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WORKING PAPER

ASSEMBLY — 39TH SESSION

TECHNICAL COMMISSION

Agenda Item 35: Aviation safety and air navigation standardization

UPDATE ON THE DEVELOPMENT OF HALON ALTERNATIVES FOR AIRCRAFT FIRE EXTINGUISHING SYSTEMS

(Presented by the Council of ICAO)

EXECUTIVE SUMMARY

The 38th Session of the Assembly directed the Council to report to the next Ordinary Session of the Assembly on a timeframe for the replacement of halon in cargo compartment fire suppression systems.

In October 2015, an international halon replacement coordinating meeting was held with regulators, international organizations and industry to discuss the status of halon replacement, reserves, contamination, and future activities related to halon replacement in aircraft fire suppression systems. The meeting also focused on the establishment of a timeframe as specified in the 38th Assembly Resolution on replacement of halon in cargo compartment fire suppression systems (A38-9, refers). As a result of the meeting, a new timeframe is proposed in the attached amended draft resolution.

Action: The Assembly is invited to review this report and adopt the Resolution on halon alternatives to supersede Resolution A38-9, as contained in the appendix.

Strategic Objectives:	This working paper relates to the Safety Strategic Objective.
Financial implications:	The activities referred to in this paper will be undertaken subject to the resources available in the 2017-2019 Regular Programme Budget and/or from extra budgetary contributions.
References:	Doc 7300, *Convention on International Civil Aviation* Doc 10022, *Assembly Resolutions in Force* (as of 4 October 2013) State letter AN 3/25.1-16/6

1. INTRODUCTION

1.1 This paper provides an update on the development of halon alternatives for aircraft fire suppression systems and proposes a new timeframe for the replacement of halon in cargo compartments in compliance with Assembly Resolution A38-9.

2. DISCUSSION

2.1 The production of halon has been prohibited and halon supplies are diminishing. Although halon is currently available for aircraft use by recycling existing supplies and States have taken measures to mitigate contamination, the potential risk of contamination of the reserves still remains. In recognition of these issues and their potential impact on safety, transitioning in a timely manner from halon to safe and effective halon alternatives has now become urgent.

2.2 Presently, halon is used for fire suppression on civil aircraft in four extinguishing system applications i.e.: lavatory, cabin, engine nacelle and APU, and cargo compartment. The International Aircraft Systems Fire Protection Working Group (IASFPWG) developed Minimum Performance Standards (MPS) for all four affected aircraft applications; alternative agents that meet these MPS are already commercially available for three of the applications.

2.3 Provisions in Annex 6 — *Operation of Aircraft* and Annex 8 — *Airworthiness of Aircraft* establish the timeframe for the use of an alternate agent to halon for fire suppression on aircraft in three of the four fire extinguishing applications as follows:

a) lavatory fire extinguishing systems used in aircraft produced on or after 31 December 2011;

b) hand-held fire extinguishers used in aircraft produced on or after 31 December 2016; and

c) engine nacelle and auxiliary power unit (APU) fire extinguishing systems used in aircraft for which application for type certification will be submitted on or after 31 December 2014.

2.4 ICAO held two International Halon Replacement Coordinating Meetings (IHRCMs) in conjunction with IASFPWG meetings in October 2014 and October 2015. The meetings were attended by State regulators, international organizations, aircraft and fire suppression manufacturers. Among the issues discussed was the status of potential halon alternatives[1] for cargo compartments. During the meeting of October 2015, the International Coordinating Council of Aerospace Industries Associations (ICCAIA) reported that based on industry expectations, a cargo compartment halon replacement system would be available for new aircraft type designs in approximately nine years. Based on this expection, ICCAIA recommended a 2024 timeframe for the replacement of halon for new aircraft type design.

2.5 During the same meeting, the United Nations Environment Programme (UNEP) Halon Technical Options Committee (HTOC) reported that based on their model of existing recycled halon, the

[1] The reference material "Updates on the development of halon alternatives for use in aircraft fire extinguishing systems" is available at http://www.icao.int/Meetings/a39/Pages/documentation-reference-documents.aspx in English only.

estimated size of the global halon banks in 2014[2] was: halon 1211-33 000 metric tonnes (MT); halon 1301-43 000 MT; and halon 2402-9 000 MT.

2.6 In support of Resolution A38-9, the Secretary General issued State letter AN 3/25.1-16/6, dated 1 February 2016, requesting information on halon reserves accessible to the civil aviation industry within each State to support future operations.

2.7 Forty-four States and one international organization replied to the State letter. Most States were unsure if their halon reserve would suffice for the aviation needs of their State, while others responded that their aviation industry relies on outside sources to provide the required halon.

2.8 The limited number of replies gives evidence that States do not know how much halon reserves are available to civil aviation. The UNEP estimates of existing recycled halon are therefore the most reliable figures that can be used.

2.9 Based on the most optimistic scenario, recycled halon quantities would no longer be sufficient to support civil aviation needs by 2046. The optimistic assumptions were based on the amount of halon left in the global supplies — these were reported to be 17 000 MT — and the lowest annual emission rate of approximately 2.5 per cent. Applying the least optimistic assumptions, recycled halon quantities would no longer be sufficient to support civil aviation needs by 2034. The least optimistic assumptions were based on the reported 14 000 MT of halon left in the global supplies to support civil aviation and the highest annual emission rate of 7 to 8 per cent.

3. CONCLUSION

3.1 Halon replacement will continue to require the full cooperation and coordination of all stakeholders to advance the development of viable alternative agents. To this end, ICAO will continue to collaborate with all stakeholders to develop solutions.

3.2 It is recommended that ICAO consider mandating the replacement of halon in cargo compartments of civil aircraft for which a new application for Type Certification has been submitted on or after 31 December 2024. This timeframe would allow enough time for the manufacturers to transition to a non-halon alternative for new aircraft type designs and for States to certify such aircraft.

3.3 The procurement of halon is exclusively from recovery, reclaiming and recycling of halon and as halon reserves decline, it is expected that the rising cost of halon will provide a market incentive which, combined with the regulatory mandate, will drive industry to accelerate the transition to non-halon alternatives as well as to minimize waste of existing reserves. The continued industry-led efforts to achieve common solutions and realistic timeframes are worthy of recognition and support.

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[2] The reference material “Global inventories of halon” is available at http://www.icao.int/Meetings/a39/Pages/documentation-reference-documents.aspx in English only.

APPENDIX

DRAFT RESOLUTION FOR ADOPTION BY THE 39TH SESSION OF THE ASSEMBLY

Resolution 35/xx: Halon replacement

Recognizing the importance of aircraft fire extinguishing systems to the safety of flight;

Recognizing that halogenated hydrocarbons (halon) have been the main fire extinguishing agent used in civil aircraft fire extinguishing systems for over fifty years;

Whereas halons are no longer being produced by international agreement because their release contributes to ozone-depletion and climate change;

Recognizing that more needs to be done because the available halon supplies are decreasing and unsure and that the environmental community continues to be concerned that halon alternatives have not been developed for all fire extinguishing systems in civil aircraft;

Recognizing that the Minimum Performance Standard for each application of halon has been developed already by the International Aircraft Systems Fire Protection Working Group with participation by industry and regulatory authorities;

Recognizing that there are stringent aircraft-specific requirements for each application of halon that must be met before a replacement can be implemented;

Recognizing that the aircraft manufacturing industry has established mechanisms for stakeholder engagement in the development of common solutions for halon replacement in ~~engine/auxiliary power unit (APU) fire suppression applications and~~ a realistic timeframe for ~~such replacement in~~ cargo compartment applications;

Recognizing that the production is prohibited by international agreement, halon is now exclusively obtained from recovery, reclaiming and recycling. Therefore, recycling of halon gas needs to be rigorously controlled to prevent the possibility of contaminated halon being supplied to the civil aviation industry; and

Recognizing that any strategy must depend on alternatives that do not pose an unacceptable environmental or health risk as compared to the halons they are replacing;

The Assembly:

1. *Urges* States and their aviation industries to intensify development and implementation of acceptable halon alternatives for fire extinguishing and suppression systems in aircraft cargo compartments~~ and engine/auxiliary power units, and to continue work towards improving halon alternatives for hand held fire extinguishers~~;

2. *Urges* States to determine and monitor their halon reserve and quality of halon;

3. *Encourages* ICAO to continue collaboration with the International Aircraft Systems Fire Protection Working Group and the United Nations Environment Programme's Ozone Secretariat through its Technology and Economic Assessment Panel's Halons Technical Options Committee on the topic of halon alternatives for civil aviation;

4. *Encourages* States to collaborate with the Industry Consortium for engine/APU applications and the Cargo Compartment Halon Replacement Working Group established by the International Coordinating Council of Aerospace Industries Associations;

5. *Encourages* States to support measures to minimize unnecessary halon emissions that occur when there is an absence of any safety threatening fire event and to ensure the better management and preservation of existing halon reserves;

~~5. *Urges* States to inform ICAO regularly of their halon reserves and directs the Secretary General to report the results to the Council;~~

6. *Directs* ~~that~~ the Council to mandate ~~shall report to the next ordinary session of the Assembly on a timeframe for~~ the replacement of halon in cargo compartment fire suppression systems used in aircraft for which application for type certification will be submitted after a specified date in the 2024 timeframe; and

7. *Declares* that this resolution supersedes Resolution ~~A37-9~~A38-9.

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