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ASSEMBLY — 38TH SESSION

TECHNICAL COMMISSION

Agenda Item 31: Aviation Safety — Emerging Issues

HALON REPLACEMENT – CHALLENGES AND SOLUTIONS

(Presented by the International Coordinating Council
of Aerospace Industries Associations)

EXECUTIVE SUMMARY

Action has been taken by the aerospace industry to introduce halon alternatives for fire suppression in aircraft and engage with all relevant stakeholders to find solutions. The industry has been active in researching halon alternatives and in working with suppliers and regulatory agencies to address all associated safety, environmental, and operational requirements. Mechanisms for broad stakeholder engagement, essential to achieve safe, environmentally responsible and cost-effective solutions for replacement of halon, have been established. Although good progress has been made, implementation of halon replacement in engine/APU fire suppression applications is dependent upon further testing and certification by regulatory authorities. While challenges remain for cargo compartment fire suppression applications, a concerted effort is underway to determine a realistic target date for halon replacement in good time for the 39th Session of the Assembly in 2016.

Action: The Assembly is invited to:

a) *recognize* the mechanisms established by the aerospace industry for stakeholder engagement in the development of common solutions for halon replacement in engine/APU fire suppression applications and a realistic timeframe for such replacement in cargo compartment applications; and
b) *include* two additional clauses, as contained in the Appendix, when adopting the Resolution on halon replacement presented in A38-WP36, TE/2.

Strategic Objectives:	This working paper relates to Safety, and Environmental Protection and Sustainable Development of Air Transport Strategic Objectives
Financial implications:	See A38-WP/36,TE/2
References:	Doc 9958, *Assembly Resolutions in Force* (as of 8 October 2010) A38-WP/36, TE/2

1. NEED FOR HALON REPLACEMENT

1.1 The aviation industry has long recognized the need for replacement of halon with safe, reliable and effective alternative agents that do not pose undue environmental or health risks. In fact, the aviation industry is committed to applying environmentally progressive solutions in all its products, services and operations. The industry has expedited research and development on halon alternatives for its various aircraft applications since the late 1990s, and is actively promoting cooperation among all stakeholders to arrive at cost-effective and safe solutions for halon replacement in different applications.

1.2 As the industry works to meet the mandates for implementing halon replacements, there are multiple requirements that must be considered and balanced. Adequate time is required to ensure aircraft safety, design, testing, qualification, in-service reliability and certification standards can be met for all planned halon replacement applications. Suitable halon replacements have not yet been identified for cargo compartment and engine/APU applications that meet other current and potential environmental requirements, are technically achievable, and are economically reasonable.

1.3 There are multiple requirements that must be considered and balanced, including effectiveness, environmental trade-offs, installation and operational impacts of alternatives. Some elements of these factors are under the purview of national regulatory agencies and not within industry control.

2. HALON ALTERNATIVES

2.1 Lavatory systems

2.1.1 Industry is implementing halon replacements in lavatory waste receptacle fire extinguishers in new aircraft. It should be noted that while implementation of alternatives in new aircraft was almost a simple “drop-in” replacement, it still required several years for OEMs to ensure that a replacement met all safety, performance and certification requirements for aircraft installation once the alternative underwent successful FAA minimum performance standards (MPS) testing.

2.2 Hand-held fire extinguishers

2.2.1 Industry has committed to phase out halon for handheld fire extinguishers in line with the dates published in ICAO Annexes 6 and 8. However, there are numerous challenges ahead, like size and weight of replacement extinguishers requiring adapted cabin design, extinguishing procedures and crew training. As noted in A38-WP/36, development and testing are underway for a promising replacement agent, 2-bromotrifluoropropene (BTP). Extensive toxicology and environmental testing, environmental agency approvals, extinguisher design and supplier qualifications are still in-work. Despite the number of different stakeholders having to do their part, in coordinating and timing the different activities, we are optimistic that the 31 December 2016 deadline can be met.

2.3 Engine and APU

2.3.1 In 2010, ICCAIA agreed with the proposed 2014 timeframe for engine and APU halon replacements. Although it was noted that “no alternatives have yet been fully tested, certified and implemented on commercial transport aircraft,” two promising agents were being developed by fire protection system suppliers. Both agents successfully passed FAA’s MPS testing (Novec1230 in 2006, a

powder agent in 2011). However, while both were being considered for certification approval, the FAA required additional testing to address concerns unique to the physical properties of these agents: one a liquid agent subjected to cold storage fire testing conditions; the other a dry chemical agent subjected to a full scale live engine fire test (July 2012). Both agents, unfortunately, did not perform as expected during these additional tests.

2.3.2 Since that time, the aircraft manufacturers are continuing to monitor and support the candidate/system suppliers but are dependent on those suppliers and the FAA to address the testing results and to determine the next steps. No schedule has been provided on when the situation will be resolved.

2.3.3 In the meantime, investigation on other agents has re-opened and information has been solicited from over fourteen different suppliers on other possible candidates. It has to be noted that none of these possible candidates have yet successfully passed FAA MPS testing. Moreover, the suppliers of any new agent will have to demonstrate that all other performance, certification, and environmental requirements can be met. This will take coordination with FAA, other governmental agencies, and other stakeholders such as the engine manufacturers, aircraft operators, etc. Based on the experience of the previous two candidates which have been under investigation for several years, the industry is not optimistic that any known agent will be certification ready to meet the 31 December 2014 date. As this date pertains to an aircraft type for which an application for a type certificate is submitted to the State of Design, sufficient additional time should be available after this date for actual implementation of non-halon engine and APU fire suppression systems, pending certification by regulatory authorities.

2.3.4 To address the remaining challenges, in early 2013 the major transport airplane manufacturers agreed to cooperate in an Industry consortium to bundle stakeholders' efforts and resources to identify a generic "best choice" for a fire extinguishing agent and system.

2.4 **Cargo compartment**

2.4.1 In November 2012, ICCAIA reiterated its position that it was still premature to specify timeframes for cargo compartment applications. However, that does not mean that transport airplane OEMs are not assiduously working with potential suppliers for halon alternatives for cargo compartments. One of the aircraft manufacturers is sponsoring research by the US National Institute of Standards and Technology (NIST) to understand the physical and chemical properties necessary for passing the FAA's MPS aerosol can test. Interim results have been shared previously at both the FAA International Fire Protection Systems Working Group and ICAO International Halon Replacement Coordinating Meetings (IHRCM) in 2011 and 2012.

2.4.2 In the November 2012 IHRCM, it was accepted that it was premature to fix deadlines for halon replacement in cargo compartments. There was still no halon-free fire suppression agent and system which would satisfy in parallel environmental, fire-fighting and aviation safety requirements. ICCAIA offered to coordinate research and development activities, involving all affected stakeholders.

2.4.3 In early 2013, ICCAIA established the Cargo Compartment Halon Replacement Working Group (CCHRWG) involving fire suppression system and agent suppliers, authorities and research institutions to develop a recommendation for a cargo compartment halon replacement deadline, applicable for new aircraft types. While the aircraft OEMs fully support the CCHRWG, involvement of further industry stakeholders requires proper consideration of intellectual property and competition aspects. The CCHRWG, driven by the aircraft OEMs, Authorities and research community, is committed to deliver its recommendation in good time for the 2016 ICAO Assembly.

3. STAKEHOLDER ENGAGEMENT

3.1 Halon replacement will continue to require full cooperation of all stakeholders and coordination to achieve uniform and orderly implementation of optimal alternative solutions for engine/APU and cargo compartment systems that provide adequate technical performance, certification, and long-term environmental benefit. To this end, the Industry consortium (paragraph 2.3.4) and CCHRWG (paragraph 2.4.3) provide the requisite basis for addressing the remaining challenges and developing such solutions.

4. CONCLUSION

4.1 The aircraft manufacturing industry has established mechanisms for stakeholder engagement, essential to achieve safe, environmentally responsible and cost-effective solutions for replacement of halon. While much work has been done, implementation of halon replacement in engine/APU fire suppression applications is dependent upon further testing and certification by regulatory authorities.

4.2 While challenges remain for cargo compartment fire suppression applications, a concerted effort involving all stakeholders under ICCAIA leadership is underway to determine a realistic target date for halon replacement in good time for the 39th Session of the Assembly in 2016.

4.3 The industry-led efforts to achieve common solutions and realistic timeframes are worthy of recognition and collaboration/support by States. To this end, two additions to the draft Resolution in A38-WP/36, TE/2 are proposed at the Appendix.

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APPENDIX

PROPOSED ADDITIONS TO DRAFT RESOLUTION TO SUPERSEDE RESOLUTION A37-9 FOR ADOPTION BY THE 38TH SESSION OF THE ASSEMBLY (AS PRESENTED IN A38-WP/36, TE/2)

Resolution 38/x: Halon replacement

Proposed additional clause to be inserted after the sixth preambular clause (*Recognizing*…):

> "*Recognizing* that the aircraft manufacturing industry has established mechanisms for stakeholder engagement in the development of common solutions for halon replacement in engine/APU fire suppression applications and a realistic timeframe for such replacement in cargo compartment applications;"

Proposed additional clause to be inserted after the third operative clause (*Encourages*…):

> "*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;"

— END —