NAT SPG/40

Summary of Discussions and Conclusions of the

Fortieth Meeting of the

North Atlantic Systems Planning Group

Paris, 22 to 24 June 2004

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FOREWORD

i. Introduction

i.1 The Fortieth Meeting of the North Atlantic Systems Planning Group (NAT SPG) was held in the European and North Atlantic (EUR/NAT) Office of ICAO from 22 to 24 June 2004.

i.2 The Meeting was chaired by **Mr Ásgeir Pálsson**, the Member for Iceland. Mr Christian Eigl 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 from ICAO Headquarters, by Mr Björn Hellroth and by Mrs Nikki Goldschmid from the EUR/NAT Office of ICAO.

i.3 In the opening session, Mr Ásgeir Pálsson informed the Group that the new Member for Norway was **Mr Knut-Bjarne Klaussen,** who replaced **Mr Frode Mo**. Mr Klaussen who was unable to attend, had sent his apologies. The Group was also informed that Mr Knud Rosing stood in for Mr Lars Peter Jensen, the Member for Denmark who was unable to attend and that Mr David Maloy had stood in for Mr Drazen Gardilcic, the Member for the United States who was also unable to attend. Mr Christian Eigl informed the Group that ICAO was experiencing financial difficulties and, as such would have to be careful how it expended its resources. He also stressed the importance that must be given to safety management.

i.4 In addition to the Members of the NAT SPG, 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 A** to this report.

i.5 The Mathematicians' Working Group (MWG) had met at the EUR/NAT Office of ICAO from 22 to 27 April 2004 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.6 The Scrutiny Group (SG) had met concomitantly with the MWG at the EUR/NAT Office of ICAO on 18 to 21 April 2004 and had been charged with the scrutiny of navigation performance in the NAT Region. The Rapporteur, **Mr David Nicholas** of the United Kingdom, provided the NAT SPG with their report.

i.7 The Aeronautical Communications Group (ACG) had not met in 2004 but had carried out its work by correspondence. The Rapporteur, **Mr Joaquim Cabral** of Portugal, provided the Group with the report on the current use of High Frequency (HF) in the NAT Region.

1.8 The NAT Operations Managers had met in Gander from 25 to 27 May 2004.

i.9 The NAT Traffic Forecasting Group (NAT TFG) had held its 34th Meeting in Montreal from 19 to 28 April 2004 and had submitted a report to the NAT SPG containing an update of short, medium and long term forecasts.

i.10 The NAT Implementation Management Group (NAT IMG) had met twice since NAT SPG/39 and a report on their activities was presented to the Group.

i.11 The NAT Economic and Financial Group (NAT EFG) had met once since NAT SPG/39 and a report on their activities and findings had been presented to the Group.

i.12 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.13 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

Agenda Item 2: Planning and implementation

- 2.1 Report of the NAT Implementation Management Group
- 2.2 Report of the NAT Economic and Financial Group
- 2.3 Report of the North Atlantic Traffic Forecasting Group
- 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) Air Traffic Management
  - b) Communications

Agenda Item 4: Documentation update

- 4.1 NAT documentation review
- 4.2 MNPS Operations Manual

Agenda Item 5: Any other business

- 5.1 Next meeting
- 5.2 Farewells

1. DEVELOPMENTS

1.1 Report on the outcome of the 11th Air Navigation Conference (ANConf/11)

1.1.1 The Group was informed that the NAT IMG had been presented with an overview of the outcome of ANConf/11, which took place in Montreal from 22 September to 3 October 2003. The Council took formal action on the recommendations of the Conference on 10 March 2004 and the Air Navigation Commission (ANC) took action on 13 and 15 January 2004.

1.1.2 It was recalled that the 10th Air Navigation Conference, which had been held in 1991, had been a pivotal event in the evolutionary process toward an improved air navigation system. It was decided then to move from a ground-based to a largely satellite-based air navigation system that also relied on digital communications technologies. Originally known as the Future Air Navigation System (FANS), it is now known as Communications, Navigation and Surveillance and Air Traffic Management (CNS/ATM) systems. The objective of ANConf/11 was to fine-tune the implementation strategy of the CNS/ATM systems and to embark upon the next phase in establishing the air navigation infrastructure of the future. It was recognized that new technologies necessary for the modernization of the air navigation infrastructure were available. ANConf/11 therefore turned its attention to specific elements of a rejuvenated approach to the ATM component of the equation and also addressed the CNS supporting technologies. An important turning point from ANConf/10 was that the global ATM operational concept would be updated as required to take account of the changing nature of technology and that relevant Standards and Recommended Practices (SARPs) must now be traceable to ATM requirements.

1.1.3 The Group was provided with an overview of the global and regional developments in the modernization of air navigation systems. The current status of ICAO provisions relating to CNS/ATM systems, a summary of the work of relevant panels and study groups, textual and tabular representations of regional developments and a set of general observations and recommendations was provided.

1.1.4 The ANC's general observations were also noted, in particular that, although good progress had been made with implementation of certain elements of CNS/ATM systems, the overall pace of implementation was slower than originally expected. The ANC had recalled that the deliberations and recommendations of the Eleventh Air Navigation Conference had been helpful to the process of planning and implementation of air navigation systems. The ANC had requested the Secretary General to invite Planning and Implementation Regional Groups (PIRGs) and States to enhance their activities in the area of planning and implementation of CNS/ATM systems.

1.1.5 With the above in mind, the Group agreed that the newly endorsed Global ATM Operational Concept should form the basis on which to develop the future NAT Regional ATM Concept of Operations. Furthermore, it agreed that all of the relevant the Recommendations of ANConf/11, as approved by the Council and the ANC, should be used as the basis for future planning for the NAT Region.

CONCLUSION 40/1 - FOLLOW UP TO THE 11TH AIR NAVIGATION CONFERENCE

That:

a) NAT Implementation Management Group use the Air Traffic Management (ATM) operational concept, as approved by the Council, as the basis for the future NAT Region ATM Concept of Operations; and

b) Recommendations of the 11th Air Navigation Conference, as approved by the Council and Air Navigation Commission (ANC), be used as the basis for planning in the NAT Region.

1.2 Adjacent Regions

North American (NAM) and Caribbean (CAR) Regions

1.2.1 The Group noted that the Reduced Vertical Separation Minimum (RVSM) programme for the NAM and CAR Regions was on schedule for implementation in January 2005. The Group also noted that the United States' Advanced Technologies and Oceanic Procedures (ATOP) System, Build 1, was scheduled to become operational in New York Oceanic Area Control Centre (OAC) around the end of 2004.

1.2.2 The Group noted that the NAV CANADA National Operations Centre (NOC) for Air Traffic Flow Management (ATFM) opened March 1, 2004 and that the new Canadian Automated Air Traffic System (CAATS) was progressively being implemented.

European (EUR) Region

1.2.3 The Group recalled that the horizontal expansion of the use of 8.33 kHz channel spaced frequencies to the entire EUR Region above FL 245 had taken place effective 31 October 2002 and that vertical expansion down to FL 195 and to some major Terminal Control Areas (TMA) was planned for 2006. This may have an effect on that part of the NAT aircraft population that operates below FL 245.

1.2.4 It was noted that the progressive implementation, as of November 2003, of Class C airspace above FL 195 in all European States was almost complete. Restrictions on Visual Flight Rules (VFR) operations above FL195 would be implemented simultaneously. This change would not have any effect on the NAT Region where Class A is implemented at FL 55 and above throughout the High Seas portions of the Region, except for Bodø Flight Information Region (FIR).

1.2.5 It was noted that the European Parliament had endorsed the enabling legislation creating the "Single European Sky (SES)" and that the European Commission (EC) had, as a result, given Eurocontrol several mandates to carry out the technical work associated with implementing the SES. The Group was informed that the ICAO EUR/NAT Office was being kept informed of developments and that procedures had been put in place to ensure that co-ordination between the EC, Eurocontrol and ICAO was assured. It was pointed out that the mandates that could have an effect on the work of the NAT SPG were related to inter-regional and inter-operability issues, especially those linked to communications. The Group noted that the Secretary would ensure that the all NAT SPG working groups concerned would be kept informed.

1.2.6 It was noted that the Council had approved new procedures for the use of Precision Area Navigation (P-RNAV) in TMA of the EUR Region. It was also noted that the intent of the procedures was to standardise the aircraft approval process and to address the problems associated with implementation. States would publish a common Aeronautical Information Circular (AIC) and it was not intended to mandate the equipage for P-RNAV.

Establishment of the Northern Oceanic Transition Area (NOTA)

1.2.7 The Group recalled that the responsibilities of providing Air Traffic Services (ATS) in Shanwick FIR had been jointly assigned by ICAO to Ireland and the United Kingdom and that the Governments of both States had signed what is known as the 1966 Shanwick Agreement which set out a methodology whereby these responsibilities would be most effectively discharged. These arrangements are reflected in the current assignment of ATC and Communications responsibilities within the Shanwick FIR.

1.2.8 Since 2000, the Irish and United Kingdom Governments have been engaged in a review of the Shanwick arrangements, in the light of Air Traffic Management (ATM) developments in the NAT Region. In August 2003, the Irish and United Kingdom Departments of Transport agreed, *inter alia*, to the establishment of a Northern Oceanic Transition Area under Irish control, in a block of Oceanic airspace to

the north and west of the Shannon FIR and the Scottish Upper Flight Information Region (UIR), respectively and delineated as 57N015W; 54N015W; 5434N010W; 57N010W; 57N015W.

1.2.9 Air Traffic Services for aircraft flying at FL 55 and above in the NOTA airspace will be provided by the Irish Aviation Authority (IAA), in similar terms as in the Shannon Oceanic Transition Area (SOTA), using mainly Irish based radar and communications facilities.

1.2.10 A joint IAA/United Kingdom NATS Implementation Group was established in November 2003 to address the technical and operational aspects of the NOTA implementation. The NOTA will be implemented on a phased basis, commencing on January 20th 2005 and the final phase will be implemented no later than October 2006. The services to be provided in the various phases were being addressed by the joint Implementation Group.

1.2.11 The implementation of the NOTA would involve, in due course, minor system modifications for neighbouring oceanic service providers. Canada, Iceland and Portugal have indicated that these modifications could be accommodated to meet the NOTA timescales.

1.3 NAT provider States

1.3.1 The Group was provided with an update on the developments of the Portuguese Oceanic ATS system. It was noted that Santa Maria was now exchanging flight data with New York using a sub-set of the NAT Interface Control Document (NAT ICD) message set. It was also noted that plans were in place to begin using Controller Pilot Data Link Communications (CPDLC), therefore joining the on-going NAT Region trials.

2. PLANNING AND IMPLEMENTATION

2.1 Report of the NAT Implementation Management Group

2.1.1 The Group was informed that the NAT IMG had met twice since NAT SPG/39. Its Air Traffic Management Group (NAT ATMG) and Future Air Navigation Systems (FANS) Implementation Group (NAT FIG) had also each met twice. The Mathematicians Implementation Group (NAT MIG) and the newly established Safety Analysis and Reduced Separation Implementation (NAT SARSIG) (paragraph 2.1.2 below refers) had each met once.

Organizational changes

2.1.2 Taking into account Amendment 40 to Annex 11 concerning safety management and the recommendations of ANConf/11 regarding the same subject, the NAT IMG had agreed that it would require expertise in the area of safety management. Considering that the NAT MIG had been addressing collision risk modelling principally and that the NAT Reduced Separation Standards Implementation Group (NAT RSSIG) had been very effective in planning for the implementation of RVSM, it was agreed that the NAT MIG and the NAT RSSIG be melded and that the terms of reference be expanded to include safety management. It had therefore been agreed to establish the Safety Analysis and Reduced Separation Implementation Group (NAT SARSIG). The NAT Operations/Airworthiness (OPS/AIR) sub group, which had been part of the NAT RSSIG, would be attached to the new NAT SARSIG. The NAT SPG handbook would be amended accordingly.

The implementation of Reduced Vertical Separation Minimum

2.1.3 It was noted that the role and therefore the requirement and funding of the NAT RVSM monitoring infrastructure had to be evaluated because of the demise of the current monitoring infrastructure which had reached the end of both its economic and technical life. With this in mind, the NAT IMG had

carried out an in depth review of the status of the monitoring infrastructure, future Altimetry System Error (ASE) monitoring requirements and the financial situation.

2.1.4 The Strumble Height Monitoring Unit (HMU) could only be kept going until the end of 2004. The Gander HMU could be kept going until at least the end of 2004, barring any unforeseen technical difficulties.

2.1.5 With the demise of the current RVSM monitoring infrastructure in mind, the NAT IMG had examined the possible use of ASE monitoring data from other sources to carry out the necessary annual risk assessments. It was pointed out that Eurocontrol was collecting data in its capacity as the Regional Monitoring Agency (RMA) for the EUR Region. Furthermore, the United States had presented its latest updates regarding its plans to implement ground based HMUs in the United States and Canada in support of the implementation of the domestic RVSM programmes. It was indicated that relevant data could be made available to the NAT Central Monitoring Agency (CMA). The NAT IMG had then agreed that it was necessary to determine whether the use of other sources of ASE data would provide the information required to develop the annual risk assessment. To this effect, the NAT CMA had been requested to prepare two vertical monitoring packs, one based on current data and procedures and the other exclusively on external data. In addition, it was agreed that the NAT CMA, while receiving data from adjoining regions, should prepare an assessment of the amount of NAT traffic that was covered by each data set, both in quality and quantity, to be used by the Group in its deliberations regarding the completeness of ASE data obtained from other RMAs.

2.1.6 Turning to the question of the financial situation, the following points were stressed:

a) the seven year depreciation of the two HMUs would come to an end on 31 December 2004;

b) user charges collected under the agreed RVSM programme for 2004 were estimated to be US$6.51 per flight, which was similar to the 2003 cost of US$6.52. The user consultation meeting, which had been held under the aegis of the Denmark/Iceland (DEN/ICE) Agreements, had been informed of the foregoing in August 2003;

c) if it was decided to renew the monitoring infrastructure, the associated costs could be met from the existing over-recovery. This would require that a user charge be collected to cover 2004 costs; and

d) the over-recovery could be used to finance the costs of running the CMA beyond 2004.

2.1.7 Considering that the current monitoring infrastructure should be available until the end of 2004 and that less costly new generation HMUs may become available in 2004 and taking into account the study on the use of other sources of ASE monitoring data, the Group noted that the NAT IMG had agreed that it would not be wise to completely deplete the moneys collected as a result of over-recovery until such time as a final decision had been made regarding the required RVSM monitoring infrastructure. The NAT IMG had however agreed that the United Kingdom should terminate its land leases with effect from 1 January 2005.

2.1.8 Taking into account the expected over-recovery under the HMU joint financing arrangement, as at 31 December 2003, and the desirability to maintain funds available for a possible replacement of at least one HMU in the near future, the NAT IMG agreed that the basis of calculating the NAT RVSM user charge for 2004 should be reduced by the amount of the value of the depreciation and interest costs for 2004, that had been estimated at US$1,720,514. This reduction would be financed from the over-recovery available as at 31 December 2003.

2.1.9 The Group was presented with the results of a study that had been carried out by the MWG to determine if alternative sources of height keeping data, the European data, could be used in lieu of the data gathered by the NAT HMUs. The conclusions given were based upon one sample of data, albeit a large one, for the period 1st January to 31st December 2003. This covered data from the CMA and the European databases.

2.1.10 The European pack had more measurements per aircraft type, for 51 out of 53 aircraft types, and more than three times the number of airframe measurements in total. Of the 401 operator fleets measured, 90 operator fleets had more measurements in the CMA pack, and 295 had more measurements in the European pack. However, the CMA pack had measurements on 10% more airframes.

2.1.11 The Group noted that objectives for height monitoring had been introduced, and an attempt had been made to determine the minimum data requirement for each objective in order to quantify the impact of the retirement of the Strumble and Gander HMUs. The number of measurements required varied markedly according to the application. For example, estimating ASE drift for individual or groups of airframes was data intensive, but establishing that an operator fleet met the Minimum Aircraft System Performance Specification (MASPS) criteria required relatively fewer measurements.

2.1.12 By itself, the European pack outperformed the CMA pack on most objectives, despite having 10% fewer airframes. The very much larger volume of measurements overall appeared to make a substantial difference to performance. However, although the great majority of airframes monitored by the Strumble and Gander HMUs were also monitored by Europe, the coverage was not identical. Thus, the impact of losing the NAT HMUs was at the level of the individual aircraft and the operator fleet. For aircraft types, the effect was much less marked.

2.1.13 The analysis showed that the combined data set, Europe and North Atlantic, was the best. Losing the NAT HMUs produced an inferior monitoring pack since there were fewer measurements. The extent of the inferiority varied from objective to objective.

2.1.14 The observer from IFALPA informed the Group that the impending shutdown of the HMUs located at Gander and Strumble raised concerns regarding the lack of NAT specific monitoring and that IFALPA believed that, in order to insure the level of safety as set out by the NAT SPG, the replacement of the HMUs at Gander and Strumble was a necessity. It was clear from the data and discussions that had taken place in various NAT fora that the NAT Region must have its own height monitoring system. Otherwise, the NAT Region would have to depend on Eurocontrol derived data. This data has proven to be less than adequate in its completeness, as it related to the NAT Region. IFALPA pointed out that the MWG had shown that at least 10 percent (251 aircraft in 2003 alone) of the data that had been collected in the NAT Minimum Navigation Performance Specifications (MNPS) airspace would be lost if Eurocontrol monitoring information was utilized. This may appear to be minimal; however, IFALPA stated that it was critical as it related to its effect on the analysis of the data and the continued tracking of the Target Level of Safety (TLS).

2.1.15 IFALPA also indicated that this HMU data can and must be used to track operator compliance with RVSM criteria. Many aircraft have demonstrated significant ASE drift over time, and some airframes have been found to be non-compliant. After the issue of non-compliant aircraft had been raised with the individual States and operators, the suspect airframes were found to either have aircraft altimetry design flaws or improper maintenance practices. NAT monitoring helped to bring about corrective actions that ultimately helped to improve safety. IFALPA believed that, in the interest of safety, the HMUs at Gander and Strumble must be replaced.

2.1.16 The Member for Canada reminded the group that ground base HMU's were being installed in Canada and the United States in support of their domestic RVSM implementation programmes. The relevant data would be made available to the CMA in support of NAT monitoring activities. This data could be used in conjunction with Eurocontrol data to provide a broader and more comprehensive sampling base.

2.1.17 The observers from IATA and IBAC, supported by the Member for Canada, felt that using data from both Eurocontrol and North American data packs could adequately ensure the future level of safety. It was therefore unnecessary for the NAT Region to have its own monitoring system. The data presented by the MWG did not conclusively prove that the data would be lost. In fact, the North American and Eurocontrol HMU's would monitor the vast majority of airframes. A small number of airframes have demonstrated a tendency for ASE drift. This drift could be attributed to a variety of reasons associated with the airframe. It was also pointed out that evidence existed that damage, faults and maintenance to the HMU's can impact the airframe measurements. IATA was not against monitoring *per se*, however there needed to be a clear demonstrated safety benefit for replacing the Strumble HMU. Any future study carried out to assess the feasibility of replacing the Strumble HMU must encompass those airframes that would not be monitored by either the Eurocontrol or North American HMU's.

2.1.18 The Group was informed that recurring technical problems had reduced the availability of the NAT HMUs by some 20%. This should be taken into account when considering the figure of 251 aircraft in paragraph 2.1.14, and there was an expectation that this factor would affect any samples of data recorded in 2003-2004 (i.e. the figure of 251 would likely have been greater had the NAT HMUs been available 100% instead of 80%).

2.1.19 In addition to the above, the CMA informed the Group that more and more operators were requesting to over fly the HMUs for operational approval purposes.

2.1.20 The Group agreed that, based on the study that had been carried out by the MWG and the position put forward by IFALPA, the NAT Region should maintain an RVSM monitoring infrastructure and as such, the HMU at Strumble should be replaced with a new generation one. However, before embarking on a procurement programme, it was agreed that the United Kingdom should re-examine its land-lease contract and the cost of replacing the HMU. In this connection, the Chief of the Joint Financing Section of ICAO informed the Group that an over-recovery under the Height Monitoring System Joint Financing arrangement, amounting to approximately US$ 1 million by the end of 2004, could be used to finance (totally or partially) the replacement of the equipment. However, it would be necessary to urgently provide the ICAO Joint Financing Section with the estimated costs associated with the replacement of one HMU, in order for them to approach the Parties to the Height Monitoring System Joint Financing arrangement if it was necessary to mobilize additional funds. It was pointed out that all information requested for a decision regarding the necessity to collect a Height Monitoring System user charge in 2005 had to be received by early November 2004 by the ICAO Joint Financing Section.

2.1.21 In addition, the Group agreed that prior to installing any new HMU, a study should be carried out to establish the best location in order to capture the maximum amount of traffic.

CONCLUSION 40/2 - REPLACEMENT OF THE STRUMBLE HEIGHT MONITORING UNIT (HMU)

That the:

a) HMU located at Strumble be replaced with a new generation one;

b) United Kingdom undertake a study to determine the most appropriate location;

c) United Kingdom urgently determine the cost of replacing the Strumble HMU;

d) Members and observers be consulted, through the NAT SPG Secretary, on the costs; and

e) ICAO Joint Financing Section be provided with the cost data for 2005 by 1 November 2004.

2.1.22 Finally, the Chief, Joint Financing Section of ICAO reported on the financial aspects of the Height Monitoring System Joint Financing Programme.

Proposals for amendment to the NAT SUPPs

2.1.23 In follow up to NAT SPG Conclusion 39/3, a proposal for amendment to change to the turn-back procedures had been developed. It was noted that all concerned had agreed that changing the offset from 30 NM to 20 NM should be proceed. It was therefore agreed that NAT SUPPs be amended in accordance with **Appendix B** of this Report. It should be noted that the NAT IMG intends to carry out a study to determine whether it is feasible to use a 300 ft vertical displacement rather than 500 ft in order to standardise the procedure with that used for weather deviations. Also, the United Kingdom has agreed to be the originator of the proposal for amendment.

CONCLUSION 40/3 - INITIATE AN AMENDMENT PROPOSAL TO THE NAT REGIONAL SUPPLEMENTARY PROCEDURES (SUPPs) (DOC 7030) CONCERNING TURN BACK PROCEDURES

That the United Kingdom, on behalf of the NAT SPG, initiate an amendment proposal to the NAT Regional Supplementary Procedures as contained in Appendix B to the Report of NAT SPG/40.

2.1.24 It was noted that, in follow up to NAT SPG Conclusion 38/4, the proposal for amendment regarding the use of the Strategic Lateral Offset Procedures (SLOP) had been approved by the President of the Council on 20 November 2003 and that work had been carried out in support of implementation. The common AIRAC date of 10 June 2004 had been chosen for implementation and the NAT IMG would monitor the effects that the implementation should have on reducing risk and report to the NAT SPG.

2.1.25 Because of the on-going activities related to the use of SATCOM voice, the NAT IMG had agreed that NAT SPG Conclusions 39/7 and 39/12, related to the initiation of proposals for amendment, be kept in abeyance until such time as a definitive policy regarding the use of SATCOM voice has been determined. Considering that a decision had been made, paragraph 2.1.67 refers, it was agreed that the Secretariat should now proceed with processing the proposals for amendment.

Reductions in horizontal separation minima

2.1.26 The Group noted that the NAT IMG had agreed that work should continue on seeking ways and means to reduce horizontal separation minima and in particular longitudinal separation. In noting the foregoing, it was recognized that other methods of carrying out safety assessments could be used rather than the formal mathematical models currently used in the NAT Region.

2.1.27 Therefore, to initiate the task, work packages, including the need to collect data regarding the various methods of using time to apply separation by the various ATS units and the need to attempt to classify longitudinal errors were developed. It was noted that the NICE facilities would be used to support the studies.

2.1.28 It was pointed out that one of the important contributors to reduce the risk in the longitudinal plane was accurate time management. The upper wind forecasts used by Flight Data Processing Systems (FDPS) to calculate the estimates, used to establish the separation minimum, also plays an important role. The NAT IMG had examined a proposal to refine the temporal resolution of MET forecasts in order to improve the accuracy of ATS estimates. It was felt that the use of more up to date wind data might provide the mechanism needed to reduce the risk and therefore permit reductions in separation minima. Accordingly, it was agreed that the temporal resolution of MET forecasts be made as fine as economically feasible and that, when stating the requirement, flexibility of implementation should be stressed. However, before

proceeding with any changes, it was agreed that the issue would need to be considered by the ICAO World Area Forecast System Operations Group (WAFSOPSG).

CONCLUSION 40/4 - IMPROVED UPPER WIND FORECASTS TO BE USED IN FLIGHT DATA PROCESSING SYSTEMS (FDPS) TO CALCULATE AIR TRAFFIC SERVICES (ATS) ESTIMATES

That the ICAO World Area Forecast System Operations Group (WAFSOPSG):

a) be invited to consider the possibilities to improve the temporal resolution of upper wind forecasts in order to improve the accuracy of ATS estimates; and

b) report the findings to NAT SPG/41.

Note: When considering the requirement, flexibility of implementation should be stressed and the level of refinement should be economically feasible.

Preparation of the Fifth Edition of the Application of Separation Minima (ASM) document

2.1.29 It was noted that the Fifth Edition of the Application of Separation Minima document was being drafted. It was also noted that extensive use of the NAT Programme Coordination Office (PCO) web site was being used to carry out this task between meetings in order to reduce the time frame required at meetings to achieve a consensus and to reduce costs. This approach was now part of the working methods of the NAT IMG as a whole. It was finally noted that the NAT IMG had agreed that the development of the Fifth Edition of the ASM was a priority issue and that it should be completed in time to present a report to NAT SPG/41.

NAT Region Flight Planning Manual

2.1.30 It was noted that a NAT Region Flight Planning Manual had been drafted and endorsed by the NAT IMG. The document has been posted on the public area of the NAT PCO web site.

Air Traffic Flow Management (ATFM) issues

2.1.31 It was noted that an initial implementation of Collaborative Decision Making (CDM) had been implemented using the NAVCANADA Traffic Density Analyser (TDA). This provided operators the opportunity of participating in the design of both the Eastbound and Westbound Organized Track Systems (OTS).

2.1.32 Bearing the above in mind and for ease of reference by the operators, it was noted that the NAT IMG had agreed that the Flight Level Allocation Scheme (FLAS) be published on the NAVCANADA TDA (this was contrary to what had been agreed at NAT SPG/39, paragraph 3.2.2 refers). Recognising that the technological solution to publishing the FLAS was evolving, the Group endorsed the NAT IMG position that the most suitable place to publish the data was the NAVCANADA TDA.

2.1.33 As regards ATFM related issues that arise at the interfaces between the NAT and EUR or NAM Regions, the Group agreed that this was not a NAT IMG matter and that the NAT Operations Managers should therefore address it, as it was a day-to-day issue. It was however stressed that it was paramount that co-ordination be carried out with the domestic service providers adjacent to the NAT Region.

CONCLUSION 40/5 - AIR TRAFFIC FLOW MANAGEMENT (ATFM) INTERFACE ISSUES

That the NAT Operations Managers be tasked with co-ordinating ATFM issues that arise at the interfaces with adjacent Regions with the domestic Air Navigation Services Providers concerned.

NAT IMG Cost Effectiveness (NICE) Group

2.1.34 It was noted that the NICE Group continued to collect data in order to keep all the data bases updated so that the facilities could be used when required. It was also noted that the NAT IMG would be provided with an annual report regarding the status of the NICE data bases. In response to a query regarding access to the data, the Group was informed that all requests should be channelled through the Chairman of the NAT IMG.

Programme Co-ordination Office

2.1.35 It was noted that the United Kingdom continued to support the NAT PCO website (www.nat-pco.org). It was also noted that the web site was important especially as it provided easy access to certain documents such as the MNPS Operations Manual and the different Guidance Materials. A new access-controlled site had been established wherein the different NAT SPG groups could carry out business between meetings in a secure area (www.members.nat-pco.org). It was pointed out that the new site provided an efficient tool to carry out work between meetings. It was noted that reports, working papers and documents would eventually be posted on the site therefore facilitating co-ordination amongst and between the working groups.

2.1.36 The Group expressed its appreciation to the United Kingdom for the efforts that they had put into supporting the NAT PCO web site as well as for the efforts to upgrade it. It was recognised that the web site was a valuable asset for the NAT SPG planning machinery.

The data link programme

2.1.37 It was noted that the terminology related to trials had been clarified as follows:

a) the term “pre-operational” should only be applied to any testing/validation phase that occurred prior to a system being introduced into an operational environment; and

b) the term “operational trial” would be reserved for testing/validation that occurred in the operational environment.

2.1.38 It was also noted that the NAT IMG had agreed that a collaborative system of data link monitoring should be put in place rather than the unilateral service that had been provided by NAVCANADA. The system, which would initially be provided by NAVCANADA and the United Kingdom National Air Traffic Services (NATS), would permit a greater ability to carry out fault identification, analysis and problem resolution. Accordingly, the terms of reference of the NAT FANS Central Monitoring Agency (FCMA) were modified and the NAT SPG Handbook would be amended.

HF regression

2.1.39 In follow up to NAT SPG Conclusion 36/6 and the discussions that had taken place during NAT SPG/38 (paragraphs 2.1.20 to 2.1.23 refer), it was noted that the NAT HF Regression Task Force, that had been established by the NAT IMG (paragraph 5.9 of the report of NAT IMG/21 refers), had held its first meeting in Paris from 9 to 11 February 2004. The ICAO European and North Atlantic Office had agreed to moderate the work of the Task Force and to provide secretariat support.

2.1.40 It was noted that the Task Force had felt that, because social and economic issues were the remit of the States themselves and, in some cases, of the Air Navigation Service Providers (ANSP), it should not address these matters. In addition, the environment was evolving and different scenarios could be envisaged whereby the States or ANSPs could address social and economic issues without any guidance from the NAT SPG. They would however require an overall strategic view of the way forward. Therefore, the Task Force had agreed that it should focus on developing a road-map for the way ahead.

2.1.41 The Task Force had reviewed and updated the initial assumptions developed by NAT IMG/17. When doing so, due account was taken of the developments, which had taken place since the original assumptions had been drafted in September 2000. These included, *inter alia*, the increased use of data link technology, the increasing availability of SATCOM voice and the possibility that the EUR Region may mandate data link capability circa 2010.

2.1.42 The Task Force also tried to determine the future residual voice requirements. It was noted that the Required Communications Performance (RCP) would be used to assist in determining future communications redundancy requirements and that HF voice communications should not be needed as a back up to data link communications. It was however recalled that the current Annex 2 requirements (paragraph 3.6.5.1) stipulated the need for continuous air-ground voice communications. Based on the May 2002 Task Force Report and available equipage forecasts, it had been determined that there would be no requirement to expand voice for ATS purposes as the continued increase in the use of data link technologies would provide the needed communications capacity and sufficient capacity was available until 2006 when the demand for HF voice should start to reduce.

2.1.43 Using the assumptions that it had developed, the Task Force had prepared a detailed road map which provided an overview for the gradual phasing out of parts of the current HF infrastructure and its replacement by data link technologies. However, the first milestone that needed to be achieved before detailed planning could begin was a decision by the NAT SPG that mandatory equipage for data link applications was required circa 2015. It was recognised that a clear statement of where the NAT Region wanted to be in 2015 regarding aircraft equipage would facilitate the task of airspace planners and give service providers and airspace users a planning horizon to aim for.

2.1.44 The Group was informed that the NAT IMG had endorsed the proposals of the Task Force as outlined above and also agreed to recommend to the NAT SPG that they endorse the need to mandate data link equipage by 2015, which was in line with EUR Region plans.

2.1.45 The observer from IATA presented the results of the updated data link survey that had first been published in 2002. The survey presented valuable planning information about future fleet data link equipage. It was based on information provided by 15 carriers that represented approximately 62% of all NAT Region traffic. The Group noted that, within the report, IATA also expressed its requirements regarding HF regression. It was noted that the NAT IMG, and its working groups, would use the information in order to plan for future data link applications as well as to support the HF regression work. Finally, the Group noted with appreciation that IATA would be updating the survey from time to time and that they would be providing the NAT IMG with these updates.

2.1.46 With the above in mind, the Group agreed that a clear statement of assumptions was required in order to advance the work. It felt however that it was too early to make a definitive statement regarding the need to mandate data link equipage. It was agreed that the Task Force should carry out its work on the basis that mandatory equipage would be required at some time in the future and that, at the first opportunity, the necessary initiatives would be launched. The Group also agreed that some form of two-way voice communications for emergencies and non-routine events was required. In this connection, it was agreed to assume that voice communications would not be required as a backup. It was also acknowledged that some form of voice communications would be required for operations by aircraft that were not or could not be data

link equipped. Finally, it was agreed that the NAT SPG should be presented with progress reports so that the assumptions can be updated and/or an equipage mandate can be launched.

CONCLUSION 40/6 - ASSUMPTIONS TO BE USED AS THE BASIS FOR PLANNING FOR HIGH FREQUENCIES (HF) REGRESSION

That the NAT Implementation Management Group:

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

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

ii) data link will be the mandated communications medium for ATS purposes in portions of the NAT Region by 2015. There will however be a continued requirement for voice communications capability in some portions of the airspace;

iii) voice communications will not be mandated for backup purposes;

iv) direct controller pilot voice communications will be required for emergencies and non-routine events;

v) no increase in current HF voice capacity requirements in the NAT Region, for ATS purposes, is anticipated because of the migration to data link applications; and

vi) a decline in HF voice capacity requirements in the NAT Region is unlikely before 2006; and

b) provide NAT SPG/41 with a progress report, including suggested changes to the assumptions.

2.1.47 The Group noted that Iceland and Ireland had recently signed an agreement on co-operation related to the provision of HF-voice services in the NAT Region. The agreement sets out the objectives and deliverables associated with their joint response to the challenges raised by changes in the provision of NAT Region air traffic voice services.

Future data link requirements

2.1.48 The Group was informed that the NAT IMG, in the course of its work regarding the implementation of data link applications in the NAT Region, had identified some concerns regarding the possibility that the NAT Region requirements and the EUR Region requirements may drive future developments in different directions. This would be contrary to the 11th Air Navigation Conference recommendation for interoperability and more importantly, seamlessness. In this connection, it was noted that the European Air Navigation Planning Group (EANPG) Programme Coordinating Group (COG) had been presented with the same concerns.

2.1.49 It was noted that these concerns had come to light when the expansion of the NAT Region data link trials to include Aeronautical Telecommunication Network (ATN) based applications was addressed and in particular when the ATN based trials, which were being carried out by Eurocontrol, were examined. It was noted that the CPDLC message set used in the Eurocontrol LINK 2000+ trials was not complete enough to meet the NAT Region requirements and that the avionics did not include Automatic Dependent Surveillance (ADS) functionality. The Group was informed that, in order to obtain a clear understanding of the differences, a study to compare the functionality of the FANS 1/A and ATN based

systems would be carried out by the United Kingdom in order to develop an initial draft requirements document to enable further discussions.

2.1.50 The Group agreed that it was important to ensure co-ordination with Eurocontrol so that European implementation programmes do not unduly affect planning efforts being carried out in the NAT Region. With this in mind, it was agreed that the Chairman co-ordinate with the Chairman of the EANPG in order to determine the best way forward. It was recognised that this was not a NAT or EUR Region matter, but it was a global one.

2.1.51 The Group was informed that efforts were under way by Eurocontrol to mandate data link equipage in the EUR Region through two programmes - LINK 2000+ and CASCADE. LINK 2000+ co-ordinates the implementation of an initial set of ICAO SARPs compliant CPDLC services over the ATN and VHF Digital Link (VDL) Mode 2. CASCADE would add more CPDLC services and would implement the first ADS services in Europe. For its initial implementation, CASCADE would build on the ATN/VDL Mode 2 and Mode S infrastructures established by the LINK 2000+ and Mode S Programmes. The optimum technology for more advanced CPDLC and ADS services had yet to be defined.

2.1.52 It was recalled that, while recognising that the ATN remained the end-state, the NAT Region, like the Pacific Region and other parts of the world, had opted for FANS 1 and FANS A, which were being used successfully in operational trials for ADS and CPDLC. FANS1/A, was not ICAO SARPs compliant but, in the current mode of operation, satisfied the operational requirements of the NAT Region.

2.1.53 It was recognised that the danger of divergence between two data link technologies (ATN based and FANS based) had been identified early on. Divergence could result in different operating methods for aircrew (a safety issue) or the carriage of two types of equipment (dual stack) on board aircraft (cost factor). It may also be necessary to implement dual stacks in ground systems, another cost factor. For these reasons the aviation industry has been talking for many years about the need for convergence between these two technologies with the aim of global interoperability. Moreover, to satisfy emerging operational needs in oceanic airspace, such as reduced horizontal separation and/or reliability to sustain HF regression, FANS1/A may need to be re-evaluated in order to ensure that increased performance requirements could be met.

2.1.54 Bearing in mind the safety and cost factors that have been identified, it was agreed that it was important that the EUR and NAT Regions should initiate a dialogue, at an early stage of developments and implementation, in order to ensure harmonisation. This dialogue should include the user community and should have as an objective the need to achieve a harmonised interoperable data link service that meets the operational requirements of both busy continental and busy oceanic airspace. It was therefore agreed that a steering group comprising representation from the EANPG, the NAT SPG, Eurocontrol, the user community and industry should be established in order to initiate this task.

2.1.55 As indicated in paragraph 2.1.48 above, the EANPG had already been informed of this proposal and it had indicated that it supported the proposal being put forward. It was therefore agreed that the NAT SPG Chairman would formalise this matter with the Chairman of the EANPG.

CONCLUSION 40/7 - DEVELOP HARMONISED DATA LINK SERVICE

That the ICAO Regional Director make the necessary arrangements to establish a joint European North Atlantic Data Link Requirements Steering Group with the following mandate and composition:

a) mandate: develop a harmonised data link service;

b) composition: representation from the European Air Navigation Planning Group (EANPG) and the NAT Systems Planning Group (NAT SPG), Eurocontrol, airspace user organizations and, as required, industry.

Draft policy to move from an operational trial to an operational system

2.1.56 In follow up to NAT SPG Conclusion 39/11, work had been initiated on a developing policy to move from an operational trial to an operational system. It was noted that no consensus had emerged on the best way forward and that the NAT IMG had therefore agreed that this matter should not be pursued in the context of data link implementation. It was noted that this matter would be taken up in the context of regional safety management (paragraph 3.1.74 refers).

The use of SATCOM voice for routine ATS communications

2.1.57 The Group noted that the NAT IMG had agreed that the waypoint position trials related to the use of SATCOM voice be extended to the entire NAT Region and that consideration be given to further extending them to include testing the uplink capabilities. Following discussions between the NAT communications providers and IATA and IBAC, it was agreed that the ACG should coordinate the trials since it would involve all the radio stations providing services in the NAT Region. It was noted that several issues were being addressed to reduce the costs of providing the service and the problems that arose as a result of multiple message switching through the public networks.

2.1.58 Because of some restrictions in the ground infrastructure of the communications providers, it was determined that initially only the business jet operators would participate. To this end, Guidance Material was developed and Portugal acted as the focal point for the registration and approval of the aircraft participating in the trials. The Guidance Material was only made available to the participants after their approval process had been completed. The trials started on April 12, 2004 and there were 49 business jet operators with 112 registered aircraft participating.

2.1.59 The number of contacts had not been high and no major problems had been identified. The information received from the radio stations regarding the trials indicated that the calls received were as good or better as HF, however, some problems with signal strength and quality had been reported. This may have been related to the ground networks or with the use of low gain antennas by the aircraft.

2.1.60 Discussions about the way ahead resulted in an agreement that the trials should continue through the summer of 2004 before any new steps were added, including the ground initiated call functionality, or uplink. Some providers had shown some concerns about the future use of SATCOM voice for routine communications since it may require investments to the ground infrastructure, especially those related to system integration.

2.1.61 Some concerns also existed about the use of some satellite networks, other than Inmarsat, especially regarding compliance with the Aeronautical Mobile-Satellite Service (AMSS) SARPs. Another concern identified in the course of the trials was the security of the communications path, especially unauthorised use.

2.1.62 The Group noted that issues related to cost recovery of SATCOM voice needed to be addressed. It was felt that, if it was determined that SATCOM voice could be used for routine ATS, then the NAT EFG should determine an equitable cost allocation mechanism or procedure.

2.1.63 A proposal to provide operators with Minimum Equipment List (MEL) relief regarding the loss of an HF radio, if the aircraft was SATCOM voice equipped, had been examined. Recognising that the MEL relief issue was a State one, it was agreed that, provided that it can be demonstrated that SATCOM voice can meet the requirements to provide routine ATS, it could recommend to States that such relief be

granted in the event of the failure of one HF radio. It was recognised that SATCOM voice was not meant to replace HF, but that if it did meet the current communications requirements, advantages should be taken.

2.1.64 On the basis of the information presented, it was agreed that the trials should continue in the current form and that the Guidance Material should be validated using only registered and approved operators. The Group also agreed that, other than Inmarsat, satellite network service providers should be analysed to determine whether they were SARPs compliant. Finally, it was agreed that the NAT IMG should develop a roadmap for the way ahead for the use of SATCOM voice in the NAT Region.

2.1.65 It was agreed that SATCOM voice could be accepted for airborne initiated calls through the Inmarsat Aeronautical Service and Public Switched Telephone Networks (PSTN) and that other satellite communications providers would be evaluated and validated according to ICAO requirements. Furthermore, a single priority would be reserved for ATS applications in the non-SARPs compliant SATCOM access and the question would be evaluated for the future SARPs compliant environment.

2.1.66 SATCOM voice could be accepted for ground initiated calls with restrictions based on the access method to be implemented for SATCOM through PSTN and access shall always use the Calling Line Identifier/Personal Identification Number (CLI/PIN) scheme for validation and the following would need to be carried out:

a) procedures for the management of the user information should be implemented;

b) ground automation of the dialling sequence and user validation should be implemented;

c) the service access should be granted only after the user validation process had been completed;

d) the list of Aircraft Earth Station (AES) Identification (ID) should be managed centrally and the proper authorization from airlines existed;

e) the list of AES ID's should be sent in an encrypted form; and

f) the proper procedures and policies to access and use the service should be implemented.

2.1.67 It was also agreed that the monitoring process of the system use should continue and annual reports should be presented to the NAT SPG by Portugal and others and the costs for ground initiated calls should be recovered through the route charges or through other means to be defined by communication providers and airlines and that this issue should be analysed by the NAT EFG.

CONCLUSION 40/8 - USE OF SATELLITE COMMUNICATION (SATCOM) VOICE IN THE NAT REGION

That:

a) subject to the resolution of the following issues, SATCOM voice could be used for routine communications for Air Traffic Services (ATS):

i) security measures as recommended have to be implemented to mitigate the risk of unauthorised access;

ii) trials need to be continued under the auspices of the NAT Implementation Management Group (NAT IMG) to validate ground initiated calls;

iii) the NAT IMG carry out an analysis of satellite providers, other than Inmarsat, to determine if they can meet ICAO's Standards and Recommended Practices (SARPs) for voice communications;

iv) the NAT Economic and Finance Group urgently address issues of cost allocation and recovery; and

v) the NAT IMG develop a roadmap for the way ahead, including required proposals for amendment, for the use of SATCOM voice in the NAT Region.

b) the Guidance Material relating to SATCOM waypoint position reporting trials is endorsed;

c) consideration be given to providing Minimum Equipment List (MEL) relief to operators that are SATCOM voice equipped but do not have a serviceable second High Frequencies (HF) radio; and

d) the NAT IMG provide NAT SPG/41 with a report.

2005 International Oceanic Conference (IOC)

2.1.68 The Group was informed that Ireland would be hosting the next International Oceanic Conference near Shannon from 16 to 18 May 2005. The Group noted that this information would be kept in mind when planning future activities.

2.2 NAT Economic and Financial Group

2.2.1 The NAT EFG met once since NAT SPG/39. The meeting had concentrated on updating the common NAT template used to report costs, reviewing issues concerning cost constraints, analysing the cost-effectiveness of service provision in the NAT Region and examining issues related to incentive pricing of communication charging.

Follow up of NAT SPG/39

2.2.2 The Group reviewed the outcome of NAT SPG/39 that related to the work of the NAT EFG itself. In follow up to Conclusion 39/13, the Air Navigation Services Economics Panel (ANSEP) Working Group of the Whole meeting, which had been held in Geneva from 8-12 September 2003, had been presented with information concerning incentive pricing in the NAT Region related to the use data link communications. After some consideration, the ANSEP working group had concluded that such a charge was not considered to be the application of economic pricing and was therefore not discussed further.

2.2.3 The NAT EFG concluded that the most appropriate course of action was for this issue to be raised at the next full meeting of the ANSEP by the NAT EFG members that participate in the ANSEP. This could be done under the topic of economic pricing. The ANSEP had met from 3 to 7 May 2004 but no action was taken.

Organizational changes and working methods

2.2.4 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 had proposed that no changes were required. As regards the frequency of meetings, it was sustained 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.

The development of a standard template to report annual expenditures

2.2.5 The NAT EFG had also carried out a review of the combined templates to report annual expenditures. The template had been prepared based on the definitions that had been agreed to by the NAT EFG. It was noted that all service providers had supplied all relevant data needed to complete the combined 2001 and 2002 templates. The Group endorsed the proposal that, because the information in the template could be mis-interpreted, it would remain an internal NAT EFG working document.

2.2.6 It was noted that the NAT EFG had discussed the future role of the template. The template had served a useful purpose in providing a high level summary of the costs of service provision in the NAT Region. However, the NAT EFG had felt that the exercise had largely served its purpose and that a more focussed analysis of cost effectiveness should be undertaken.

2.2.7 In follow up to the above, it was noted that the NAT EFG had agreed that the first such analysis should focus on service delivery in Gander and Shanwick FIRs. It was further noted that the NAT EFG had agreed that the initial study should be carried out by Canada, Ireland and the United Kingdom, because of the similarity of the traffic patterns and airspace configuration of Gander and Shanwick FIRs, and that they should present the results of their analysis to NAT EFG/9. All other members of the NAT EFG had been invited to present information on the same issue at future meetings.

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

2.2.8 The Group was informed that the NAT EFG had examined a proposal in which it had been pointed out that, in addition to the charge levied on the ATS provider for the delivery of an ATS message, communications service providers might also be charging the airline. While the amount of monies involved was unknown, it was sufficient to persuade certain airlines to request that they be allowed to use Aeronautical Operational Control (AOC) messages in lieu of ADS messages, which was at odds with the long-term plans of the NAT Region ATS providers.

2.2.9 It was noted that the NAT EFG had considered that, based on the information presented, it did not have sufficient knowledge of the issue to be able to pursue it at this time. It had therefore agreed to consult with technical experts within administrations to determine the extent of the problem and especially to ensure that there were no pass-through charges being applied. The Group agreed that this matter be added to the NAT EFG work programme (paragraph 2.2.13 refers).

Issues related to incentive pricing

2.2.10 The NAT EFG had had an in-depth discussion on the issue of incentive pricing. It was recognised that this issue would become increasingly important in the near future and that, within the European Commission's Single European Sky (SES) proposals, the question of incentive pricing was being addressed. It was noted that the United Kingdom would make a presentation to NAT EFG/9 on the European Commission's proposals.

Status of work relating to HF regression

2.2.11 On the basis of the review of the report of the NAT IMG Task Force on HF Regression, the NAT EFG had noted that the Task Force had developed several assumptions that would require the endorsement of the NAT SPG. The most important assumption was the need to mandate data link equipage by 2015. In this connection, the observer from IATA stressed the importance that any mandate should be done in such a way that the avionics could be used globally and that the ANSP infrastructure must be available to support the applications.

2.2.12 It was noted that the NAT EFG had recognised that it had been identified to lead two tasks: the need to provide guidance on determining exit costs and a cost recovery mechanism, as well as to determine an equitable charging mechanism. It was recognised that this activity would constitute an important task for the NAT EFG in the future.

The future work of the NAT EFG

2.2.13 The Group endorsed the following work programme:

a) carry out a cost comparison of service provision in the NAT Region, commencing with Gander and Shanwick FIRs;

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

c) examine the European Commission's Single European Sky proposals regarding incentive pricing;

d) on the basis of input from technical experts, examine issues related to charging for data link services; and

e) address issues of cost allocation and recovery related to the use of SATCOM voice communications.

2.3 NAT Traffic Forecasting Group

2.3.1 The 34th meeting of the NAT TFG had been held at the ICAO Headquarters in Montreal from 19 to 28 April 2004. The Group's task had been to update its forecasts for the short and medium term (2004-2010) and long-term to 2015 and 2020.

2.3.2 An essential first step during an aviation forecasting exercise was to review the performance of the previous forecasts and to establish the continuing appropriateness of the assumptions used. The latest available data indicated that actual traffic was well within the range forecasted during the 2003 interim meeting, but much at variance with the aviation forecasts derived at NAT TFG/33, held in Paris in May 2002. The prolonged weakness in air travel throughout most of 2002 resulting from the September 11th attack in the United States and in 2003 as a result of the Iraq War and the Severe Acute Respiratory Syndrome (SARS) epidemic in North America were the primary reasons for the variance.

2.3.3 This year’s data was processed for the prescribed periods (July 1-7 and November 1-7, 2003) and in the agreed format by Portugal. Data had been received from Gander, Reykjavik, Santa Maria and Shanwick Oceanic and Edmonton Area Control Centres (ACC). Canada would collect and process the 2004 sample data from the Oceanic and Edmonton ACCs and distribute it to the NAT TFG members.

General Observations

2.3.4 A review of the most recent historical monthly passengers, flights and airlines’ scheduled plans suggested a recovery in air travel was underway in the first half of 2004 and that this recovery would continue to generate strong growth for the major traffic generating areas until the end of 2004 and throughout the first half of 2005.

2.3.5 It was expected that by the end of 2005, passenger and flight activities would have returned to, and in the case of flight activities exceeded, levels experienced during 2000 as a result of strong economic growth and a recovery in passenger confidence in aviation.

Short to medium term forecasts

2.3.6 Annual passenger and aircraft movement forecasts were prepared for the six-year period 2004-2010. The baseline forecast for the number of passengers was 65.1 million in 2004 and 90.0 million in 2010. The baseline forecast for 2004 was approximately 12.6 percent lower than the baseline forecast put forward in 2002 for the year 2004. The baseline forecast for the number of aircraft movements was 372,900 in 2004 and 486,500 movements in 2010. The baseline forecast for 2004 was approximately 10.5 percent lower than that put forward in 2002 for the year 2004. The average annual growth rates between 2003 and 2010 for passengers and flights were 6.0 percent and 4.7 percent respectively. The medium term forecasts for aircraft movements are summarized in the **Appendix C** to this Report.

2.3.7 For the pessimistic medium-term scenario, the average annual growth rates between 2003 and 2010 for passengers and flights were 4.2 percent and 3.0 percent respectively. For the optimistic case, the equivalent figures were 7.4 percent annually for passengers and 5.8 percent annually for aircraft movements.

2.3.8 Forecasts of non-scheduled or charter passengers were developed using the assumptions regarding the scheduled carriers' future share of total passengers on the North Atlantic routes, raising the level by 0.1 percent each year from the 2003 level of 97.6 percent throughout the forecast horizon to 2010. Non-scheduled passengers are forecast to increase from 1.2 million in 2003 to 1.3 million in 2010, an annual growth rate of 0.7 percent. Non-scheduled flights for 2010 are projected to remain at the 2003 level of 6,000 flights.

2.3.9 Based upon actual cargo results for the first 3 months of 2004, the Group developed seasonality factors to extrapolate the data on a monthly basis through December 2004. These monthly totals were summed to generate annual cargo flights for 2004 (20,200, up 3.0 percent). An econometric model was used to generate growth rates for cargo-only flights for the 2005-2010 period. Cargo flights were projected to increase at an annual rate of 4.3 percent over the 7-year period, from 19,600 in 2003 to 26,300 in 2010.

2.3.10 The Group had assumed that general aviation activity, in particular corporate and business flights, would continue to be positively impacted in 2004 by the increased times required for check-in and security clearance at airports, as well as the concern for safety for corporate employees. As such, the number of general aviation flights had been projected to increase to 19,800 in 2004 (up 14.2 percent). In 2010, the number of general aviation flights should total 22,200, an annual increase of 3.7 percent over the 17,300 flights recorded in 2003.

2.3.11 It was assumed that military activity would drop from the 2003 level following a reduction of United States military operations abroad in 2004 (20,000, down 22.3 percent), then decline to 16,100 in 2005 (down 19.5 percent) as United States military operations begin to wind down. Military operations are held at the 2005 level throughout the remainder of the forecast period.

Long-term forecasts

2.3.12 Annual passenger and aircraft movement forecasts were also prepared for the long-term period 2015 and 2020. The forecast for the number of passengers was 110.9 million in 2015 and 133.7 million in 2020. The forecast for the number of aircraft movements was 583,900 in 2015 and 688,100 movements in 2020. The average annual growth rates between 2003 and 2020 for passengers and flights were 4.8 percent and 4.0 percent respectively, with slower growth in the latter part of the forecast period.

2.3.13 In the pessimistic long-term scenario, the average annual growth rates between 2003 and 2020 for passengers and flights were 3.8 percent and 3.0 percent respectively. For the optimistic case, the equivalent figures were 6.0 percent annually for passengers and 4.7 percent annually for aircraft movements. The long range forecast for aircraft movements are summarized in the **Appendix D** to this Report.

Other issues

2.3.14 It should be recalled that NAT TFG/33 had asked the NAT SPG to specify who uses the busy hour forecasts and to explain for what purpose and how these forecasts are used. The production of the busy hour forecasts was time-consuming, and the NAT TFG was anxious that it used the limited time at its disposal to best effect. The NAT SPG at its 38th meeting responded by saying that the busy hour forecasts would be useful in planning sector manning and when sizing new systems, but that the current presentation of the forecasts made them difficult to fully exploit. The NAT TFG further requested the NAT SPG to clarify the potential users of the busy hour forecasts, in order that an improved presentation can be agreed. Accordingly, it should be agreed that all users of the busy hour forecasts should provide the Secretary with suggestions to improve the presentation; otherwise, the NAT TFG would discontinue preparing them.

CONCLUSION 40/9 - IMPROVEMENTS TO THE PRESENTATION OF THE BUSY HOUR FORECASTS

That all who use the busy hour forecasts inform the Secretary by 31 August 2004 of the use of the forecasts and how to improve their presentation. Otherwise, the NAT TFG will be advised to discontinue preparing the busy hour forecasts.

2.3.15 In the report of its 33rd meeting, the NAT TFG requested a description of the uses made of its aircraft type forecasts from the NAT SPG. The NAT SPG, at its 38th meeting (Conclusion 38/8 refers), agreed that the NAT TFG, in close co-ordination with other NAT teams engaged in similar activities, explored ways to predict in detail the future aircraft type mix. Subsequently, a number of changes were made to the number of aircraft types reported and the format of the forecasts. The new categorization is given in the **Appendix E** to this Report. These changes were made so as to allow the NAT IMG working groups to better estimate current and future FANS equipage in the NAT fleet. The NAT TFG requests that the NAT SPG confirm that the new format of the forecasts provided meets their requirements, and for any further suggestions as to future improvements. The NAT TFG also requested that the NAT SPG identify any levels of disaggregation that were not required as this would help reduce future workload.

CONCLUSION 40/10 - AIRCRAFT CATEGORIES AND TYPES

That the:

a) table of aircraft categories and types shown in Appendix E to the Report of NAT SPG/40 be used by the NAT Traffic Forecasting Group (TFG); and

b) NAT Implementation Management Group provide the NAT Traffic Forecasting Group (TFG) with updates in accordance with identified requirements.

Future activities

2.3.16 To better allocate limited staff and travel resources among the various ICAO forecasting groups (North Atlantic, Pacific, Latin America), it was agreed in 1995 to meet on a biennial basis rather than annually. As such, the Group was not scheduled to meet formally in 2005. Given the current uncertainties in the aviation industry, the NAT TFG would monitor the performance of their forecasts closely in the coming months and make a decision early in 2005 as to whether an interim meeting would be required to revise the short-term outlook. If such a meeting were needed, it would be held following the Federal Aviation Administration's (FAA) Annual Aviation Forecasting Conference in March 2005. The Group expected to hold its next formal meeting in Paris at the end of April 2006.

2.4 Other issues

2.4.1 The Group recalled that NAT SPG/34 had endorsed the mandatory carriage of Airborne Collision Avoidance System (ACAS) in two phases, the first one being effective on 31 March 2001 and the second on 1 January 2005 (Conclusion 34/8 refers). NAT SPG/35 directed the NAT IMG to develop an implementation strategy that took account of developments in the EUR Region (Conclusion 35/1 refers). The policy developed by the NAT IMG was that the NAT Region would use the same policy as the one developed for the EUR Region.

2.4.2 The Group noted that EUROCONTROL was developing a policy for Phase 2 implementation, applicable after the 1 January 2005 deadline. The Group noted the information and agreed that Conclusion 35/1 remained extant and that the same approach that was used for Phase 1 should be used for Phase 2.

3. AIR NAVIGATION SYSTEM REVIEW

3.1 Review of system safety performance

SCRUTINY MATTERS [1]

Lateral navigation performance accuracy achieved in the NAT Region during the period 1 January 2003 to 31 December 2003

3.1.1 The Group completed a scrutiny of observed Gross Navigation Errors (GNE) in the NAT Region and found that a total of 18 (*22*)* errors were reported during the period under review. Of these errors, 8 (*12*)* occurred outside Minimum Navigation Performance Specifications (MNPS) airspace and were classified as Table "Charlie" errors. From the remaining 10 (*10*)*, 9(*6*)* were not eligible for inclusion in the risk analysis as defined at NAT SPG/17 (amended by NAT SPG/23) and were classified as Table "Bravo" errors. The remaining 1 (*4*)* error, was classified as a Table "Alpha" error.

** Figures in brackets refer to 2002*

3.1.2 The number of errors in MNPS airspace compared with the previous 12 month period (2002) remained unchanged. It was noted that the overall number of reported GNEs in the whole NAT Region had decreased by four compared with the previous period. Overall, the effect of the reported GNEs in 2003 had produced a reduction in the estimated risk compared with 2002. However, it was noted that during the reporting period total traffic in NAT MNPS airspace had increased by 5% compared with the previous reporting period.

3.1.3 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 ten of the reported occurrences. The Group also noted that action had been taken by Oceanic Area Control Centres (OACs) to contain the number of GNEs through timely intervention to prevent incorrect routing.

3.1.4 During the monitoring period, Gander and Shanwick OACs advised the Central Monitoring Agency (CMA) of 71 (84*) occasions when action had been taken to prevent a GNE. The Group noted that this was 13 fewer than reported during the previous 12 month period. The following information was extracted from the available data:

[1] For the detailed discussions and analysis of lateral navigation performance, reference should be made to the report of the Scrutiny Group which had been presented to NAT SPG/40 and which is available on request from the EUR/NAT Office of ICAO.

a) 54 (78*) cases of crew error, or probable crew error, including 14 where a filed flight plan route was followed instead of the cleared route;

b) 6 (5*) cases considered to be attributable to ATC error;

c) 8 claiming to have received a re-route from an Air Traffic Services Unit (ATSU); and

d) 2 (1*) from an undetermined cause.

** Figures in brackets refer to 2002*

3.1.5 The overall number of reported interventions was slightly less than in the previous reporting year. Specifically, the Group noted a decrease in the number of errors attributable to the crew. It was also noted that 6 of the interventions related to CPDLC-equipped aircraft.

3.1.6 With regard to the application of 10 minutes longitudinal separation, it was noted that the CMA had received 6 reports of erosions of longitudinal separation in excess of three minutes compared to 7 in 2002.

3.1.7 In considering methods whereby the observed standard of navigation performance might be improved, account was taken of the lessons derived from previous reviews of navigation performance and the recommendation made by the Scrutiny Group to NAT SPG/39 (Conclusion 39/14 refers) that an Aeronautical Information Circular (AIC) be published by the United Kingdom that recommended the adoption of robust navigational practices, as published in the NAT MNPS Operations Manual. It was pointed out that pilots rarely received AICs and that this did not appear to be the most appropriate means of promulgating the information to those most involved. The Group considered that the matter had not been satisfactorily resolved. It was therefore agreed that the objective of good navigational practice in the NAT Region should be raised to a much more prominent level. Accordingly, the following was agreed:

a) that efforts be made to close the loop between the regulatory bodies, the operators and the end-user in the cockpit. This might be achieved through a revised version of the videotape entitled "Keeping Track", the establishment of a dedicated website for NAT user groups to exchange information and experiences, and appropriate use of a range of aeronautical publications;

b) providers of computerised flight planning services should be encouraged to include in their pre-flight briefing material a recommendation that crews use a plotting chart when flying over the ocean, use track and distance tables when entering a route change into the Flight Management System (FMS), and make position reports directly from the FMS as opposed to reading the position from the navigation log, each of which continued to be factors in navigational errors. The Group identified with concern at least one, and possibly two incidents where navigational charts may not have been used by the crews involved and strongly discouraged any such move away from the use of tried and tested navigational safeguards; and

c) to mitigate the consequences of misinterpretation of a named waypoint by pilots, the Group agreed that Air Navigation Service providers should ensure that same-sounding five-letter name-codes (5LNC) are not used to identify points that are in the same proximity. It was pointed out that the ICAO EUR/NAT Office, who was responsible for the management of 5LNCs for these Regions, used an Internet based programme called the ICAO Five-Letter Name Code and Route Designator System (ICARD) to carry out this management function. It was also pointed out that ICARD checks for similar sounding codes within a radius of 1000 NM. The Group was informed that it was simple to change codes, that it was possible

to browse through the data base to find codes and that each State has designated a 5LNC manager. The allocation can be done in a very short time (hours).

3.1.8 In order to assist subsequent categorization of an incident, the Group agreed that it was important that Radio/Telephony (R/T) transcripts should be retained, and provided to the CMA at the time of reporting a GNE or an altitude deviation of 300 ft or more. The Group noted with appreciation the comprehensive reports that had been provided by Santa Maria OAC during the reporting year.

CONCLUSION 40/11 - RECOMMENDATIONS FOR IMPROVING THE OBSERVED STANDARD OF NAVIGATION PERFORMANCE

That:

a) the Central Monitoring Agency (CMA) update and re-issue the "Keeping Track" DVD;

b) States be reminded of the necessity to inform aircrew that operate in the NAT Region of the need to:

i) use a plotting chart when flying over the ocean;

ii) use track and distance tables when entering a route change into the Flight Management System (FMS); and

iii) make position reports directly from the FMS as opposed to reading the position from the navigation log;

c) Air Navigation Service Providers ensure that similar sounding five-letter name-codes are not used in the same area; and

d) The Central Monitoring Agency (CMA) be provided with transcripts of incidents involving Gross Navigation Errors (GNE).

Vertical navigation performance accuracy achieved in the NAT Region during the period 1 January 2003 to 31 December 2003

3.1.9 The Group scrutinised the altitude deviations of 300 ft 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 49 (35*) 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 12 (11*) of these deviations, while of the remainder 31 (19*) were directly attributable to crew or ATC action.

** Figures in brackets refer to 2002*

3.1.10 The scrutiny process had highlighted the following as the major causes of risk bearing errors:

a) non-compliance with an ATC clearance or restriction 23 (11) of which 8 resulted in entry to oceanic airspace at an uncleared level;

b) turbulence, ambient temperature and aircraft technical defects 12 (11); and

c) communications difficulties, HF blackouts and crew to HF radio operator to ATC communications delays and misunderstandings 11 (4).

3.1.11 It was noted that the number of incidents as a result of entry into oceanic airspace at the incorrect level had increased and had accounted for 8 *(6*)* of the 23 *(11*)* events in (a) above. As noted in the past, the issue of joint crew/ATC responsibility for ensuring that an aircraft enters oceanic airspace at the oceanic clearance level was discussed and further consideration was given to means of reducing the incidence of failure to receive, or in some cases to request, a clearance from domestic ATC, to achieve the cleared oceanic level.

3.1.12 The Group reviewed the outcome of the conclusion in last year's report concerning entry into oceanic airspace at an uncleared level, and noted the outcome of the meeting, which had taken place in December between France and the United Kingdom. This meeting had addressed the matter of Very High Frequency (VHF) communications between Brest ACC and aircraft approaching oceanic entry. It turned out that the VHF coverage was not an issue. The meeting had agreed to improve the co-ordination between Brest ACC and Shanwick OAC and the creation of an effective mechanism for the follow-up of any occurrences concerning traffic crossing this boundary at incorrect levels.

3.1.13 The Group noted, however, that the France-United Kingdom meeting had not resolved all of the problems where clearance to change level to that contained in the oceanic clearance had not been received from domestic ATC. It was noted that, because of communications congestion and/or ATC workload, a request for clearance to climb or descend to the oceanic entry level had not been made by some aircraft. This continued to be an issue, and it was agreed that failure to resolve this matter constituted a system safety concern, which should be considered by the NAT IMG, in conjunction with the appropriate sub-groups.

3.1.14 It was noted that there were instances of crew misinterpretation of an acknowledgement (usually from the radio-station operator) of a request to climb as being a clearance to climb. A newly evident factor was the misinterpretation of CPDLC data by crews, where a printed CPDLC acknowledgement of a request was being read as a clearance to execute the requested change. First evident in 2003, this had become further apparent in 2004 and required action to eliminate the problem.

3.1.15 The Group therefore agreed with the following recommendations:

a) that the NAT IMG address the incidence of entry to oceanic airspace at an uncleared level;

b) that the pilot community be reminded that they should request a level change with domestic ATC well before the oceanic boundary and not wait until the last moment before requesting the necessary change of level;

c) that the NAT IMG take account of the growing trend in CPDLC misinterpretation which was becoming evident from a number of occurrences reported to the CMA during 2003 and which continued into the early part of 2004. The adoption of a common phraseology between voice-R/T and CPDLC requests and clearances was recommended;

d) that the MNPS Operations Manual be redrafted to clarify the text and enhance it's usefulness to both pilots and flight planners; and

e) that crews be made aware of the risks of non-compliance with a clearance, or with a restriction within a clearance. A significant number of height deviations had been reported where an aircraft had been cleared to change level after the next route waypoint and had done so immediately or had been cleared to change level immediately and had not done so until a later time, in both cases resulting in loss of safe separation with other traffic.

CONCLUSION 40/12 - RECOMMENDATIONS FOR REDUCING THE NUMBER OF HEIGHT DEVIATIONS

That:

a) the NAT Implementation Management Group (NAT IMG) address the incidence of entry to oceanic airspace at an uncleared level, including communications failure procedures;

b) the representatives from IACA, IBAC and IATA inform pilots of the requirement to obtain, from domestic Air Traffic Control (ATC), a clearance that enables the aircraft to enter oceanic airspace at their oceanic cleared level;

c) States inform ATC of the requirement to ensure that aircraft enter oceanic airspace at their oceanic cleared level; and

d) the Minimum Navigation Performance Specifications (MNPS) Operations Manual be amended to reflect the risk associated with entering the NAT Region at the wrong flight level.

3.1.16 The most effective means of communicating the concerns to the aircraft operators and their pilots was discussed extensively and it was concluded that multimedia can, if constructively adopted, go some way towards better informing and advising the pilot community. While it was recognised that the enhancement of an oceanic safety culture should be instilled at the training level, whether civil or military, this should be done within the flight safety departments of the airlines or the military.

3.1.17 The Group therefore agreed as follows:

a) that a workshop be convened to address the need to instil a safety management culture in training programmes for pilots operating in the NAT Region; and

b) that States of Registry undertake periodic checks of aircraft, which have operated under an exemption status, in order to confirm the validity of their claim.

CONCLUSION 40/13 - ADDITIONAL MEASURES TO MITIGATE RISK IN THE NAT REGION

That:

a) ICAO convene a workshop to address the need to instil a safety management culture in training programmes for Air Traffic Controllers and pilots operating in the NAT Region; and

b) States of registry verify claims for exemption from Reduced Vertical Separation Minimum (RVSM) approval for individual aircraft seeking to operate when non-approved or technically non-compliant.

3.1.18 The Group agreed that the current practice of reporting lateral (but not vertical) deviations to the operator and state of registry, subject to certain exclusions, was anomalous and that unexplained height deviations should be the subject of a letter from the ATC unit to the operator, with a copy to the CMA for the information of the State of Registry. It was further agreed to include in all such letters to operators a request for a response to be made within 30 days, and a full report within 60 days.

CONCLUSION 40/14 - FOLLOW-UP TO HEIGHT DEVIATIONS

That:

a) height deviations be the subject of a letter from the Air Traffic Control unit concerned to the operator, with a copy to the Central Monitoring Agency (CMA) for the information of the State of Registry; and

b) ICAO, in co-operation with the CMA prepare a template of the letter to be sent to operators.

MATHEMATICAL MATTERS

General

3.1.19 It was noted that the MWG had been arranged to follow directly the meeting of the Scrutiny Group. Members of the MWG also attended the Scrutiny Group, in which lateral, vertical and longitudinal errors were reviewed for the period 2003. This provided benefits for both groups because the MWG takes part in decisions regarding the classification of each error, and so avoided any potential misunderstandings between the groups when the MWG prepared the risk estimates.

2003 LATERAL AND VERTICAL COLLISION RISK ESTIMATES

Lateral Risk

3.1.20 On the 24th January 2002 the vertical flight level structure in the NAT MNPS airspace, as well as the West Atlantic Route System (WATRS), was changed from Phase 2 RVSM to full RVSM (FL 290 to FL 410 inclusive). 2003 was the first calendar year of full RVSM operations in the NAT Region. The occupancy estimates for the year were based on the full twelve months of 2003, as were the error rates used in the risk estimates. Until further significant changes occur in airspace structure, the risk would be assessed on a calendar year basis using occupancies and errors for the full calendar year.

3.1.21 The lateral occupancy estimates for 2003 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 the Canadian and the United Kingdom 30°W estimates were determined. The estimates were based on data for the 4th and 15th days of each month. The 2003 estimates together with the estimates for the previous six monitoring periods are shown in **Table 1**.

Table 1: Lateral Occupancy Estimates for the Periods from 1998 to 2002

		Monitoring Period						
Direction	**Traffic**	**1998 RVSM Phase 1**	**1998/99 RVSM Phase 2 ***	**1999 RVSM Phase 2**	**2000 RVSM Phase 2**	**2001 RVSM Phase 2**	**2002 Full RVSM §**	**2003 Full RVSM**
Same	**OTS**	1.151	0.818	0.959	0.996	1.008	1.002	0.907
	Random	0.222	0.156	0.173	0.165	0.174	0.166	0.153
	Comb	0.802	0.567	0.671	0.702	0.716	0.683	0.609
Opposite	**OTS**	0.002	0.003	0.004	0.005	0.002	0.003	0.003
	Random	0.007	0.008	0.010	0.012	0.006	0.007	0.005
	Comb	0.004	0.005	0.006	0.007	0.003	0.004	0.004

* seven-month occupancy period
§ eleven- month occupancy period

3.1.22 The OTS, Random and combined same direction occupancy values had decreased since the previous year (2002). There had been a small (1%) increase in NAT traffic over the year, assuming 356,300 flights for 2003 and 351,700 flights for 2002. Furthermore, it appeared that the number of proximate pairs, in general, had reduced.

3.1.23 The opposite direction occupancies had shown little detectable trend because of the small number of aircraft involved.

3.1.24 It was recalled that NAT SPG/37 had agreed that, in future, the MWG should review the error weights for lateral GNEs using the latest occupancy estimates. A recommendation to update the weights would then be made as required. Based on the occupancy estimates for 2003 it was found that there was no need to update the error weights from those adopted at NAT SPG/36. They would continue to be reviewed annually.

3.1.25 **Table 2** presents the weighted GNEs used in preparing the risk estimate with **Table 3** providing the weighted risk-bearing rates since 1998. Table 2 also shows that the weighted risk-bearing error rate was below the maximum acceptable level as set out in the corresponding NAT MNPS lateral error rate requirement of $1.3x10^{-4}$.

Table 2: 2003 Weighted Gross Navigation Errors

Class	≥ 30 NM	Risk-bearing	OTS	Random	Combined
A	0	0	0.00	0.00	0.00
B	0	0	0.00	0.00	0.00
C1	0	0	0.00	0.00	0.00
C2	0	0	0.00	0.00	0.00
C3	1	1	0.00	0.55	0.55
D	0	0	0.00	0.00	0.00
E	0	0	0.00	0.00	0.00
F	0	0	0.00	0.00	0.00
Unknown	0	0	0.00	0.00	0.00
Total	1	1	0.00	0.55	0.55
Traffic Count			160368	186043	346411
Error Rate ($x10^{-4}$)			**0.00**	**0.03**	**0.02**

Table 3: Weighted Risk-Bearing Error Rates (x 10^{-4}) for the years from 1998 to 2003

Sample	1998	1999	2000	2001	2002	2003
OTS	0.06	0.03	0.00	0.00	0.00	**0.00**
Random	0.31	0.21	0.20	0.12	0.02	**0.03**
Combined	0.17	0.10	0.08	0.05	0.01	**0.02**

3.1.26 The 2003 lateral collision risk estimates together with the estimates for the previous six monitoring periods are shown in **Table 4**. The estimated lateral collision risk for all MNPS traffic shows a downward trend for the past six years. 2003 was the fourth year in a row that the estimated collision risk in the OTS was zero. All the estimates for 2003 were below the target level of safety (TLS) for the lateral dimension, which was 20 x 10^{-9} fatal accidents per flight hour.

3.1.27 Based on the available evidence, it appeared that procedures aimed at keeping large lateral navigational errors to a minimum seemed to have had some effect on the risk estimate, especially on the OTS. For example, reference was made on the daily OTS track message for pilots to adhere to standard operation procedures for waypoint insertion.

Table 4: Lateral Risk Estimates (x 10^{-9}) for the Years from 1998 to 2003

All figures are in fatal accidents per flight hour and should be multiplied by 10^{-9}. These should be compared against the TLS of 20 x 10^{-9}.

	Monitoring Period						
	1998 RVSM Phase 1	1998 RVSM Phase 2 *	1999 RVSM Phase 2	2000 RVSM Phase 2	2001 RVSM Phase 2	2002 Full RVSM §	2003 Full RVSM
OTS	4.5	3.3	1.6	0.0	0.0	0.0	0.0
Random	5.7	4.5	3.4	3.4	1.8	0.4	0.5
All MNPS	5.0	3.8	2.4	1.5	0.9	0.2	0.3

* seven- month occupancy period
§ eleven-month occupancy period

Review of Lateral Risk Methodology

3.1.28 It was noted that there had only been one *risk-bearing* GNE. According to the accepted lateral error sampling methodology, a GNE was considered risk-bearing and eligible for inclusion in the risk estimate if it occurred exiting oceanic airspace in range of Gander or Shanwick radar coverage (referred to as the 'window'). In addition, there were eight observed Bravo errors for 2003. These errors were not included in the risk calculation because they did not meet the current accepted sampling criteria. It was noted that the MWG had felt that, if a statistically valid method were devised by which Bravo errors could be brought into the risk calculation, the sample size would likely increase and the estimate of lateral risk would generally be improved. This would not necessarily mean that the risk estimate for a given period would go up since including the reported errors from table Bravo would also increase the sample of flight segments over which the errors could occur. The re-estimation would have the effect of increasing the stability of the resulting risk estimate. Additionally, what was desired was a sample that was representative of the whole of NAT MNPS airspace. Two suggestions were put forward for obtaining a larger, unbiased sample of GNEs that could be used in lateral risk calculations:

a) use outbound as well as inbound GNEs as seen at the radar windows; and

b) use GNEs captured by radar coverage in Reykjavik and/or Santa Maria and/or New York.

3.1.29 For item a), unless a GNE occured inbound at the window, the error would not be included in the risk calculation. Because radar coverage on both sides of the ocean provided a complete picture of lateral navigation performance along those boundaries, using the windows inbound and outbound in each direction could provide an improved estimate of lateral navigation performance. However, work would have to be done to determine if the errors seen outbound at the window were similar to the types of errors seen at the inbound window and to revise the current error weightings. The Group agreed that a study should be carried out to determine the feasibility of using outbound and inbound errors at the window and to calculate appropriate weightings for risk calculation purposes.

3.1.30 For item b), there was an opportunity to take advantage of radar coverage within NAT airspace. Some GNEs within these areas were already being captured but were necessarily regarded as either

Bravo or Charlie errors. If errors reported by ACCs, other than Gander and Shanwick, were included, the additional traffic seen in these areas would also have to be accurately estimated and added to the base used for estimating error rates. This should then allow any appropriate risk-bearing GNEs captured by Reykjavik, Santa Maria and New York to be included in future risk calculations. It was therefore agreed that the feasibility of using additional areas of GNE reporting should be investigated.

3.1.31 The potential improvements discussed briefly above would be in accordance with NAT SPG Conclusion 38/15, which emphasised the need to review the lateral risk estimation methodology.

3.1.32 In addition to the foregoing, the sampling period was also discussed. It was agreed that increasing the sample size by making more use of the data already collected could offer the most immediate benefit. This would go a long way in providing planners a better method to get the necessary feedback to determine how the system was behaving.

3.1.33 It was noted that the MWG had also discussed potential benefits of using data link systems, such as the Centralised Automatic Dependent Surveillance (CADS), CPDLC, or Flight Management Computer (FMC) Waypoint Position Reporting (WPR) to capture errors in mid Ocean. Although not examined in great detail, it was agreed that all opportunities to improve the sample size or quality needed for safety management should be considered.

CONCLUSION 40/15 - EXPANSION OF THE NAT MINIMUM NAVIGATION PERFORMANCE SPECIFICATIONS (MNPS) GROSS NAVIGATION ERROR (GNE) MONITORING WINDOW

That the NAT Mathematicians Working Group (MWG) study the possibility of:

a) including all GNEs in MNPS airspace to determine lateral risk;

b) extending the monitoring window to include the radar data of New York (including Bermuda), Reykjavik and Santa Maria radars; and

c) using GNE-related information obtained from data link applications to determine risk.

Strategic Lateral Offsets and $P_y(0)$

3.1.34 A key parameter which was used in the calculations of vertical risk (which is also relevant to horizontal risk) was the lateral overlap probability, $P_y(0)$. Vertical and horizontal risks increase in direct proportion to this value. The value had been re-estimated twice during the past four years because it was dependent on the lateral navigational accuracy of the NAT traffic population. The number of aircraft navigating with Global Positioning System (GPS) as a proportion of the NAT fleet had generally increased with time. GPS has allowed much improved navigation along a given track, and so the lateral distribution about the centreline of a given track had changed over time, and the distribution had tightened up.

3.1.35 On the 10th of June 2004, the Strategic Lateral Offset Procedure (SLOP) came into effect in the NAT Region. An operational trial of the SLOP had been running in the WATRS area of the NAT Region since November 2001, with limited success. The SLOP provided pilots the option of either flying on the centreline, or flying a 1 NM or a 2 NM offset to the right of the centreline. If the three options were to be flown in equal proportion, the vertical and longitudinal collision risks would be reduced considerably.

3.1.36 The lateral distribution about the track centreline was likely to change from the 10th of June 2004, depending on the level of use of the SLOP. If few pilots elected to fly strategic lateral offsets the current $P_y(0)$ value could still be valid when calculating the risk for 2004. Otherwise, a new $P_y(0)$ would need to be calculated. However, several potential problems, which may make the calculation of $P_y(0)$ difficult, had been identified.

3.1.37 In the past the lateral distribution about the centreline had been characterised by using radar data at the oceanic boundary. The wording of the AIC/NOTAM on the use of the SLOP said that pilots must be back on the centreline at entry or exit to the ocean. It was noted that there were likely to be a variety of interpretations of 'at oceanic entry/exit'. However, it was noted that revised definitions would be included in all relevant NAT documentation. The Group further noted that the possible misinterpretation could be exacerbated on the Western side of the ocean, as the Westbound exit was less well defined than the Eastbound exit. There was a feeling that many pilots would be returning to track centreline several minutes before exiting the ocean at the boundary. This could have implications for calculating an accurate $P_y(0)$.

3.1.38 To calculate a realistic lateral distribution about the track centreline it was imperative that aircraft be recorded (by radar at the oceanic boundary) flying their track centrelines or offsets that were flown across the NAT. If aircraft moved back to centreline before radar coverage (having flown an offset all the way across the NAT), the recorded lateral distribution about the centreline would be inaccurate to some degree and could lead to an incorrect $P_y(0)$ and hence inaccurate risk estimates.

3.1.39 For the reasons given above, it may not be possible to capture a representative lateral distribution about track centreline from radar data at the edge of Shanwick, so other windows should be identified. A potential window could be at 45°N-49°N at 50°W. The Group agreed that a sample for $P_y(0)$ estimation be designed.

CONCLUSION 40/16 - REVISED ESTIMATION OF $P_Y(0)$ TAKING ACCOUNT OF THE APPLICATION OF STRATEGIC LATERAL OFFSET PROCEDURES (SLOP)

That the NAT Mathematicians Working Group (MWG) develop a re-estimate of $P_y(0)$ taking account of the application of the SLOP.

3.1.40 The Group noted that the MWG had strongly felt that a revised version of the MNPS Operations Manual should be published as soon as possible. The Group noted that airline and other training departments make extensive use of this invaluable manual and it should therefore be kept current. A new version was required to take account of the SLOP and other important recent changes made to the NAT airspace. The Group felt that this was a safety issue and needed to be urgently addressed (paragraph 3.1.49 refers)

Strategic Lateral Offsets in the Western Atlantic Route System

3.1.41 An operational trial of the SLOP had been running in the WATRS area of the NAT Region since November 2001. Information on the application of the SLOP, which had been collected from radar data over a 24 day period (February to March 2004) on a particular track segment of the WATRS using the radar at Bermuda, had shown the lateral deviations about track centreline of all the aircraft for that track segment. Setting boundaries between centreline, 1 NM and 2 NM offsets, using an ad hoc definition, the proportion of aircraft within each lateral category were computed. For the 24-day sample, about 82% of aircraft flew the track centreline. About 14% flew either a 1 NM or 2 NM offset, in accordance with the recommended procedure. About 4% flew a left, or incorrect, offset.

3.1.42 The sample was taken after two years of operational trials of the procedure. The results had shown that the application of offsets was less than that which could produce an optimal reduction of $P_y(0)$. However, there was also evidence that much of the sample was not using highly accurate navigation systems, which also reduced $P_y(0)$. It was expected that the implementation of a NAT Region-wide application of the SLOP will affect the performance in the WATRS in the future.

3.1.43 Considering that the correct use of the SLOP could provide significant reductions of the risk in the system, it was agreed that efforts should be made to increase pilot awareness. As a first measure, it was agreed that the revised version of the video "keeping track" should include references to the application of the SLOP. Secondly, user organisations should inform pilots of the risk reduction benefits of using the SLOP.

Vertical Risk

3.1.44 The vertical occupancy estimates for the twelve months of 2003 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 the United Kingdom 30°W estimates were determined. The estimates were based on data for the 4th and 15th days of each month. The 2003 estimates, together with estimates since 1998, for RVSM levels, are shown in **Table 5**.

Table 5: Vertical Occupancy Estimates for the Years from 1998 to 2003

Direction	Traffic	1998	1999	2000	2001	2002	2003
Same	OTS	1.153	1.324	1.303	1.283	1.276	1.244
	Random	0.133	0.143	0.165	0.160	0.155	0.157
	Comb	0.795	0.921	0.928	0.914	0.848	0.812
Opposite	OTS	0.001	0.002	0.002	0.001	0.001	0.002
	Random	0.033	0.032	0.027	0.029	0.027	0.033
	Comb	0.013	0.012	0.010	0.010	0.011	0.014

3.1.45 The Group noted that the technical risk in the vertical dimension was not calculated for 2003 as it was very small compared to the estimated operational risk; furthermore, it had not been calculated for some time for the same reason.

3.1.46 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 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 clearance or without following published contingency procedures (and the speeds at which the levels were crossed) during the monitoring year. **Table 6** shows the total number of large height deviations (LHDs), not all of which were risk-bearing, reported to the CMA and the estimate of risk-bearing time spent at uncleared levels for 2003 and the previous six monitoring periods.

Table 6: Large Height Deviations and Time Spent at Wrong Levels for the Years 1998-2003

	1998 Phase I[1]	1998 Phase II[2]	1999 Phase II	2000 Phase II	2001 Phase II	2002 Full RVSM	2003 Full RVSM
Number of Deviations	62	7	52	31	41	69	**61**
Time at Wrong Level (mins)	60.2	10	170	52	159	360	**431**

1: Collection period from January to 7 October 1998.
2: Collection period from 8 October to December 1998.

3.1.47 It was noted that, as with the lateral errors, the large height deviations reported to the CMA during 2003 were examined by the MWG in conjunction with the Scrutiny Group to agree on the classification for risk calculation purposes. Table 6 shows that there had been a large increase in the time spent at uncleared levels, although the number of deviations reported had dropped slightly.

3.1.48 Based on the set of large height deviations reported in 2003, the operational vertical collision risk estimates were determined. The estimates are shown in **Table 7** together with, for comparison, the estimates back to 1998.

Table 7: RVSM Vertical Collision Risk Estimates between 1998 and 2003 (Large Height Deviations Only)

All figures are in fatal accidents per flight hour and should be multiplied by 10^{-9}

	1998* Phase II	1999 Phase II	2000 Phase II	2001 Phase II	2002† Full RVSM	2003 Full RVSM
OTS	0.8	6.0	0.5	3.0	0.6	6.3
Random	6.1	8.9	6.6	16.3	41.6	46.3
Combined	3.2	7.2	3.0	9.0	20.5	27.8

*: 1998 values estimated for Phase 2 RVSM between October and December using twelve months of LHD data.

†: 2002 values estimated for full RVSM (January 24 to December 31) using twelve months of LHD data. Note that $P_y(0)$ was increased in both 2000 and 2002.

3.1.49 Table 7 shows that the random and combined vertical collision risk due to operational errors for the year 2003 were estimated to be approaching six times the TLS. In order to reduce the risk, the Group agreed that vertical errors should be referred back to the States and the operators in order to increase awareness of the problem. The Group also agreed to attach a high priority to consider other initiatives to reduce the frequency and magnitude of vertical errors.

CONCLUSION 40/17 - REDUCTIONS IN THE NUMBER OF VERTICAL OPERATIONAL ERRORS

That, in order to reduce the number of operational errors:

a) States and operators be informed by the Central Monitoring Agency (CMA) of all instances of vertical errors so as to raise awareness and to take corrective action;

b) the NAT Implementation Management Group (NAT IMG) develop, as a priority, initiatives to reduce the frequency of vertical errors;

c) the revised "keeping track" awareness DVD incorporate the strategic lateral offset procedures;

d) user organisations take action to increase the awareness of pilots of the risk reduction benefits of using the Strategic Lateral Offset Procedure (SLOP); and

e) the NAT IMG provide NAT SPG/41 with a report on the outcome of their activities.

3.1.50 In reviewing the RVSM vertical risk estimates for the last six monitoring periods, it was noted that the combined collision risk had now exceeded the TLS four times. It appeared from the risk estimates that the risk presented by random traffic was consistently higher than that presented by OTS traffic. The estimated combined risks for 2002 and 2003 have both exceeded the TLS by more than four times.

3.1.51 An analysis of the vertical risk for 2003 had shown that approximately 60% of the total risk was accounted for by just four large height deviations involving crew or ATC error, out of a total of 43 operational risk-bearing large height deviations included in the risk estimate. The single event that contributed most to the vertical risk was caused by several factors. As a result of an HF blackout the aircrew utilised the 'no communications' procedures. The procedure utilised, however, was not the approved procedure for Reykjavik airspace as promulgated by Reykjavik regarding HF blackouts. The aircraft was climbed by the flight crew during the HF blackout and remained off the cleared altitude for 118 minutes. The Group recalled that it had already agreed that common procedures should be developed to address operational issues resulting from HF propagation problems. Taking account of the discussions related to the use of SATCOM voice (paragraph 2.1.65 refers), the Group agreed to re-iterate Conclusion 39/12, agreed to by NAT SPG/39.

3.1.52 Two of the four largest LHDs, totalling 74 minutes spent at incorrect flight levels, were caused by ATC error. The fourth LHD, accounting for 55 minutes spent at the wrong flight level, occurred when an aircraft had climbed without a clearance during a loss of HF communications. Incidentally, this military aircraft entered RVSM airspace without an ATC clearance and was also non-MNPS/RVSM approved.

3.1.53 Since RVSM operations began in 1998, there had been considerable fluctuation in the vertical risk estimates. The risk had been produced by large height deviations due to operational errors or equipment failures, which, by their nature and in a statistical sense, are rare events with highly variable individual risks. That is, one event can contribute a large risk while another would only have a small effect. Based on the accumulated evidence showing the nature of the underlying risk-generating errors, it was expected that the vertical risk would continue to exhibit considerable variation from year to year.

3.1.54 Finally, it was noted that since 2000, the trend in vertical risk estimates was upward, especially the most recent two estimates. Four of the last six estimates of collision risk are above the TLS. Given these data there was a clear indication that the true risk of the NAT Region in the vertical dimension was above the TLS.

Large Height Deviation Categories in United States Domestic RVSM Airspace

3.1.55 The Group noted the information contained in **Table 8**, which shows the categories of LHDs in RVSM airspace of the United States. The table is an expansion of the classification table commonly used in NAT airspace and identifies new categories that were relevant to a radar environment.

Table 8: US RVSM Codes – Vertical Errors

Category	**Description**
1	Final level within RVSM airspace
2	Final level above RVSM airspace
3	Final level below RVSM airspace
Subcategory	**Description**
A	Contingency action due to engine fault
B	Contingency action due to pressurisation failure
C	Contingency action due to other cause
D	Failure to climb/descend as cleared
E	Climb/descent without ATC clearance
F	Entry to RVSM airspace at an incorrect level
G	ATC FL re-clearance resulting in loss of lateral or longitudinal separation
H	Deviation due to TCAS
I	Aircraft unable to maintain level
J	ATC failure to correctly record, co-ordinate, or follow through on FL changes and/or other clearances
K	Aircrew not maintaining level as cleared
L	ATC failure to capture incorrect read back of control instructions fails to maintain situational awareness. Or fails to resolve transposed call signs
O	Other
W	Weather

3.1.56 Categories J, K, L and W were four new ones. In the NAT table, weather was not listed as a category but was a modifier of other categories. In Table 8, weather was both a category and a modifier.

3.1.57 The United States reported that the table would have a twofold use. Firstly, to classify LHDs as a step towards identifying trouble spots and secondly to help calculate the operational risk. It was felt that the table would be a useful tool to meet these objectives.

An Alternative to the Current Method of Estimating Occupancy

3.1.58 It was recalled that a study into an alternative method for classifying flights as either OTS or Random for the purpose of estimating lateral and vertical collision risk had been reported to NAT SPG/39. The reason for this work was that flights were only classified as OTS flights if they follow all of the waypoints of an OTS track from coast out to coast in. Flights that deviate from such a track, even if they follow most of the OTS waypoints, are labelled in the Gander Automated Air Traffic System (GAATS) database as Random. Hence, many flights that are classified as Random may in fact be following part or most of an OTS track and contributing to the true occupancy of the OTS. The system risk estimate is a linear combination of its constituents (OTS and Random) and as such the total system risk estimate would not change under any re-apportionment. The study was undertaken, in part, to suggest how the elemental risk contributions could be more accurately portrayed.

3.1.59 A comparable study for 2003 was conducted. The study treated the region(s) of NAT MNPS airspace occupied by OTS tracks as an 'OTS block' and flights observed in that block were treated as OTS flights, regardless of their classification in the database. Data were sampled at 30°W for this particular study.

3.1.60 Because of a decrease in the number of flights classified as OTS, it was found that, in general, OTS same direction occupancy increased under the new definition in both the lateral and vertical dimensions, with some variation depending on the time the tracks were considered to be active at 30°W. In general, Random same direction occupancies also increased under the new definition, due to an increase in the number of Random/Random proximate pairs following the reclassification of some OTS flights as Random. This occurred because, although some flights were traditionally classed as OTS and were following the path of OTS tracks, they were actually above or below the published OTS levels, or were outside the times when the OTS was in effect. Under the new definition, these flights were classed as Random and proximate pairs formed with other flights would be Random/Random instead of OTS/Random.

3.1.61 Although track times formally end at 08:00Z for the night tracks, and at 18:00Z for the day tracks, most flights in the hour following those times were on OTS routes and were classified as such in the database. If the times for both the night and day tracks were extended for one hour beyond their formal times, the occupancies so calculated would be very similar to those reported under the traditional method.

3.1.62 Under any definition of an OTS flight, there remained some variability in the vertical, geographical and temporal boundaries of the 'block' depending on the flight levels requested by pilots or cleared by air traffic controllers on an OTS track, and whether or not published track times were strictly adhered to.

3.1.63 Opposite direction lateral occupancies, which could be potentially important in risk estimation, were unchanged. The opposite direction vertical occupancy increased in the OTS and decreased in Random airspace. The above work was also applicable to the vertical risk estimation.

3.1.64 It was felt that no advantage would be gained from adopting a new method of estimating occupancies for inclusion in risk estimates. On the other hand, the treatment of lateral and vertical errors should consider the track structure in effect when and where the error occurred, and be classified as OTS or Random accordingly.

Review of on-going vertical monitoring procedures

3.1.65 The Group considered the 'vertical monitoring pack', which was a collection of tables and graphs used for assessing the combined Altimetry System Error (ASE) performance of the population of aircraft that traverse the NAT Region. It was produced twice yearly with the intent of providing quality assurance data relevant to individual aircraft, aircraft groups and operators. The source of the data used for generation of the pack was the CMA's database of HMU and GPS-Based Monitoring System (GMS) ASE measurements. The global guidance material contained ASE performance specifications and the pack was used to ensure that individual aircraft, aircraft groups and operators continued to meet those specifications.

3.1.66 Usually, a pack was presented which included all the data captured by the NAT HMUs. However, on this occasion, a CMA pack was presented which contained data for just 2003 to permit a comparison with data obtained from European HMUs.

3.1.67 Although the pack contained a table of aberrant measurements it did not contain a list non-compliant ones. The Group noted that a table would be formulated and published on the NAT PCO website for discussion. In future it will be included in the pack as it helped to interpret the data, particularly to highlight individual aircraft that were not meeting vertical performance requirements.

3.1.68 The Group agreed that future monitoring packs be produced with the most recent two-year sample of data. However, the packs should continue to produce cumulative tables of aberrant and non-compliant measurements. Old measurements could be 'greyed out' to emphasise recently acquired data.

CONCLUSION 40/18 - VERTICAL MONITORING PACKS

That:

a) future monitoring packs be produced with the most recent two-year sample of data; and

b) the packs contain cumulative tables of aberrant and non-compliant measurements.

SAFETY MANAGEMENT

Regional safety management

3.1.69 The Group was informed that the NAT IMG had felt that it was necessary to develop a policy on regional safety management in order to ensure that the new Annex 11 provisions were implemented. It was stressed that ATM safety management was of paramount importance when new CNS/ATM systems and associated procedures were being developed. While safety oversight is a State responsibility, there are obvious benefits to be derived from close cooperation of specialists engaged in this field, both from State agencies and air traffic service providers. There has however been no common forum within the NAT Region for experts in this field to carry out the work. Accordingly, it was proposed that a group, to be named the Safety Management Coordination Group (SMCG), should be established under the auspices of the NAT SPG.

3.1.70 The main function of the SMCG would be the continuous monitoring of ATM safety in the NAT Region. One of its initial tasks would be the compilation of a comprehensive approach to the monitoring of the health of the ATM system in the region and submit their findings to NAT SPG/41. In order to support regional monitoring of ATM safety, the SMCG would review all reported incidents from the entire Region. Therefore, the collection and analysis of all ATM incidents should be an agreed objective. Should the number of such reports be found to exceed the capabilities of the group, then a severity classification scheme (similar to those employed by Eurocontrol and the United Kingdom) may need to be

adopted to allow the group to focus its attention on the more important occurrences. A common occurrence report format would be needed.

3.1.71 In this context it was clear that the CMA would play a crucial role in collecting and collating data for review by the SMCG. It was also clear that there was great commonality of purpose between the SMCG and the current Scrutiny Group and MWG, it may in fact be argued that the SMCG could be created by adding safety management experts to the Scrutiny Group. Alternatively, the Scrutiny Group could continue to carry out the specific task of classifying occurrences for the purpose of determining their impact on the target level(s) of safety while the SMCG would focus on the mitigation of occurrences from a safety management point of view.

3.1.72 The Group agreed that, considering the current strain on resources, it would not be appropriate to create another NAT SPG group. It was therefore agreed that the Scrutiny Group would take on the tasks outlined above. To do so, it would be necessary to expand the membership to include Brest and Gander as well as safety management expertise. It was also agreed that the Scrutiny Group would be re-named the SMCG with the terms of reference shown in **Appendix F** to this Report and that the composition should be based on operational expertise and knowledge of safety management and risk assessment.

3.1.73 The Group agreed that a meeting of the SMCG should take place in the autumn in order to examine the more significant events reported to date, to monitor the progress achieved, and to ensure that other groups reporting to the NAT SPG receive timely information concerning NAT system safety which may affect their deliberations.

3.1.74 In addition to the main task outlined above, it was foreseen that the SMCG may be called upon by the NAT IMG to provide its working groups with expertise and advice in the area of safety assessment of new systems, procedures and applications. It was proposed that the group would be composed of members from States/ANSPs. Users and interested parties may also be invited to participate in meetings.

CONCLUSION 40/19 - ESTABLISHMENT OF A SAFETY MANAGEMENT COORDINATION GROUP (SMCG)

That:

a) the name and terms of reference of the Scrutiny Group be modified in accordance with Appendix F to the Report of NAT SPG/40;

b) the SMCG, as its first task, develop a work programme which would be coordinated through the NAT SPG Chairman with the NAT SPG Members;

c) the SMCG meet in the autumn in order to review and take action on identified safety issues; and

d) the SMCG support the NAT IMG by providing safety management expertise and advice when required.

3.2 Review of system operations

AIR TRAFFIC MANAGEMENT

North Atlantic Operations Managers' Meeting

3.2.1 The Group was informed that the Operations Managers had met from the 25 to 27 May 2004, in accordance with the Terms of Reference established by the NAT SPG. The Group regretted that the OPS

Managers had not provided a report to the meeting. It reiterated its previous decisions that the NAT SPG Member hosting the OPS Managers should endeavour to ensure that the report was provided in time for the NAT SPG to consider.

COMMUNICATIONS

Aeronautical Communications Group

3.2.2 The Group was informed that the total amount of HF and General Purpose (GP) VHF contacts for the year of 2003 had been 3 256 461 messages, distributed across all Aeronautical Stations. It was also noted that 74.7% were by HF and 25.3% by VHF. For each one of the Aeronautical Stations, the percentage of traffic was Gander (32.9%), Shanwick (25.7%), Iceland (12.3%), Santa Maria (13%),United States (15.7%) and Norway (0.5%).

3.2.3 The HF message volume had increased by 4.5% from 2002 to 2003 and the impact of the current data link initiatives had stabilized demand and that no major decrease was expected in the short term, unless further data link initiatives were introduced. It was however expected that during 2004, the volume of messages may decrease because of the CPDLC trials.

3.2.4 It was noted that, due to difficulties in defining the scenarios for the new reporting format, as defined in paragraph 3.2.12 of the NAT SPG/39 report, Busiest Day reports for the year 2003 were not presented. It was intended to analyse the scenarios at the next ACG meeting planned for May 2005 and to present the results to NAT SPG/41.

3.2.5 Finally, the Group noted that the NAT Region HF Guidance Material had been published and that the version took account of NAT SPG Conclusion 39/22 related to poor propagation conditions.

4. DOCUMENTATION UPDATE

4.1 NAT Documentation review

4.1.1 The Group noted that the NAT IMG had agreed that the undertaking of developing a new ATM concept of operations, based on the outcome of the ANConf/11 and an amendment to the NAT ANP should be completed in time to be presented to NAT SPG/41 for its endorsement. To carry out this work, a task force, comprised of Canada, Iceland, Ireland, Portugal, the United Kingdom, the United States and IATA, had been established and had held its first meeting in Paris the week of 26 to 30 January 2004.

4.1.2 The work involved had been divided into two parts, the first was to update the ANP and FASID, which have not been updated since they were agreed to by the Limited NAT Regional Air Navigation (RAN) Meeting of 1992. The second task was to develop a new ATM concept of operations, which would reside within the ANP and FASID as required.

4.1.3 As regards the NAT FASID, the Secretary indicated that it needed to be updated to reflect current and anticipated services and facilities. To this end, it should be noted that the ICAO EUR/NAT Office would be co-ordinating formally with States concerned to advance this task. Concerning the requirements for VOLMET at Shannon, it should be noted that Ireland was proceeding with the replacement of the current system and that the same broadcast schedule would be maintained. It was also noted that, following a survey of users, the United States had determined to maintain the VOLMET service because the users had indicated that no consensus existed to withdraw it.

Update to the MET section of the ANP and FASID

4.1.4 The Group was informed that the Secretariat had carried out an in-depth review of the NAT ANP/FASID PART VI METEOROLOGY. The intent had been to align the MET part with the current standard structure of the ANP/FASID, applicable for all ICAO Regions and also to bring it up to date to include the current requirements in the NAT Region.

4.1.5 The substantial changes introduced in the draft revised ANP Part VI MET were:

a) revised requirements on the World Area Forecast System (WAFS) and International Airways Volcano Watch (IAVW);

b) deletion of the current provisions for non-regular exchange of Aviation Routine Weather Report (METAR), Selected Special Weather Report (SPECI) and Terminal Aerodrome Forecast (TAF) (< five flights per week), considering the improvement of the Aeronautical Fixed Telecommunication Network (AFTN) and the regular distribution of the Operational Meteorological Information (OPMET) information by Satellite Distribution System for information relating to air navigation (SADIS), International Satellite Communications System (ISCS) - SADIS/ISCS satellite broadcasts;

c) provisions for 9 hour TAF (at some selected aerodromes) and/or 24 hour TAF (currently 18/24 hour TAF);

d) designation of the Brussels International OPMET data bank for the NAT Region;

e) deletion of all provisions currently covered by Annex 3; and

f) restructuring of the contents to align them with the current standard of the ANP/FASID, applicable for all ICAO Regions.

4.1.6 The substantial changes introduced in the draft revised FASID Part VI MET were:

a) revised requirements on the WAFS and the IAVW in FASID Tables MET 3 to MET 6;

b) deletion of provisions for non-regular exchange of METAR, SPECI and TAF (< five flights per week) in FASID Table 2A and the addition of some new requirements; and

c) revised exchange requirements for SIGMET in Table 2B to include all types of SIGMET and Special Air Reports.

4.1.7 The Group endorsed the proposal for amendment and agreed that the Secretary General should be requested to initiate the proposal for amendment which would then be circulated to States and interested international organisations for comments.

CONCLUSION 40/20 - INITIATE AN AMENDMENT PROPOSAL TO THE NAT AIR NAVIGATION PLAN (ANP) AND NAT FACILITIES AND SERVICES IMPLEMENTATION DOCUMENT (FASID) CONCERNING METEOROLOGY

That ICAO, on behalf of the NAT SPG, initiate an amendment proposal to the NAT ANP and NAT FASID in order to update the MET regional requirements.

Updating the Minimum Navigation Performance Specifications Operations Manual

4.1.8 The Group was informed that, in follow up to the discussions that had taken place at NAT SPG/39 regarding the need to update the MNPS Operations Manual, the Secretariat had requested that a temporary contract be entered into with an individual to amend the document. It was recalled that all previous editors had withdrawn their services and only ICAO remained to oversee the task. It was also recalled that the ICAO EUR/NAT Office did not have the expertise nor the human resources necessary to carry out this task.

4.1.9 The request for a temporary contract was made and although the need for updating the document was not challenged, it was pointed out that due to ICAO's current financial problems, funds were not available to finance the proposal. Therefore, the Joint Financing Section was approached in order to determine whether or not funds could be obtained from the RVSM programme, subject to meeting all conditions of using such funds. It was pointed out that RVSM is an important part of the document and that it was used by operators and training establishments. It was stated that the RVSM fund could be used but that the accord of the user community was a pre-requisite. It was also pointed out that, if it was not possible to update the document, it would be necessary to withdraw it as it was out of date and contained erroneous information that could prejudice safety.

4.1.10 Recalling the recommendation from both the Scrutiny and Mathematicians groups that the need to update the MNPS Operations Manual was safety related and could therefore contribute to reducing risk by keeping the pilot community more aware of the NAT Region operating requirements, the Group strongly endorsed the need to update the Manual.

4.1.11 With the above in mind, the Group noted that the NAT IMG had reviewed a proposal to use funds that were available through the RVSM arrangement to update the manual. The Group endorsed the NAT IMG proposal and further endorsed the proposal that this would be done through the CMA, who would then recover the costs through the RVSM arrangement. It 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. It was therefore further agreed that the document be published electronically using the NAT PCO web site. With this in mind, all user organisations supported the proposal that the RVSM arrangement managed by the ICAO Joint Financing Section be used to finance the updating of the MNPS Operations Manual. The task of updating the document would need to be closely followed and overseen. In order to save time, it was therefore proposed that the NAT IMG act on behalf of the NAT SPG to oversee the project.

4.1.12 The Member for the United Kingdom agreed to make the necessary arrangements to hire a consultant. The cost should be based on the project document that had been prepared by the ICAO EUR/NAT Office, which amounted to approximately 60 working days and two trips to Paris for briefing and consultations. It was stressed that all concerned should be prepared in advance so that the necessary co-ordination could be carried out expeditiously. In this connection, the Group noted that ICAO would be prepared to host a wrap-up meeting in order to finalise the document. The task should be completed as close as possible to 15 November 2004.

4.1.13 Taking account of the proposed electronic nature of the document and the future amendment process, the Group agreed that consideration should be given to including a reminder on the OTS track message after every update to the document in order to inform the user community of the most recent changes.

CONCLUSION 40/21 - UPDATING THE NAT MINIMUM NAVIGATION PERFORMANCE SPECIFICATIONS (MNPS) OPERATIONS MANUAL

That:

a) the ICAO Regional Director make arrangements to have the MNPS Operations Manual updated;

b) the United Kingdom, through the Central Monitoring Agency (CMA) arrange to hire a consultant to update the Manual, the cost of which will be recovered through the NAT Reduced Vertical Separation Minimum (RVSM) arrangement managed by ICAO;

c) the NAT Implementation Management Group manage this task on behalf of the NAT SPG; and

d) consideration be given to using the Organized Track System (OTS) message to inform users of changes to the MNPS Operations Manual.

5. ANY OTHER BUSINESS

5.1 Next meeting

5.1.1 The Group agreed that NAT SPG/41 be held in the ICAO EUR/NAT Office, from 21 to 23 June 2005. Considering the benefit of starting the meeting on Tuesday, the same procedure will be applied for the next meeting.

5.2 Farewell

5.2.1 The Group expressed its very sincere appreciation to Mr C. Eigl, the Secretary of the NAT SPG, who would be retiring shortly. The Chairman pointed out that Mr Eigl had been working with the Group since NAT SPG/8, which had been held in 1972. The Group wished Christian Eigl a healthy and happy retirement.

APPENDIX A -
LIST OF PARTICIPANTS / LISTE DES PARTICIPANTS

(Paragraph i.4 refers)

CHAIRMAN/ PRESIDENT

Mr Asgeir PALSSON*

CANADA

Mr Don HARRIS*

DENMARK/ DANEMARK

Mr Knud ROSING**

FRANCE

Mr André BERMAN*

Mr Kamel REBAI

Mr Philippe TANGUY

ICELAND/ ISLANDE

Mr Leifur HAKONARSON

IRELAND/ IRLANDE

Mr Pat RYAN*

Denis DALY

PORTUGAL

Mr Carlos MONTEIRO*

Mr Jose CABRAL

Mr Luis RODRIGUES

Mr Nelson PIMENTEL

UNITED KINGDOM/ ROYAUME-UNI

Mr George BALLANTYNE*

Mr Stephen KIRBY

Mr David NICHOLAS

UNITED STATES/ ETATS UNIS D'AMERIQUE

Mr David MALOY**

EUROCONTROL

Mr Robert STEWART#

IATA

Mr Peter LAY

Mr Cees GRESNIGT

IBAC

Mr Peter INGLETON

IFALPA

Capt John FUENTES

IFATCA

Mr Edward WALLACE

INMARSAT

Mr Gary COLLEDGE

* Member/ Membre
** Alternate Member / Membre suppléant
# Part time / à temps partiel

APPENDIX B -
DRAFT PROPOSED AMENDMENT TO THE NAT SUPPS

(Agenda Item 2, Paragraph 2.1.23 refers)

"7.3 Special contingency procedures for ~~subsonic~~ turbojet aircraft, including turn-backs

7.3.1 The following guidance is recommended for aircraft operating within NAT airspace.

7.3.2 *Initial action*

7.3.2.1 If unable to obtain prior air traffic control clearance, the aircraft should leave its assigned route or track by initially turning 90 degrees to the right or left to acquire an offset track of ~~56 km (30 NM).~~ 37 km (20 NM). The direction of the turn should, where possible, be determined by the position of the aircraft relative to any organized route or track system (e.g. whether the aircraft is outside, at the edge of, or within the organized track system (OTS)). Other factors which may affect the direction of the turn are the location of an alternate airport, terrain clearance, and levels allocated on adjacent routes or tracks.

7.3.3 *Subsequent action (using offset procedures)*

7.3.3.1 An aircraft that is able to maintain its assigned flight level, once established on the offset track, should:

a) if above FL 410, climb or descend 300 m (1 000 ft); or

b) if below FL 410, climb or descend 150 m (500 ft); or

c) if at FL 410, climb 300 m (1 000 ft) or descend 150 m (500 ft).

7.3.3.2 An aircraft that is unable to maintain its assigned flight level should:

a) initially minimize its descent rate to the extent possible;

b) select a flight level which differs from those normally used by 300 m (1 000 ft) if above FL 410 or by 150 m (500 ft) if below FL 410;

c) if it is a random track aircraft operating in MNPS airspace and its distance is less than 110 km (60 NM) from any organized track, establish and maintain a ~~56 km (30 NM)~~37 km (20 NM) offset track from any OTS track prior to initiating descent if the aircraft is able to do so; and

d) contact ATC as soon as practicable and request a revised ATC clearance.

7.3.3.3 An aircraft that is not MNPS/RVSM approved and is unable to maintain a flight level above MNPS/RVSM airspace should descend to a flight level below MNPS/RVSM airspace.

7.3.3.4 An aircraft compelled to make a descent through MNPS airspace, whether continuing to destination or turning back, should, if its descent will conflict with an organized track:

a) plan to descend to a level below FL 280;

b) prior to passing FL 410, proceed to a point midway between a convenient pair of organized tracks prior to entering that track system from above;

c) while descending between FL 410 and FL 280, maintain a track that is midway between and parallel with the organized tracks; and

d) contact ATC as soon as practicable and request a revised ATC clearance.

7.3.4 *En-route diversion across the prevailing NAT air traffic flow*

7.3.4.1 Before diverting across the flow of adjacent traffic, the aircraft should climb above FL 410 or descend below FL 280 using the procedures specified in 7.3.2 or 7.3.3. However, if the pilot is unable or unwilling to do so, the aircraft should be flown at a level as defined in 7.3.3.1 for the diversion until a revised ATC clearance is obtained.

~~**7.4 Special procedures for supersonic aircraft**~~

~~*7.4.1 Turnback procedures*~~

~~7.4.1.1 If a supersonic aircraft is unable to continue flight to its destination and a reversal of track is necessary, it should:~~

~~a) when operating on track 'SM', turn north, or if on track 'SO', turn south;~~

~~b) when operating on a random track or on track 'SN' or 'SP', turn either left or right as follows:~~

~~1) if the turn is to be made to the right, the aircraft should first attain a position 56 km (30 NM) to the left of the assigned track and then turn to the right onto its reciprocal heading, at the greatest practical rate of turn;~~

~~2) if the turn is to be made to the left, the aircraft should first attain a position 56 km (30 NM) to the right of the assigned track and then turn to the left onto its reciprocal heading, at the greatest practical rate of turn;~~

~~c) while executing the turnback, the aircraft should lose height so that it will be at least 1 850 m (6 000 ft) below the level at which turnback was started (but not below FL 430) by the time the turnback is completed;~~

~~d) when turnback is completed, heading should be adjusted to maintain a lateral displacement of 56 km (30 NM) from the original track in the reverse direction, if possible maintaining the flight level attained on completion of the turn.~~

~~*7.4.2 Procedures when unable to maintain*~~
~~*7.4.2 the assigned flight level*~~

~~7.4.2.1 A supersonic aircraft compelled to make a descent through MNPS airspace, whether continuing to destination or turning back, should, if its descent will not conflict with an organized track system for subsonic air traffic:~~

~~a) plan to descend to a level below FL 280; and~~

~~b) contact ATC as soon as practicable and request a revised ATC clearance.~~

~~7.4.2.2 A supersonic aircraft compelled to make a descent through MNPS airspace, whether continuing to destination or turning back, should, if its descent will conflict with an organized track system for subsonic air traffic:~~

~~a) plan to descend to a level below FL 280;~~

~~b) prior to passing FL 410, proceed to a point midway between a convenient pair of subsonic tracks prior to entering that track system from above;~~

~~c) while descending between FL 410 and FL 280, maintain a track that is midway between and parallel with the subsonic tracks; and~~

~~d) contact ATC as soon as practicable and request a revised ATC clearance.~~

~~7.4.2.3 If height is critical to reach the destination, the pilot shall be expected to use the urgency signal (PAN, PAN, PAN) when communicating with air traffic services to request clearance at FL 280 or above.~~

APPENDIX C - FORECASTS OF AIRCRAFT MOVEMENTS IN THE ICAO NORTH ATLANTIC REGION (THOUSANDS)

(Agenda Item 2, paragraph 2.3.6 refers)

	ACTUAL									FORECAST						
SCENARIO	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002R**	**2003e**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
OPTIMISTIC										379.5	410.5	435.2	459.2	481.7	504.4	524.7
BASELINE	281.5	302.8	313.9	338.4	365.0	382.0	368.9	344.3	353.6	372.9	398.5	417.9	435.9	451.9	468.4	486.5
PESSIMISTIC										365.4	374.1	387.0	400.9	411.7	423.3	435.4

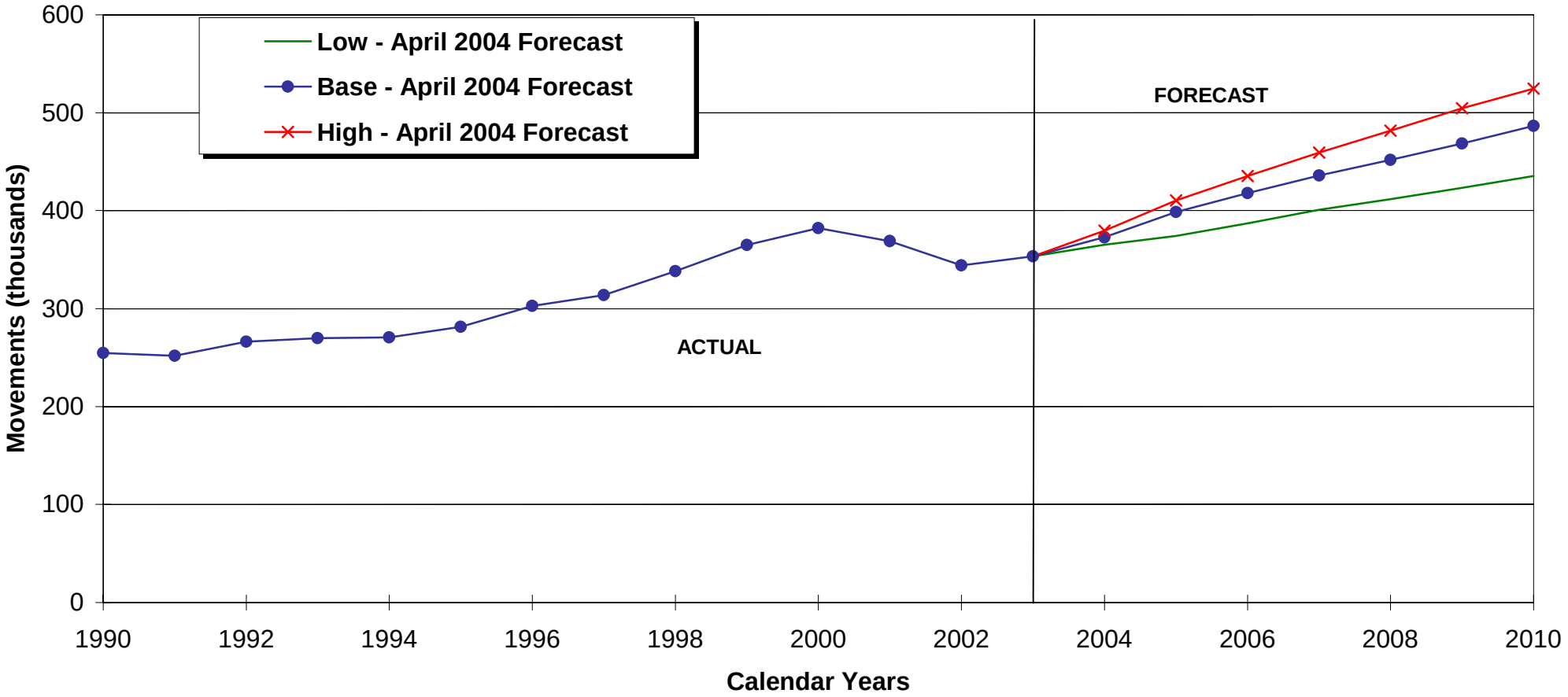
ANNUAL PERCENTAGE CHANGE IN AIRCRAFT MOVEMENTS

	ACTUAL									FORECAST						
SCENARIO		**1996/95**	**1997/96**	**1998/97**	**1999/98**	**2000/99**	**2001/00**	**2002/01**	**2003/02**	**2004/03**	**2005/04**	**2006/05**	**2007/06**	**2008/07**	**2009/08**	**2010/09**
OPTIMISTIC										7.3%	8.2%	6.0%	5.5%	4.9%	4.7%	4.0%
BASELINE		7.6%	3.7%	7.8%	7.9%	4.7%	-3.4%	-6.7%	2.7%	5.5%	6.9%	4.9%	4.3%	3.7%	3.7%	3.9%
PESSIMISTIC										3.3%	2.4%	3.4%	3.6%	2.7%	2.8%	2.9%

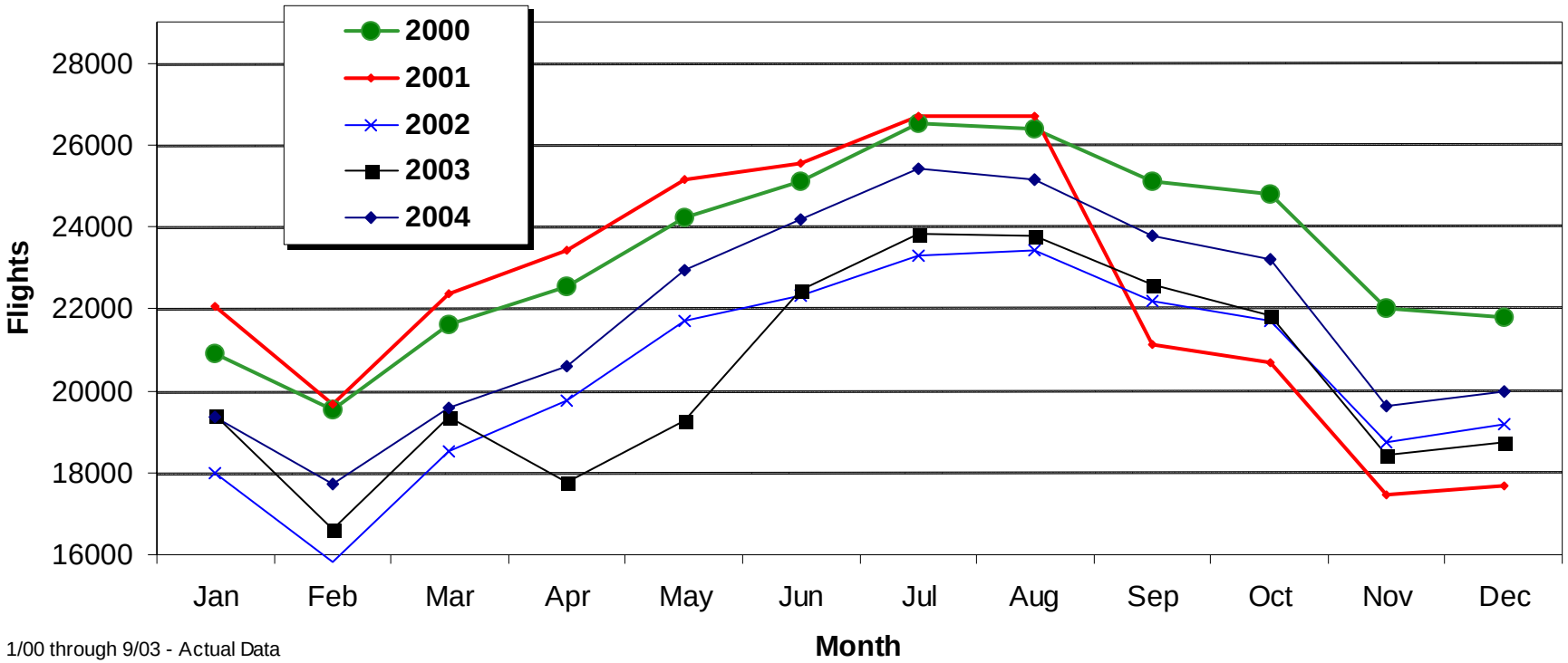
e = Estimate

R = Revised

NORTH ATLANTIC TRAFFIC FORECASTS
AIRCRAFT MOVEMENTS: 1990-2010



NORTH ATLANTIC SCHEDULED FLIGHTS 2000-2004



1/00 through 9/03 - Actual Data
10/03 through 12/04 - NAT TFG Estimates

APPENDIX D – LONG-TERM FORECASTS OF AIRCRAFT MOVEMENTS IN THE ICAO NORTH ATLANTIC REGION (THOUSANDS)

(Agenda Item 2, paragraph 2.3.13 refers)

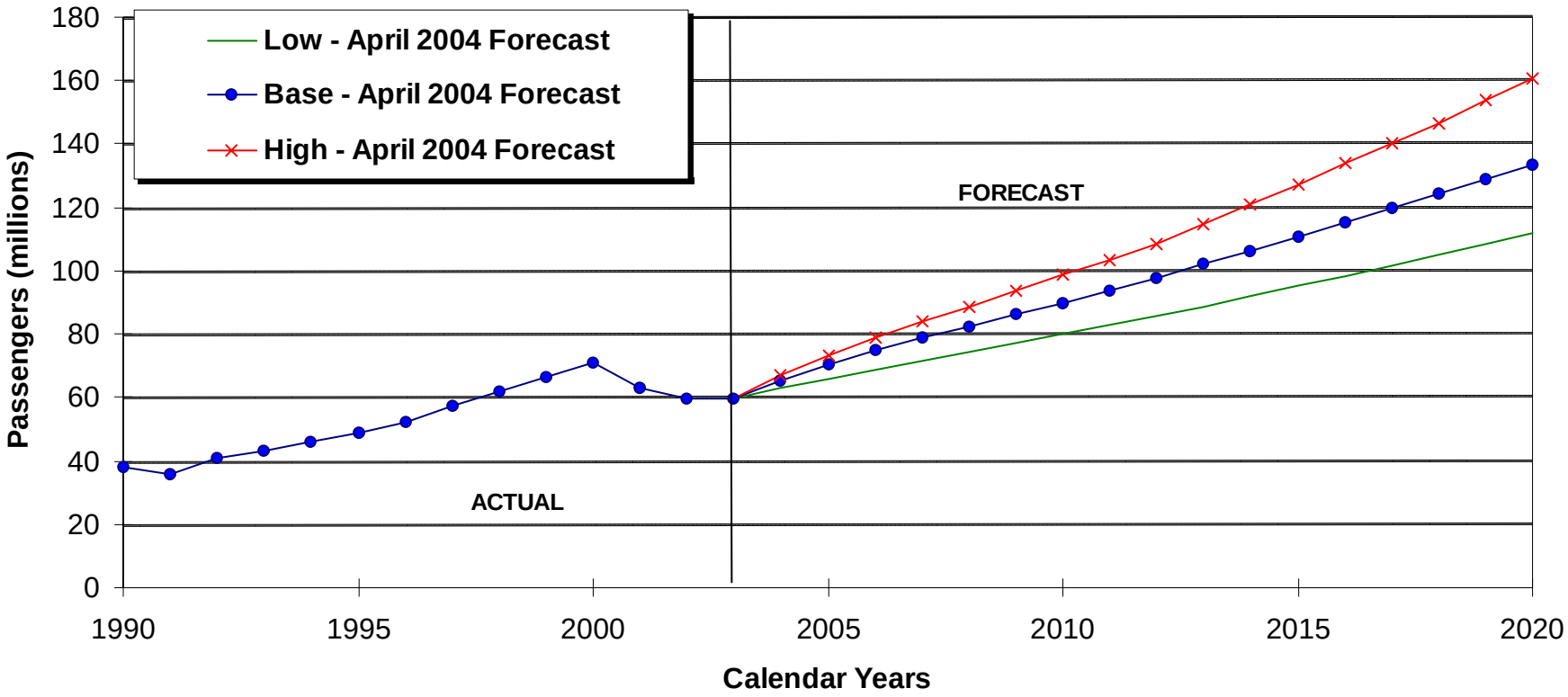
	ACTUAL				FORECAST			
SCENARIO	**2000**	**2001**	**2002R**	**2003e**	**2005**	**2010**	**2015**	**2020**
OPTIMISTIC					410.5	524.7	644.4	777.7
BASELINE	382.0	368.9	344.3	353.6	398.5	486.5	583.9	688.1
PESSIMISTIC					374.1	435.4	504.8	580.4

AVERAGE PERCENTAGE CHANGE IN AIRCRAFT MOVEMENTS PER ANNUM

	ACTUAL				FORECAST			
SCENARIO	**2000/99**	**2001/00**	**2002/01**	**2003/02**	**2005/2003**	**2010/05**	**2015/10**	**2020/15**
OPTIMISTIC					7.7%	5.0%	4.2%	3.8%
BASELINE	4.7%	-3.4%	-6.7%	2.7%	6.2%	4.1%	3.7%	3.3%
PESSIMISTIC					2.9%	3.1%	3.0%	2.8%

e = Estimate
R = Revised

NORTH ATLANTIC TRAFFIC FORECASTS
ANNUAL PASSENGERS: 1990-2020



APPENDIX E – AIRCRAFT CATEGORIES AND TYPES

(Agenda Item 2, paragraph 2.3.15 refers)

CATEGORY	TYPE	NOTES
Twin Engine Wide/Narrow-bodies (Old Category 4)	B757	
	B767-200	
	B767-300	
	B767-400	
	B767 other	Only required for historical data
	B7E7	Yet to be introduced
	B777	
	A310	
	A330	
	Other	B737s, A320s, DC9s etc.
Other Wide-bodies (Old Category 2)	A340	
	A380	Yet to be introduced
	B747-400	
	B747 other	
	IL-96	
	Other	MD11s, DC10s, etc.
Obsolete Wide-bodies (Old Category 3)		DC8s, etc.
Other Military (Old Category 6)		F-900, C-5, C-141, etc.
Business Jets (Old Category 8)		Gulfstream, CL-60, etc.
Other (Old Categories 1,5,7 and 9)		All other aircraft types, includes Concorde (retired), other G.A., etc.

Note: Military flights with a commercial designation (e.g., B737) are assigned to their relative commercial group.

APPENDIX F -
TERMS OF REFERENCE OF THE SMGC

(Agenda Item 3, Paragraph 3.1.72 refers)

SAFETY MANAGEMENT COORDINATION GROUP (SMCG)~~SCRUTINY GROUP (SG)~~

Terms of Reference

1. To review the navigation and safety performance in the NAT Region.

2. To categorise, for the purpose of mathematical analysis, gross navigation errors and altitude deviations of 300 ft or more occurring in NAT MNPS airspace.

3. In coordination with the Central Monitoring Agency and the NAT Operations Managers, to establish a mechanism for the sharing of data on all ATM occurrences in the NAT Region.

4. To establish common procedures for analysis of occurrences.

5. On request of the NAT IMG or one of its sub-groups, to provide advice in the area of safety assessment of new systems, procedures and applications .

~~3.~~6. To recommend methods of improving the observed standard of navigation and safety performance in the NAT Region.

~~4.~~7. To review current methods of monitoring and to recommend improvements to the process.

~~5.~~8. To address other related issues as necessary.

~~6.~~9. To report to the NAT SPG.

Composition The Safety Management Coordination Group ~~Scrutiny Group~~ is composed of representatives from Canada, Denmark, France, Iceland, Ireland, Portugal, the United Kingdom (Central Monitoring Agency (CMA)), the United States, IATA, IFALPA and IFATCA.

Rapporteur/secretary The United Kingdom (Central Monitoring Agency (CMA)) representative.

Working Methods The Safety Management Coordination Group ~~Scrutiny Group~~ meets in conjunction with the Mathematicians Working Group on an annual basis around 2 months before the NAT SPG. The report from the meeting will normally be presented to the NAT SPG by the Rapporteur.

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
AFI	African
AFTN	Aeronautical Fixed Telecommunications Network
AIC	Aeronautical Information Circular
AIP	Aeronautical Information Publication
AIS	Aeronautical Information Services
ALLPIRG	All Planning and Implementation Regional Groups
AMSS	Aeronautical Mobile-Satellite Service
ANP	Air Navigation Plan
ASE	Altimetry System Error
ATC	Air Traffic Control
ATM	Air Traffic Management
ATMG	Air Traffic Management Group
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
CADAG	Communications, Automation and Data Link Applications Group
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
EATCHIP	European Air Traffic Control Harmonization and Integration Programme
ECAC	European Civil Aviation Conference
EFG	Economic and Financial Group
EGNOS	European Geostationary Navigation Overlay Service
ELT	Emergency Locator Transmitter
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
FIG	FANS 1/A Implementation Group
FIR	Flight Information Region
FIS	Flight Information Services
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
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
Inmarsat	International Maritime Satellite Organization
INS	Inertial Navigation System
IOC	International Oceanic Conference
IRS	Inertial Reference System
ITASPS	ICAO Informal Trans-Asia/Trans-Siberia/Cross Polar Routes High Level Steering Group
ITU	International Telecommunications Union
JAA	Joint Aviation Authorities
LHD	Large Height Deviation
LIM NAT RAN	Limited North Atlantic Regional Air Navigation
MAS	Message assurance
MASPS	Minimum Aircraft System Performance Specification
MEL	Minimum Equipment List
MIG	Mathematicians Implementation Group
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
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
NAT TFG	North Atlantic Traffic Forecasting Group
NAT	North Atlantic
NICE Group	NAT Implementation Management Cost Effectiveness Group
NOAA	National Oceanic and Atmospheric Administration
OAC	Oceanic Area Control Centre
OCA	Oceanic Control Area
OCD	Oceanic Clearance Delivery
ODAPS	Oceanic Display and Planning System
OLDI	On Line Data Interchange
OPS MNG	NAT Operations Managers
OPS/AIR	Operations/Airworthiness
OTS	Organized Track System
PCO	Programme Co-ordination Office
R&D	Research and Development

R/T	Radio Telecommunication
RAIM	Receiver Autonomous Integrity Monitoring
RHSM	Reduced Horizontal Separation Minima
RMA	Regional Monitoring Agency
RNAV	Area Navigation
RNP	Required Navigation Performance
RSSIG	Reduced Separation Standards Implementation Group
RTCA	Radio Technical Commission for Aeronautics
RVSM	Reduced Vertical Separation Minimum
SAR	Search and Rescue
SARPS	Standards and Recommended Practices (ICAO)
SATCOM	Satellite Communications
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
TOR	Terms of Reference
TVE	Total Vertical Error
UIR	Upper Information Region
VHF	Very High Frequency
WAAS	Wide Area Augmentation System
WATRS	West Atlantic Route System
WGS-84	World Geodetic System – 1984 Standards
WPR	Waypoint Position Report
WWW	World Wide Web

– END –