International Civil Aviation Organization
North American, Central American and Caribbean Office
Second Meeting of the NAT/CAR ATS Routes Group (NAT/CAR ATS/2)
(Miami, Florida, USA, 8-10 May 2007)

Agenda Item 1: WATRS Plus Project Implementation Issues

ICAO PERFORMANCE BASED NAVIGATION MANUAL GUIDANCE: AIRCRAFT RNP 4 ELIGIBILITY

(Presented by the United States)

SUMMARY

This IP discusses RNP 4 as an option for eligible aircraft operating in WATRS Plus Control Areas. It provides paragraphs extracted from the ICAO Performance Based Navigation Manual and a draft Job Aid for helping to determine operator aircraft RNP 4 eligibility. 50 NM lateral separation will be applied to both RNP 10 and RNP 4 aircraft when the WATRS Plus project is implemented.

1. Discussion

1.1 **Appendix A** contains two paragraphs extracted from the ICAO Performance Based Navigation (PBN) Manual (Doc 9613) that was published in April 2007. The paragraphs provide guidance on three eligibility groups and on aircraft requirements. The RNP 4 aircraft eligibility groups are:

a) Group 1: RNP certification

b) Group 2: Prior navigation system certification

c) Group 3: New technology

1.2 **RNP 10 is the minimum navigation specification for the application of 50 NM lateral separation. RNP 4 is an option for eligible aircraft, however, 50 NM lateral separation will be applied to both RNP 10 and RNP 4 aircraft when the WATRS Plus project is implemented.**

1.3 **Appendix B** is a draft Job Aid for aircraft RNP 4 eligibility that provides references to the ICAO PBN Manual.

1.4 ICAO PBN Manual Volume II, Part C, Chapter 1 (Implementing RNP 4) should be read in its entirety for guidance on operational approval, pilot training and operational procedures.

2. Action

2.1 The group is invited to review the guidance on RNP 4 eligibility and consider its application to RNP 4 eligible aircraft operating in the WATRS Plus CTAs.

APPENDIX A – EXTRACTS FROM ICAO PBN MANUAL
VOLUME II, PART C, CHAPTER 1 (IMPLEMENTING RNP 4)

1.3.2.1 Aircraft Eligibility

Eligibility airworthiness documents. Relevant documentation acceptable to the State of Operator/Registry must be available to establish that the aircraft is equipped with an RNAV systems meeting RNP 4 requirements. To avoid unnecessary regulatory activity, the determination of eligibility for existing systems should consider acceptance of manufacturer documentation of compliance e.g. as with EASA AMC 20 series document.

Aircraft Eligibility Groups

a) **Group 1: RNP certification**

Group 1 aircraft are those with formal certification and approval of RNP integration in the aircraft. RNP compliance is documented in the aircraft's flight manual.

The certification will not necessarily be limited to a specific RNP specification. The flight manual must address the RNP levels that have been demonstrated and any related provisions applicable to their use (e.g. Navaid sensor requirements). Operational approval is based upon the performance stated in the flight manual.

This method also applies in the case where certification is received through a STC issued to cover retrofitting of equipment, such as GNSS receivers, to enable the aircraft to meet RNP 4 requirements in oceanic and remote area airspace.

b) **Group 2: Prior navigation system certification**

Group 2 aircraft are those that can equate their certified level of performance, given under previous standards, to RNP 4 criteria. Those standards listed below in subparagraphs i) to iii) can be used to qualify aircraft under Group 2.

i) **Global navigation satellite systems (GNSS).** Aircraft fitted with GNSS only as an approved long range navigation system for oceanic and remote airspace operations must meet the technical requirements specified in paragraph 1.3.3. The flight manual must indicate that dual GNSS equipment approved under an appropriate standard is required. Appropriate standards are FAA Technical Standard Orders (TSO) C129a or C146(), and JAA Joint Technical Standard Orders (JTSO) C129a or C146(). In addition, an approved dispatch fault detection and exclusion (FDE) availability prediction program must be used. The maximum allowable time for which FDE capability is projected to be unavailable on any one event is 25 minutes. This maximum outage time must be included as a condition of the RNP 4 operational approval. If predictions indicate that the maximum allowable FDE outage will be exceeded the operation must be rescheduled to
a time when FDE is available.

ii) **Multi-Sensor Systems Integrating GNSS with integrity provided by Receiver Autonomous Integrity Monitoring (RAIM).** Multi-sensor systems incorporating Global Positioning System (GPS) with RAIM and FDE that are approved under FAA AC 20-130A, or other equivalent documents, meet the technical requirements specified in paragraph 1.3.3. Note that there is no

requirement to use dispatch FDE availability prediction programmes when multi-sensor systems are fitted and used.

iii) **Aircraft Autonomous Integrity Monitoring (AAIM).** AAIM uses the redundancy of position estimates from multiple sensors, including GNSS, to provide integrity performance that is at least equivalent to RAIM. These airborne augmentations must be certified in accordance with TSO C-115b, JTSO C-115b or other equivalent documents. An example is the use of an inertial navigation system or other navigation sensors as an integrity check on GNSS data when RAIM is unavailable but GNSS positioning information continues to be valid.

c) **Group 3: New technology**

This group has been provided to cover new navigation systems that meet the technical requirements for operations in airspace where RNP 4 is specified.

1.3.3. Aircraft Requirements

For RNP 4 operations in oceanic or remote airspace, at least two fully serviceable independent long-range navigation systems (LRNSs), with integrity such that the navigation system does not provide misleading information, must be fitted to the aircraft and form part of the basis upon which RNP 4 operational approval is granted. GNSS must be used. It can be used as either a stand-alone navigation system or as one of the sensors to a multi-sensor system.

United States FAA Advisory Circular AC 20-138A, or equivalent documents, provides an acceptable means of complying with installation requirements for aircraft that use but do not integrate the GNSS output with that of other sensors. FAA AC 20-130A describes an acceptable means of compliance for multi-sensor navigation systems that incorporate GNSS.

The equipment configuration used to demonstrate the required accuracy must be identical to the configuration specified in the MEL or flight manual.

The design of the installation must comply with the design standards that are applicable to the aircraft being modified and changes must be reflected in the flight manual prior to commencing operations requiring an RNP 4 navigation approval.

APPENDIX B – DRAFT RNP 4 JOB AID FOR DETERMINING AIRCRAFT RNP 4 ELIGIBILITY

#	Subject	ICAO PBN Manual, Vol. II, Part C and FAA AC References:	Location in Operator Exhibits	Inspector Recommendations/Comments	Inspector Tracking Item Status & Date
1	**Defining Group Aircraft**	1.3.2.1			
2	**Requirement For At Least Two Long Range Navigation System**	1.3.3			
3	**Eligibility Group 1 – Aircraft Eligibility Through RNP Certification** (RNP compliance documented in Airplane Flight Manual (AFM)	1.3.2.1 a) 1.3.3			
4	**Eligibility Group 2 – Aircraft Eligibility Through Prior Navigation System Certification**	1.3.2.1 b) 1.3.3			
	GNSS Only Equipped Aircraft	1.3.2.1 b) i) 1.3.3 FAA AC 20-138A (or equivalent)			
	Multi-sensor Systems Integrating GPS **With Integrity Provided by RAIM**	1.3.2.1 b) ii) 1.3.3 FAA AC 20-130A (or equivalent)			
	Multi-sensor Systems Integrating GPS **With Integrity Provided by AAIM**	1.3.2.1 b) iii) 1.3.3 FAA AC 20-130A (or equivalent)			
5	**Eligibility Group 3 – Eligibility Through Data Collection**	1.3.2.1 c)			

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