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COMMITTEE A

Agenda Item 4: Implementing the global air navigation system and the role of planning and implementation regional groups (PIRGs)
4.3: Implementing ASBUs for performance improvement

MANAGEMENT CONCEPT AND IMPLEMENTATION OF PUBLIC RNP AR FLIGHT PROCEDURES IN CHINA

(Presented by the People's Republic of China)

EXECUTIVE SUMMARY

This paper describes the management concept and implementation of required navigation performance authorization required (RNP AR) flight procedures in China. With the implementation of performance-based navigation (PBN) in China, the Civil Aviation Administration of China (CAAC) advocated and implemented public RNP AR to avoid the repeated design and complex certification process of existing RNP AR procedures. Some of the information contained in this paper comes from the advisory circular issued by CAAC entitled *Guidance on Airworthiness and Operation Approval of RNP AR Procedures Implementation*, as well as from the design report provided by flight procedure designers to airport authorities.

Action: The conference is invited to deliberate and agree to the recommendations proposed in paragraph 3.1.

1. INTRODUCTION

1.1 Background

1.1.1 Over the past fourteen years, twenty one civil airports in China have published the Required Navigation Performance Authorization Required (RNP AR) flight procedures, and most of these airports are at high altitude areas with complex terrains. The main purpose of applying RNP AR at these airports was to enhance airport accessibility and catchment, improve airlines flight safety and regularity, and increase carriage and traffic so as to improve operational quality. The development of RNP AR in China can be divided into three phases: a) RNP AR pilot application in China; b) application and operation of airlines customized RNP AR in China; and c) promotion and practice of public RNP AR management concept in China with the focus on airports.

[1] Chinese version provided by China.

1.2 **China's first pilot application of RNP AR procedures**

1.2.1 The first RNP AR pilot application of China's civil aviation started from 2004 to 2005, and Lhasa Gonggar Airport was selected as the pilot airport. Under the leadership of CAAC and the support of Boeing, Naverus was commissioned to design a flight procedure for B757 of Air China. Lhasa Gonggar Airport located in the long and narrow valley of Yalu Zangbu River on the Tibetan Plateau. At an elevation of 3,570 meters (11,710 ft), it was very difficult to rely on traditional navigation during flight. For example, when landing from west to east, only visual approach was possible, and course reversal and diversion occurred quite often, which have severely restricted the development of airport and the operation of airlines.

1.2.2 In order to address the operational challenges such as special terrain and high plateau, as well as to improve the viability of flight procedures, the principles under which the flight procedures are designed, is diverted from the existing design principles of flight procedures contained in *Aircraft Operations* (Doc 8168). And even compared with the *Required Navigation Performance Authorization Required (RNP AR) Procedure Design* Manual (Doc 9905) that was later published by ICAO specifically for the design of the RNP AR flight procedures, there were still many deviations.

1.3 **Rapid implementation and application of airlines customized RNP AR in China**

1.3.1 After the success of RNP AR at Lhasa Airport, CAAC vigorously promoted its application across China and encouraged airlines to conduct RNP AR operations at airports with significant safety and operational benefits like Lhasa Airport. There were many high plateau airports that followed suit, such as Linzhi Airport, Yushu Airport and Shigatse Airport.

1.4 **Problems encountered in the implementation of customized RNP AR**

1.4.1 Since an increasing number of airlines are willing to operate RNP AR at special airports like Lhasa Gonggar Airport, the shortcomings of customized RNP AR procedures have become increasingly obvious. The original concept of RNP AR procedures was to target on special approvals of specific aircraft and crews, with airlines taking the responsibilities of the procedures. And because RNP AR procedures designed by different airlines have various naming of paths and waypoints, they were always costly and time consuming and likely to be mixed up in air traffic control and command, and also brought forth a huge workload for procedure design, inspection, validation and approval.

1.5 **The first practice of public RNP AR with focus on airports**

1.5.1 The repeated design and case-by-case certification of customized RNP AR procedures have hindered their popularization. In order to make a change of this situation, CAAC decided to implement public RNP AR procedures with focus on Jiuzhai Huanglong Airport. The horizontal flight paths, minimum obstruction clearance altitude of segments, segment control points and decision points of public procedures at Jiuzhai Airport were designed in a unified manner, and the liability subject was shifted to the airport. RNP AR procedures have enabled Jiuzhai Airport to realize double direction landing, and saved 30 million yuan for efforts in obstacle clearance, and the flight regularity rate increased by 13.9 per cent comparing with that of last year, reaching 90.4 per cent.

1.6 **The formation of the management concept of Chinese public RNP AR flight procedures.**

1.6.1 With airlines and air traffic control building up operational capabilities and accumulating operational experience during the application of the RNP AR procedures, CAAC has formed a new set of

management concept: popularizing public RNP AR procedures, and separately managing RNP AR procedures, aircraft capabilities, and the qualifications of flight crew. If airlines utilize the public RNP AR procedures announced by the airport, the validation process is no longer required; if it is not clearly stated, the aircraft does not need to validate. If pilots have relevant experience, then specific training is not needed even if an RNP AR procedure is added in the airport. These have greatly eased the operation of RNP AR procedures. Of course, CAAC still pays close attention to safety. If RNP AR procedures diverge from the specifications or require special skills, airlines still need to take relevant measures.

1.7 Specific practices of public RNP AR management in China

1.7.1 The flight paths of China's public RNP AR flight procedures are developed, optimized and verified by airports and they will gain approval from CAAC, after which the procedures will be provided to all the operators at the airport. This greatly simplifies the approval process, the implementation and application, and increases operational efficiency.

1.7.2 The operator's customized operating standards and charts, etc., are approved one by one according to the different types of operators and models. For a new operator who has never had an RNP AR operation, there is no room for further simplification. For those operators who are already running RNP AR, the focus is solely on the differences that have not yet been approved.

1.7.3 For adding new operational models at the same airport, the difference of three major systems that might have an impact on RNP AR operations will be simplified according to the table below:

Difference of configuration and recommended inspection and validation methods

Difference of configuration	Recommended inspection and validation methods
Different flight management systems (FMS)	Simulator validation
Different terrain warning systems (TAWS, e.g. T3CAS, EGPWS)	Simulator validation
Different engine types	Performance analysis check

2. DISCUSSION

This paper encompasses the following topics: a) management concept of public RNP AR in China; b) the specific practice of public RNP AR in China; and c) simplification of Chinese public RNP AR in operational approval.

3. CONCLUSION

3.1 The Conference is invited to:

a) take note of the simplification of the operational validation process of Chinese public RNP AR contained in this paper; and

b) recommend the management concept of Chinese public RNP AR and amend the relevant parts of the *Performance-Based Navigation (PBN) Operational Approval Manual* (Doc 9997).

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