was Gander (32.5%), Shanwick (26%), Iceland (13%), Portugal (13%), United States (15%) and Norway (0.5%). From an analysis of the data, it was shown that an increase of 1.5% in communications traffic occurred from 2003 to 2004. It was noted that the

number of SATCOM messages was not included by some stations for the year but would be included in the statistics for future years.

3.2.12 It was pointed out that, despite the increase in the percentage of data link equipped aircraft using the data link capabilities, the volume of messages had not decreased proportionally and had even increased. Some of the reasons identified as contributing to this conundrum were pilot errors and nuisance reports. It was however felt that a more in-depth analysis was required before any action could be recommended. With this in mind it was decided to do an evaluation exercise in which each station would look at a week's data from the stations log files and separate message types between duplicate voice reports for data link equipped aircraft and nuisance reports.

3.2.13 It was also agreed to discontinue the Busiest Day Report, since the existing format did not supply useful information and building a new format was too time consuming and the results would not benefit the network performance analysis.

CONCLUSION 41/25 - STUDY OF INCREASED COMMUNICATIONS TRAFFIC

That:

a) all NAT aeradio stations carry out an analysis of one weeks traffic in order to determine the cause in the increase in communications traffic;

b) report their findings to Portugal; and

c) the busiest day report be discontinued.

4. DOCUMENTATION UPDATE

4.1 NAT Documentation review

The Minimum Navigation Performance Specifications Operations Manual

4.1.1 It was recalled that NAT SPG/40 had agreed that the MNPS Operations Manual urgently needed to be updated because its publication was considered to be safety related and it contributed to reducing risk by keeping the pilot community more aware of the NAT Region operating requirements.

4.1.2 The Group was informed that arrangements had been made to finance the use of a consultant to carry out the work. It was recalled that when agreeing to the financing arrangements, the NAT SPG had also agreed that the update should be done in such a way that the document would not need to be completely updated every time a major change occurred and that the document should be published electronically using the NAT PCO web site. On this basis, all user organisations had supported the proposal to finance the updating of the MNPS Operations Manual.

4.1.3 The Group expressed its appreciation to the Member for the United Kingdom who had agreed to make the necessary arrangements to hire a consultant. The Group was presented with a status report on the work. It was noted that that the first draft of the revised Manual had been prepared and had been distributed for review and comment to all the NAT SPG specialist sub-groups in October 2004 and that comments received to date were being incorporated. The plan leading to final publication was to post the document on the NAT PCO web site until mid-August 2005. By 1 September, all comments would be incorporated if appropriate and the Document would be officially published on 15 September 2005. After that date, all future changes would be made to the electronic version and no hard copies would be produced.

It was emphasised that the document would be available to all concerned and would be freely downloadable from the open NAT PCO web site www.nat-pco.org.

4.1.4 The Member from Iceland informed the Group that they would be prepared to support the maintenance of the NAT MNPS OPS Manual for the time being. The Group expressed its appreciation for the offer.

CONCLUSION 41/26 - ENDORSEMENT OF THE MNPS OPERATIONS MANUAL

That the ICAO Regional Director make the necessary arrangements to publish the revised Minimum Navigation Performance Specifications (MNPS) Operations Manual on the NAT Programme Coordination Office (PCO) web site by 15 September 2005.

NAT Basic ANP and FASID

4.1.5 The Group was informed that, in follow up to NAT SPG Conclusion 38/21, the NAT IMG had set up a task force to review and update the NAT Basic ANP and FASID. The task force held three meetings and had completed its work. It was recalled that the current NAT ANP had been approved by the Council subsequent to the Limited NAT Regional Air Navigation (RAN) Meeting (Cascais, 1992). The basic ANP and FASID had been published as a trial document in 1995.

4.1.6 Since the publication of the NAT ANP, several global activities have taken place that have had a direct bearing on the document. The format of the document was refined in the light of its exposure to other RAN meetings and the 11th Air Navigation Conference (ANC). In addition, the Air Navigation Commission (ANC) approved a new Statement of Basic Operational Requirements and Planning Criteria in the spring of 2005 that will be included in the revised Basic ANP.

4.1.7 In follow up to NAT SPG Conclusion 40/20 concerning an amendment to the provision of MET services, the proposal for amendment was circulated to all concerned and approved by the President on behalf of the Council on 24 February 2005.

4.1.8 The Group was informed that, although the task force had completed its work and the documents had been updated, some outstanding issues still needed to be resolved before the changes could be processed in accordance with the Council approved procedure for the amendment of approved Regional Plans.

4.1.9 As regards the changes, it was noted that the NAT IMG had agreed that it was not necessary to include an Aeronautical Telecommunication Network (ATN) transition plan in the ANP and that references to specific technologies should be eliminated. All States and international organisations concerned had provided inputs in order to update the FASID tables. New charts and maps would be prepared once the NAT SPG had endorsed the proposal for amendment.

CONCLUSION 40/27 - AMENDMENT PROPOSAL TO THE NAT ANP

That ICAO, on behalf of the NAT SPG, initiate a proposal for amendment to the trial edition of the NAT Air Navigation Plan (ANP), Volumes I and II.

On the right track DVD

4.1.10 In follow up to NAT SPG Conclusion 40/11 a) and b), the Group was informed that a completely revised and expanded DVD, now entitled "On the Right Track" had been completed and was available. The publication was intended to address aspects of good operational practice and airmanship within the NAT Region. The DVD, which had been designed as a training tool and a reference source,

would be distributed in the first instance to crew training and safety departments of aircraft operators (commercial, military and IGA) that operate within NAT Oceanic airspace, and to ground training organisations involved with oceanic procedures training. The medium was available for copying by other agencies and individuals provided that acknowledgement was made of the original publisher, that no changes were made to the content and that it was not used commercially.

Other documentation

NAT APPLICATION OF SEPARATION MINIMA DOCUMENT

4.1.11 The Group recalled that it had endorsed the Fourth Edition of the Application of Separation Minima (ASM) Document at its 32nd Meeting (Conclusion 32/7 refers) in September 1996. Since then, many changes to the separation minima being applied in the NAT Region (such as RVSM) had been implemented. With that in mind, the NAT IMG had tasked its Air Traffic Management Group (ATMG) with updating the document.

4.1.12 The Group noted that the revised ASM Document reflected the current operation and not the anticipated one. If new separation minima were agreed to, amendments would be required.

4.1.13 The Group noted that the NAT IMG, at its 26th Meeting in April 2005, had endorsed the revised ASM Document. Accordingly, the Group endorsed the revised ASM Document and it was agreed that it should be published on the NAT PCO website and that it should be an electronic document rather than a hard copy one. It was further agreed that, when it was published, it should not be given an Edition number but should, instead, be given a version number such as 1.0 with subsequent versions based on 1.1. A major change could entail a change to the version number such as 2.0. Also, a change sheet would be included.

4.1.14 In addition, the current version of the ASM Document would always be the one contained on the NAT PCO web site. Each amended page would have a date in order to facilitate traceability. Furthermore, the track-changes function would be used for the latest amendment in order to highlight the changes. As regards configuration management, it was agree that all changes would be agreed to through the NAT IMG planning machinery. It was also agreed that the updated ASM Document would be published on 29 September 2005.

CONCLUSION 41/28 - NAT REGION ASM DOCUMENT

That the:

a) NAT Systems Planning Group endorse the revised Application of Separation Minima (ASM) Document prepared by the NAT Implementation Management Group (NAT IMG);

b) ASM Document be published electronically on the NAT Programme Coordination Office (PCO) web site; and

c) NAT IMG oversee the configuration management of the ASM Document.

FUTURE ATM CONCEPT OF OPERATIONS FOR THE NORTH ATLANTIC REGION

4.1.15 The Group was informed that, in follow up to NAT SPG Conclusion 38/21, the NAT IMG had set up a task force to undertake the updating the NAT ANP and FASID as well as to develop a new NAT ATM Concept of Operations that would be based on the outcome of the 11th Air Navigation Conference.

4.1.16 The revised ATM Concept of Operations was based on the seven ATM operational concept components which are as follows:

a) Airspace Organisation and Management;

b) Aerodrome Operations;

c) Demand and Capacity Balancing;

d) Traffic Synchronisation;

e) Airspace User Operations;

f) Conflict Management; and

g) ATM Service Delivery Management.

4.1.17 Although the Concept of Operations was based on the above components, safety remained the highest priority and the safety of air traffic would continue to be the most important consideration in all phases of the life cycle of the Concept of Operations. The acceptable or tolerable level of safety would be determined from the perception of safety needs by society and the international community. Acceptable safety would be related to the trust required from the ATM system. This was a different approach to reporting safety from the current method of only relating to a Target Level of Safety (TLS).

4.1.18 Because the NAT Concept of Operations was firmly rooted in the Global ICAO ATM Operational Concept, which was a living document kept under continuous review by the Air Navigation Commission (ANC), it would also need to be kept under review within the NAT Region. It was therefore agreed to the proposal that this task be given to the NAT IMG.

4.1.19 It was also agreed that the Future ATM Concept of Operations for the NAT Region, whilst clearly linked to the ANP, should be maintained as a separate NAT document (NAT Doc 005).

CONCLUSION 41/29 - ENDORSEMENT OF THE DRAFT NAT ATM CONCEPT OF OPERATIONS

That the NAT IMG:

a) use the draft Air Traffic Management (ATM) Concept of Operations that it developed as the baseline to for future planning;

b) update the ATM Concept of Operations in the light of regional and/or global developments; and

c) **provide the NAT SPG with regular updates.**

5. ANY OTHER BUSINESS

5.1 Next meeting

5.1.1 The Group agreed that NAT SPG/42 be held in the ICAO EUR/NAT Office, from 20 to 23 June 2006.

5.2 Farewells

5.2.1 The Group expressed its sincere appreciation to Mr Don Harris, the Member for Canada, who joined the Group in 2003 (NAT SPG/39). The Group wished Don a happy and healthy retirement.

5.3 Remembrance

5.3.1 The Group was informed of the passing of Mr Claude Girard after a long illness. Mr Girard was a long time friend and participant in the activities of the NAT SPG. Claude was a former operations manager of Trans World Airlines at Charles de Gaulle Airport for many years. He participated as a representative of IATA and after retirement worked part-time for Jeppesen and often participated in several Eurocontrol fora. His frank and candid participation in NAT SPG educated everyone with the day to day operations of airlines. He will be missed.

APPENDIX A – DR KOTAITE'S SPEECH

(paragraph i.3 refers)

Good morning ladies and gentlemen

It is with great pleasure that I use this opportunity to address the doyen of all regional planning groups – the North Atlantic Systems Planning Group. The Group was created in 1965 with the view to providing planning machinery for the North Atlantic Region. It should be recalled that the NAT Region has always been at the forefront of civil aviation developments.

North Atlantic operations really began in December 1942 with the first flight of aircraft from Gander to Northern Ireland. A winter crossing of the NAT had never been attempted before. The mission was successful and, as they say, the rest is history. However, the men and women that risked their lives to develop what can be considered one of the safest and efficient air navigations systems in the world should be remembered. The first air navigation conferences that were held after the signature of the Chicago Convention were dedicated to the NAT Region. I am thinking of the North Atlantic Route Service Conference held in Dublin in 1946.

The NAT Region has been a hot bed of innovation over the years. Already in 1965, the NAT SPG was created by the Limited NAT Regional Air Navigation (RAN) Meeting. At that time, the meeting had envisioned RVSM and the use of satellites. Sometimes our ideas and thoughts are far ahead of our technological capabilities! If we do not dare, we do not move forward.

The NAT SPG was set up as a planning group and has done an exemplary job. It has been the source of the Required Navigation Performance (RNP) concept through the implementation of the Minimum Navigation Performance Specifications (MNPS) concept. It was the first area in the world to implement a regional safety management system; it pioneered the development of the Mach number technique, which permitted reductions in longitudinal separation in many areas of the world. The NAT Region was the first to implement RVSM, and we all know what the benefits to the user community has been!

It is with great pleasure that we have noticed that the NAT SPG has evolved from a planning machinery to one that incorporates safety management. Again, the NAT SPG should be congratulated fore taking this role. We in ICAO recognise that difficulties will arise because of the potential conflict between supervisory authorities and air navigation service providers. Regional planning groups have a fundamental role in arbitrating between safety oversight and service provision. Even if a State is represented in a regional planning group through its service provider, the State still carries the ultimate responsibility to ensure that safety standards are met. ICAO will not audit air navigation service providers, we will audit States.

Because of the importance that the Air Navigation Commission (ANC) and Council place on inputs from the regional planning groups, it has been decided that, as of 2006, the NAT SPG will formally submit its report to ICAO. This does not mean that the Group's terms of reference nor its working methods should change. However, if the Group wants to bring important issues to the attention of the Council, it should ensure that the issues are well documented in its report.

From the agenda that has been explained to me by the Secretary, I have noted the importance that has been placed on regional safety management, based on the new Annex 11 provisions. I note in particular the emphasis that you have put on height monitoring to ensure the continued safety of the use of Reduced Vertical Separation Minimum (RVSM).

Again, I congratulate you, the NAT SPG, for the valuable work that you have done over the last forty years and wish the forty first meeting a successful outcome.

APPENDIX B - LIST OF PARTICIPANTS

(paragraph i.6 refers)

NAT SPG Chairman
Mr Asgeir PALSSON*

CANADA
Mr Don HARRIS*
Mr Randy SPEIRAN

DENMARK
Mr Lars Peter JENSEN*
Mr Kurt ANDREASEN

FRANCE
Mr André BERMAN*
Mr Philippe TANGUY
Mr Didier EVEN

ICELAND
Mr Leifur HAKONARSON

IRELAND
Mr Pat RYAN*
Mr Donie MOONEY

PORTUGAL
Mr Carlos MONTEIRO*
Mr Jose CABRAL
Mr Luis RODRIGUES
Mr Henrique NUNES

RUSSIAN FEDERATION
Mr Sergey DIKAREV
Mr Arkady BUBAS
Mr Vadim LINOV
Mr Alexander MELNIKOV
Ms Elena GRACHEVA

UNITED KINGDOM
Mr George BALLANTYNE*
Mr David NICHOLAS
Mr Stephen KIRBY
Mr Ben BENOIST
Ms Seonaid RIDDELL-BLACK

UNITED STATES
Mr Luis RAMIREZ*
Mr Robert SWAIN
Ms Carey J. FAGAN
Mr Michael PUMPHREY
Mr Gerald L. RICHARD

IATA
Mr Peter LAY
Mr David STRAND
Mr Mark HURSTON

IBAC
Mr Peter INGLETON

IFALPA
Capt John R FUENTES

IFATCA
Mr Edward WALLACE

INMARSAT
Mr Gary COLLEDGE

ICAO
Mr Karsten THEIL
Mr Jacques VANIER
Mr Jean-Claude BUGNET
Mr George FIRICAN
Mr Robert KRUGER
Mr Bjorn HELLROTH
Mrs Nikki GOLDSCHMID
Mrs Patricia CUFF
Ms Leyla SULEYMANOVA

*** Member**
**** Alternate Member**
 # part time

LIST OF ACRONYMS

AAD	assigned altitude deviation
ACARS	Aircraft Communication Addressing and Reporting System
ACAS	Airborne Collision Avoidance System
ACAS II	Airborne Collision Avoidance System – Phase 2
ACC	Area Control Centre
ACG	Aeronautical Communications Group
ADS	Automatic Dependent Surveillance
ADS-B	Automatic Dependent Surveillance-Broadcast
ADS-C	Automatic Dependent Surveillance-Contract
AFTN	Aeronautical Fixed Telecommunications Network
AGHME	Aircraft Geometric Height Measurement Element
AIC	Aeronautical Information Circular
AIDC	Air Traffic Services (ATS) Inter-Facility Data Communication
AIP	Aeronautical Information Publication
AIS	Aeronautical Information Services
ALLPIRG	All Planning and Implementation Regional Groups
AMSS	Aeronautical Mobile-Satellite Service
ANC	Air Navigation Commission
ANP	Air Navigation Plan
ANSP	Air Navigation Service Provider
ASE	Altimetry System Error
ASM	Application of Separation Minima
ATC	Air Traffic Control
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
ATMIP	Air Traffic Management Implementation Plan
ATN	Aeronautical Telecommunications Network
ATOP	Advanced Technologies and Oceanic Procedures
ATS	Air Traffic Services
BOTA	Brest Oceanic Transition Area
CAA	Civil Aviation Authority
CADS	Central Automatic Dependent Surveillance
CAR	Caribbean
CMA	Central Monitoring Agency
CNS	Communications
CNS/ATM	Communications, Navigation and Surveillance/Air Traffic Management
CPDLC	Controller Pilot Data Link Communications
CRM	Collision Risk Model
CTA	Control Area
DFDR	Digital Flight Data Recorder
DLSG	Data Link Steering Group
EANPG	European Air Navigation Planning Group
EATCHIP	European Air Traffic Control Harmonization and Integration Programme
EC	European Commission
EFG	Economic and Financial Group
EGNOS	European Geostationary Navigation Overlay Service
ELT	Emergency Locator Transmitter
ETMS	Enhanced Traffic Management System
EUR	European
EUR/NAT	European and North Atlantic
FAA	Federal Aviation Administration
FANS	Future Air Navigation Systems
FASID	Facilities and Services Implementation Document
FCMA	FANS Central Monitoring Agency
FDE	Fault Detection and Exclusion

FDPS	Flight Data Processing System
FIR	Flight Information Region
FIS	Flight Information Services
FCM	Flight Management Computer
FMS	Flight Management System
FTE	Flight Technical Error
GAATS	Gander Automated Air Traffic System
GAT	General Air Traffic
GLONASS	Global Orbiting Navigation Satellite System
GMS	Global Positioning System Monitoring System
GMU	Global Positioning System Monitoring Unit
GNE	Gross Navigation Error
GNSS	Global Navigation Satellite System
GP	General Purpose
GPS	Global Positioning System
HF	High Frequency
HFDL	HF Data Link
HMS	Height Monitoring System
HMU	Height Monitoring Unit
IACA	International Air Carrier Association
IAOPA	International Council of Aircraft Owner and Pilot Associations
IATA	International Air Transport Association
IAVW	International Airways Volcano Watch
IAVWOSPG	International Airways Volcano Watch Operations Group
IBAC	International Business Aviation Council
ICD	Interface Control Document
IFALPA	International Federation of Air Line Pilots' Associations
IFATCA	International Federation of Air Traffic Controllers' Associations
IGA	International General Aviation
IMSO	International Mobile Satellite Organization
Inmarsat	International Maritime Satellite Organization
INS	Inertial Navigation System
IOC	International Oceanic Conference
IRS	Inertial Reference System
ITP	In Trail Procedure
ITU	International Telecommunications Union
LHD	Large Height Deviation
LIM NAT RAN	Limited North Atlantic Regional Air Navigation
LoA	Letters of Agreement
MAS	Message assurance
MASPS	Minimum Aircraft System Performance Specification
MEL	Minimum Equipment List
MNPS OPS	Minimum Navigation Performance Specifications Operations
MNPS	Minimum Navigation Performance Specifications
MOPS	Minimum Operational Performance Standards
MNT	Mach Number Technique
MSSR	Monopulse Secondary Surveillance Radar
MWG	Mathematicians Working Group
MWO	Meteorological Watch Offices
NAM	North American
NAT EFG	North Atlantic Economic and Financial Group
NAT IMG	North Atlantic Implementation Management Group
NAT SPG	North Atlantic Systems Planning Group
NATS	National Air Traffic Services
NAT TFG	North Atlantic Traffic Forecasting Group
NAT	North Atlantic
NICE Group	NAT Implementation Management Cost Effectiveness Group
NOAA	National Oceanic and Atmospheric Administration

NOTA	Northern Oceanic Transition Area
OAC	Oceanic Area Control Centre
OCA	Oceanic Control Area
OCD	Oceanic Clearance Delivery
ODAPS	Oceanic Display and Planning System
OPS MNG	NAT Operations Managers
OPS/AIR	Operations/Airworthiness
OTS	Organized Track System
PCO	Programme Co-ordination Office
PRM	Preferred Route Message
P-RNAV	Precision-Area Navigation
R&D	Research and Development
R/T	Radio Telecommunication
RACGAT	Russian American Co-ordinating Group for Air Traffic Control
RAIM	Receiver Autonomous Integrity Monitoring
RHSM	Reduced Horizontal Separation Minima
RMA	Regional Monitoring Agency
RNAV	Area Navigation
RNP	Required Navigation Performance
RTCA	Radio Technical Commission for Aeronautics
RVSM	Reduced Vertical Separation Minimum
SAR	Search and Rescue
SARPS	Standards and Recommended Practices (ICAO)
SATCOM	Satellite Communications
SELCAL	Selective Calling System
SES	Single European Sky
SLOP	Strategic Lateral Offset Procedure
SMCG	Safety Management Co-ordination Group
SOTA	Shannon Oceanic Transition Area
SSR	Secondary Surveillance Radar
SST	Supersonic Transport
SUPPS	Regional Supplementary Procedures
TA	Traffic Advisors
TCAS	Traffic Alert and Collision Avoidance System
TIBA	Traffic Information Broadcast by Aircraft
TLS	Target Level of Safety
TMA	Terminal Control Area
TOR	Terms of Reference
TVE	Total Vertical Error
UIR	Upper Information Region
USOAP	Universal Safety Oversight Audit Programme (
VAA	Volcanic Ash Advisories
VAAC	Volcanic Ash Advisory Centres
VHF	Very High Frequency
WAAS	Wide Area Augmentation System
WAFC	World Area Forecast Centre
WAFSOPSG	World Area Forecast System Operations Group
WATRS	West Atlantic Route System
WPR	Waypoint Position Report
WWW	World Wide Web

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