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**Agenda Item 6: Any other business**

**AIRSPACE, AIRPORTS, AND “GREEN” PROCEDURES,  
A COMMITMENT OF THE DGCA OF CHILE**

(Presented by Chile)

**SUMMARY**

The purpose of this working paper is to describe the action taken regarding the implementation of air navigation procedures based on environmentally sustainable, less polluting, and more efficient criteria.

**1. Background**

1.1 The ICAO vision of promoting a safe, protected, and sustainable development of civil aviation is accomplished through the attainment of the strategic objectives set for the 2005-2010 period.

One of the Strategic Objectives is “C”: **Environmental Protection.**

This Objective is met by minimising the environmentally negative effects of global air navigation, particularly noise and aircraft engine emissions, through the following measures:

- a) Develop, adopt and promote new or amended measures in order to:
  - limit or reduce the number of people affected by significant levels of noise produced by aircraft;
  - limit or reduce the impact of aircraft engine emissions on local air quality; and
  - limit or reduce the repercussions of greenhouse gases on the global climate.
- b) Cooperate with other international bodies, particularly the United Nations Framework Convention on Climate Change, in the work on the contribution of aviation to global climate change.

1.2 GREPECAS/14 defined and approved the ATM Performance Objectives, supported by a set of Global Plan Initiatives, which include the optimisation of the ATS route structure in terminal and en-route airspace and the implementation of RNP approaches, which will result in benefits in the areas of environmental protection, efficiency, and safety.

1.3 Of the 11 expectations of the ATM community, two are related to the environmental aspects of the ATM operational concept:

a) Capacity

The global ATM system should make use of the inherent capacity to meet the demand of airspace users in peak traffic hours and locations, while minimising restrictions on traffic flows. In order to meet future growth, capacity should be enhanced together with efficiency, flexibility, and predictability, while ensuring that there is no negative impact on safety, paying due attention to the **environment**. The ATM system must not be affected by service disturbances and the resulting temporary loss of capacity.

b) Environment

The ATM system should contribute to environmental protection, paying attention to noise, gas emissions, and other environmental issues during the implementation and operation of the global ATM system.

## 2. Discussion

2.1 The VISION of the General Directorate of Civil Aeronautics of Chile is to become an intelligent public service, capable of anticipating technological change, seeking excellence in the provision of services and customer service.

2.2 The DGCA, in its Strategic Plan for 2008-2012, sets forth an Environmental Policy aimed at “promoting the environmental sustainability of the national aeronautical system development process, in order to ensure continuous improvement of the quality of life of the community.” This policy is contained in **Appendix A** to this working paper.

2.3 The following environmental measures have been implemented with respect to airports:

2.3.1 ISO 14.001- 2004 certification: The Carriel Sur aerodrome in Concepción, located 800 km south of Santiago, was certified in view of its condition as alternate aerodrome to the Santiago airport, and in order to establish an Environmental Management System (EMS) model to be applied at the other aerodromes of the country starting in 2008.

The cited aerodrome EMS covers all the areas of responsibility of the DGCA, defining environmental programmes and goals.

2.3.2 The State of Chile, through its environmental control body, the National Environmental Commission, has established a series of environmental obligations for the Arturo Merino Benítez airport, including:

- a) Air quality control in airport surroundings through a gas monitoring station that measures the following parameters: Carbon oxide (CO), nitrogen oxide (NO), ozone, volatile organic compounds (VOC), PM10 and PM2.5 particulates.
- b) treatment of all waste waters generated at the airport, including those produced in the aircraft.

- c) Control and disposal of all household solid wastes.
- d) Control, treatment, and disposal of solid wastes produced by aircraft loading and unloading operations.
- e) Control of noise caused by aircraft, through the implementation of operational measures at the airport, such as banning runway use at night (17R/35L), restricting the use of engine brakes (because of the close distance between human settlements and runway 17R/35L).

2.4 In the field of air navigation, several operational measures have been implemented based on the DGCA environmental policy and ICAO environmental goals:

A) RNP AIRWAYS:

The implementation of RNP 10 in parallel RNAV routes UL 780 and UL 302 (Santiago-Lima corridor), between FL 290 and FL 410, as of January 2005, has resulted in:

- enhanced air traffic management, increasing available airspace in this segment two-fold
- an additional two-fold increase in this capacity through RVSM implementation
- more frequent flights
- reduced emission of greenhouse gases.

B) MINUTE-SAVING COMMITTEE

In 2006, Chile began a “MINUTE CAMPAIGN” aimed at reducing minutes of flight time through airspace and route management and control procedures.

- 2006, 1<sup>st</sup> campaign - 39.000 minutes saved.
- By late 2007, **100.000 minutes** had been saved.
  - For example, an A-319 burns 41 kg of fuel per minute; thus, in 100.000 minutes, **12.935 tons of CO<sub>2</sub> have not been released** to the air.
  - For 2008, a savings of 35.000 additional minutes is foreseen.

It is estimated that 1 kg of burnt jet fuel produces 3,155 kg of CO<sub>2</sub> (Hanyo Vera)

C) PACIFIC OCEAN ROUTES

The use of UPRs (User Preferred Routes) has been introduced, with maximum savings obtained in the Santiago –Auckland segment.

In order to get a idea of the benefits derived from this implementation, flight data were collected from LAN, between 14 January and 28 February 2008:

- a) 46 flights were carried out and the company reportedly obtained an average reduction of 10.8 minutes per flight.

$46 \times 10.8 = 496.8$  minutes less of flight time during the period  
 $496.8 \times 3.155 = \mathbf{1.567,4}$  tons of CO<sub>2</sub> were not released to the air.

- b) In a one-year projection, it is estimated that, in the Santiago- Auckland segment alone, **12.437 tons of CO<sub>2</sub> will not be released to the air.**

Regarding this route, an RNAV oceanic departure is being developed to optimise departures from the Arturo Merino Benítez airport towards a point where the UPRs originate, together with an RNAV STAR oceanic route to optimise the entry to the Santiago TMA from the ocean.

This will mean optimum flight profiles in the incoming and outgoing phases, generating fuel savings and thus reducing CO<sub>2</sub> and noise emissions.

## 2.5 SUPPLEMENTARY INITIATIVES OF A USER TO BENEFIT THE ENVIRONMENT

As a result of the DGCA (Minute-Saving Committee) initiatives:

- Adjustments were made in departure, direct approach, and taxiing procedures, which resulted in a reduction of emissions of approximately 1.500 tons of CO<sub>2</sub>.
- Towbarless tractors were added to operations between the maintenance station and the SCL airport, which will result in yearly savings of 300 thousand gallons of fuel/2,870 tons of CO<sub>2</sub>.

These initiatives, in addition to others such as the paperless cockpit, one-engine taxiing, flaps 3 APP, crew rest, weight reduction, installation of winglets on some aircraft, washing of engines, fan blade cleanup, and reduced use of APU, are part of the fuel saving programme of this holding, which will result in approximately 210,000 tons of CO<sub>2</sub> not released into the air.

## 2.6 USE OF SATELLITE SYSTEMS

Changes made in airspace design in Chile have permitted a better air traffic management and a greater use of GNSS.

The airway network in Chilean airspace includes:

- 22 RNAV airways* in the upper airspace.
- 12 RNAV airways* in the lower airspace.

### **RNAV/GNSS procedures in terminal areas and non-precision approaches**

*RNAV/GNSS approach procedures* are being applied in:

- Antofagasta
- Balmaceda
- Santiago A. Merino Benítez
- Puerto Montt
- Punta Arenas

**Appendices B** and **C**, respectively, contain RNAV-GNSS approach charts for Carlos Ibañez del Campo airport (southernmost part of Chile) and RNP approach charts for the La Florida de La Serena aerodrome (near north).

## 2.7 ENVIRONMENTAL CHALLENGES FOR THE PERIOD 2008 – 2012

### 2.7.1 AT THE AIRPORT

2.7.1.1 ISO 14.000-2004 certification: The DGCA has committed to certify airports under the ISO 14.001-2004 standard with respect to the environment. To that end, there will be a pre-certification in 2009 to identify existing gaps and define the action to be taken in order to obtain the environmental certification, which would take place in 2010.

2.7.1.2 Monitoring of airport activities: To supplement the above, the activities of users at the airport which might affect airport processes that have received environmental certification will be monitored, and national environmental legislation applicable to aeronautical concessionaires will be enforced.

### 2.7.2 AIR NAVIGATION

- Implementation of the PBN concept
- Studies for the implementation of a ground-based augmentation system (GBAS).
- Establishment of precision procedures in airport terminal areas.

### 2.7.3 SURVEILLANCE

- ADS-C: Operational implementation in the oceanic sector
- ADS-B: Under study for implementation

## 2.8 SANTIAGO DECLARATION

Within the context of IATA seminar “Wings of Change”, carried out during FIDAE 2008, the aeronautical authorities of the region and commercial air organisations signed the Santiago Declaration: The Environment and Aviation, in support of the initiatives being put into practice for environmental protection.

In a ceremony that reckoned with the participation of Roberto Kobeh, President of the ICAO Council, Giovanni Bisignani, General Director and CEO of IATA, Patricio Sepúlveda, president of the IATA Latin American Regional Office, Eustacio Fábrega, president of LACAC; Pedro Heilbron, president of ALTA, and Bruno Ardito, manager of corporate relations of LAN, José Huepe Pérez, General Director of Aeronautics of Chile read the document, which was then signed by all the participants of the seminar “Wings of Change”.

**Appendix D** to this working paper contains a copy of the “Santiago Declaration”.

## 3. Suggested action

3.1 The Meeting is invited to take note of the information provided herein, and the States are requested to renew their efforts and initiatives towards environmental protection, paying attention to noise, gas emissions, and other environmental issues.

## **APPENDIX A**

### **DGCA STRATEGIC PLAN FOR THE PERIOD 2008 – 2012** **“ENVIRONMENTAL POLICIES”**

The DGCA, aware of the special importance environmental issues have acquired in recent times, particularly in the development of the air transport system and its implications for adjacent communities, has undertaken to responsibly improve, effectively and efficiently, its relationship with the environment and respect for nature.

#### **I. OBJECTIVE**

Promote the environmental sustainability of the national aeronautical system development process and, with it, ensure the continuous improvement of the quality of life of the community.

#### **II. FOUNDATIONS**

- A. Concern about the quality of life of members of communities adjacent to the airports and aerodromes and of the personnel carrying out their activities in those airports.
- B. Complementary relationship between environmental sustainability and development of the national aeronautical system.
- C. Compliance with environmental control standards established by national environmental and sanitary authorities and consideration of the international recommendations issued by the International Civil Aviation Organization (ICAO).

#### **III. SPECIFIC POLICIES**

- A. The implementation of an Institutional Environmental Management System will have primary importance, inasmuch as it will provide for a structured, documented system in line with the standards issued by the environmental authority that will make it possible to reach the pre-established environmental objectives and goals. This system will be subject to periodic review and to the continuous improvement of each of the processes involved in the installation, operation and maintenance of airport aeronautical and ground services.
- B. The full participation of all organisations interested in the environmental improvement of the airports and aerodromes under DGCA management and their adjacent areas is essential for the success of any environmental programme that may be established. In this connection, an effort will be made to incorporate the community in environmental issues affecting the development of the national aeronautical system, with a view to obtaining its harmonious and sustainable development.
- C. The issuing and application of standards, procedures and recommendations for environmental protection with regard to aeronautical activity is a responsibility of the central level. However, the participation of all actors in the national aeronautical system should be encouraged.

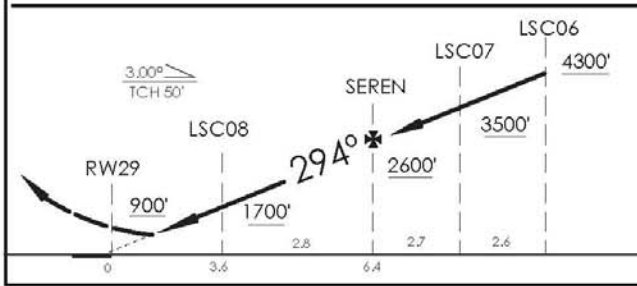
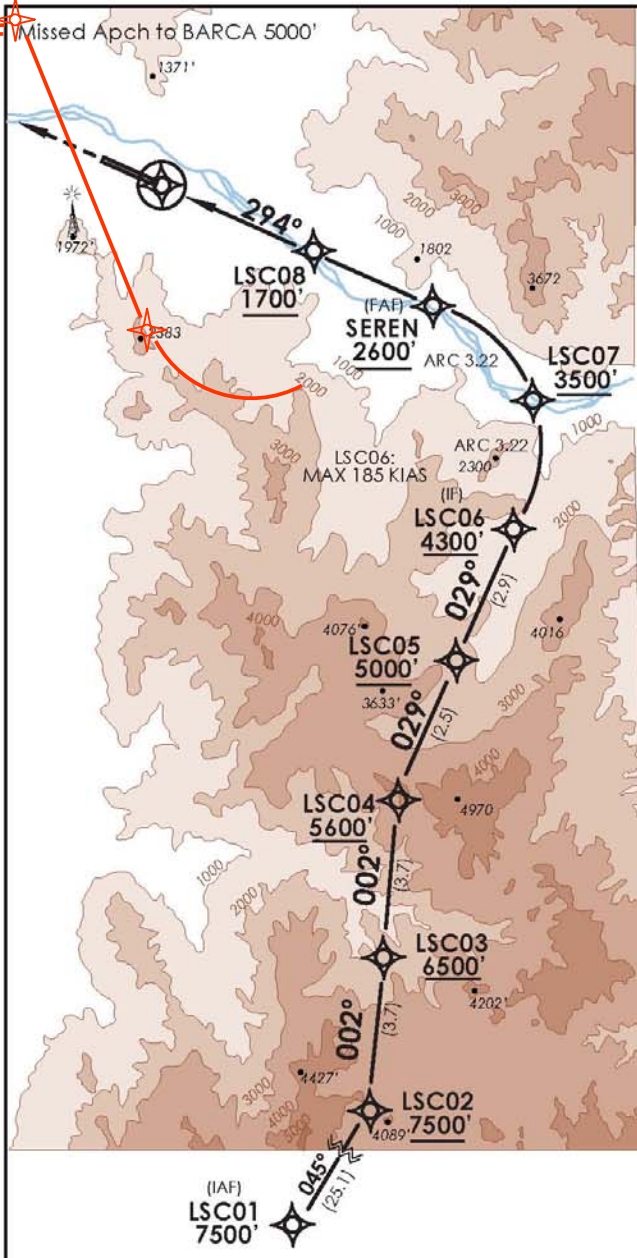
- D. The training of those involved in the national aeronautical system will be sought, with a view to setting up a team that can implement, maintain and review actions taken to comply with environmental regulations and to preserve the environmental heritage.
- E. Environmental Sustainability will be expressed in the respect for physical limits in the use of renewable and non-renewable natural resources. In this connection, it is necessary to raise the awareness of personnel of the importance of environmental protection, so that provisions regulating this aspect and those issued in the future are understood, respected and accepted.
- F. Preventive activities or the anticipation of negative effects caused by aeronautical activity must be a matter of continuing concern to the people responsible for such matters in the different DGCA organisations.
- G. Environmental protection standards defined by national and international organisations that should be adopted by members of the national aeronautical system should be identified, applied and reviewed.
- H. Consideration will be given to participating actively in national and international bodies with regard to the study and implementation of initiatives that will make it possible to improve environmental conditions in the delivery of airport aeronautical and ground services.

**APPENDIX B**

**RNAV-GNSS APPROACH CHART CARLOS IBAÑEZ DEL  
CAMPO AIRPORT (SOUTHERN AREA OF CHILE)**



**SCSE / LSC  
 LA SERENA RWY29 VISUAL RNP TEST**



RF required

Final Segment  
 RNP 0.15

Initial Segment  
 RNP 0.4

Intermediate  
 RNP 0.4

Segmento Final  
 GP 3°  
 PAPI 3°

DA/H 900(419)  
 THR29 481'

RDR 128.1  
 TWR 118.6

LSC01 15NM S  
 from TOY

Based on FAA  
 Order 8160.52

REV 1 04/07

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