



WORKING PAPER

ASSEMBLY — 37TH SESSION

TECHNICAL COMMISSION

Agenda Item 33: Halon replacement

HALON REPLACEMENT AND THE NEED FOR ADDITIONAL TIME

(Presented by the Council of ICAO)

EXECUTIVE SUMMARY

The production of halogenated hydrocarbons (halon), which have been the main fire extinguishing agent used in civil aircraft fire suppression systems, was banned in 1994 with the signing of the Montreal Protocol on Substances that Deplete the Ozone Layer. This was mainly due to its ozone depleting and global warming characteristics. Halon is still being widely used in civil aircraft fire suppression systems. The 36th Session of the Assembly, consequently, established timeframes for the gradual replacement of halon fire extinguishers for consideration by the Council.

In December 2009 a halon coordinating meeting was held with industry, State regulators and international organizations to review the current status of halon replacements, to look to the way ahead, and to discuss alternatives to halon. This meeting focused its work on the timeframes specified in Assembly Resolution A36-12: Halon replacement and on the viability of meeting those timeframes. As a result of the meeting, new timeframes are proposed in the form of an amended draft resolution.

Action: The Assembly is invited to review the modifications proposed and adopt the Resolution in the appendix, on halon replacement, to supersede Resolution A36-12.

<i>Strategic Objectives:</i>	This working paper relates to Strategic Objective A.
<i>Financial implications:</i>	Resources for the activities referred to in this paper are included in the proposed budget for 2011 to 2013.
<i>References:</i>	Doc 7300, <i>Convention on International Civil Aviation</i> Doc 9902, <i>Assembly Resolutions in Force</i> (as of 28 September 2007) State letter AN 3/25.1-10/2

1. BACKGROUND

1.1 At the 36th Session of the Assembly a proposal was presented requesting the Council to consider a mandate for the replacement of halon to be effective in the 2011 and 2014 timeframes and Resolution A36-12 — *Halon Replacement* was adopted.

1.2 As halon supplies are diminishing and the production of halon has been prohibited by international agreement, halon is mainly available for aircraft use by recycling existing supplies. The majority of the recycling centres are not regulated by State authorities and reports of contaminated halon have surfaced in Europe and in the United States.

2. ICAO PROVISIONS

2.1 Existing ICAO provisions for fire extinguishing systems on-board aircraft are contained in Annex 6 — *Operation of Aircraft* and Annex 8 — *Airworthiness of Aircraft*. The provisions are performance based and do not refer to a specific method or type of system or the fire suppression agent to be used. Consequently, halon is not specifically mentioned in the ICAO provisions. The certification and use of fire extinguishing/suppression systems and their agents are determined by State authorities.

3. CONTAMINATED HALON

3.1 A recent finding by a State civil aviation authority revealed that significant amounts of contaminated halon were being released to the aviation industry for use in fire fighting equipment. Based on these findings, the European Aviation Safety Agency (EASA) issued an emergency airworthiness directive and has subsequently issued four additional airworthiness directives to address contaminated halon in hand-held fire extinguishers. The United States Federal Aviation Administration (FAA) has also issued an airworthiness directive to address contaminated halon in hand-held fire extinguishers. To avoid any further occurrences in other Contracting States the Secretary General issued a State letter (AN 3/25.1-10/2) urging States to ensure their aviation industry utilize halon that has been recycled to an international or State-recognized performance standard.

4. VALIDATION OF HALON REPLACEMENT AGENTS

4.1 The International Aircraft Systems Fire Protection Working Group (IASFPWG), which was established to explore the viability of halon alternatives, continues to test halon replacement agents for use in aircraft. Once a halon replacement firefighting agent successfully completes testing, the next steps include aircraft design integration, manufacturing/production specification and incorporation, and development and implementation of a certification plan allowing the State civil aviation authority to evaluate the halon replacement firefighting system prior to issuing approval for installation on an aircraft.

5. DISCUSSION

5.1 Presently, several manufacturers have installed halon replacement agents for fire extinguishers in aircraft lavatory waste receptacles. The installation of a halon replacement lavatory system is considered to be a “drop in” replacement. The International Coordination Council of Aerospace

Industries Associations (ICCAIA) has reported that aircraft manufacturers are installing halon replacement lavatory fire extinguishers in new production aircraft and the 2011 halon replacement timeframe called for in Resolution A36-12 is attainable. Currently, halon replacement agents for hand-held fire extinguishers are available with a slight cabin design change (fitting) in order to properly secure the larger fire extinguisher bottle in the cabin. The present hand-held halon replacement agents have an average weight ratio to halon of 2 to 1. All of the current alternatives for hand-held fire extinguishers meet the minimum performance standards (MPS). Two agents have no ozone depletion potential (ODP) and the other has minimal ODP. All three alternatives have a global warming potential (GWP).

5.2 However, another halon replacement agent for hand-held fire extinguishers, which is reported to be neither a greenhouse gas nor an ozone depleting substance, is currently undergoing testing and is expected to be available for use by the aviation industry in 2016. The airframe manufacturers and the International Air Transport Association (IATA) requested additional time (until 2016) to thoroughly test and validate the applicable halon replacement agent. ICCAIA and IATA also indicated that should the halon replacement agent not be available by 2016, the aircraft manufacturers have agreed to put into service the current, approved hand-held halon fire extinguishing agents in order to meet the 2016 timeframe.

5.3 Halon replacement agents for engine nacelles/APUs have been successfully tested to minimum performance standards (MPS). Weight penalties exist and the replacements have a global warming potential but very little to no ODP. Even though the three alternatives have a GWP there is no prohibition on their use for aviation. Airbus has successfully tested an engine nacelle halon replacement agent against the MPS that has little to no weight or global warming penalties and no ODP. Additionally, Boeing is undergoing testing of an engine nacelle halon replacement agent and expects similar results. ICCAIA reported that it would be feasible for a halon replacement agent to be available for engine/APU fire suppression systems for aircraft for which a new application for type certification has been submitted after 2014.

5.4 A halon replacement coordinating meeting with State regulators, international organizations, aircraft and fire suppression manufacturers was held at ICAO from 1 to 3 December 2009 to review the halon replacement timeframes contained in Resolution A36-12 and to discuss the progress made by Contracting States regarding halon replacement. The purpose of the meeting was to assist the Secretariat in reviewing the current timeframes for the replacement of halon fire extinguishing agents in aircraft and discuss the need for amendment to the Annexes.

5.5 Following the halon replacement coordinating meeting, on 22 February 2010, ICCAIA, IATA, the United Nations Environment Programme (UNEP) and ICAO discussed the merits of a proposal by industry to delay the halon replacement timeframe for hand-held fire extinguishers in Resolution A36-12 to 2016. The halon coordinating meeting participants were contacted to comment on the industry proposal. While UNEP and the United States Environmental Protection Agency supported the proposal, the halon replacement coordinating group did not express its unanimous support.

5.6 At present, there is no viable halon replacement for cargo compartment fire extinguishing systems.

6. INDUSTRY FINANCIAL IMPACT

6.1 Minimal financial impact is anticipated for halon replacement in lavatories and hand-held fire extinguishers in new production aircraft as alternative fire extinguishing agents are currently

available. The hand-held fire extinguishers require larger bottles and a minor cabin modification is necessary to accommodate such bottles. Moderate financial impact is anticipated for halon replacement on engine nacelle and auxiliary power unit (APU) fire extinguishing systems after 2014 for new application type certificates. The financial impact for halon replacement in cargo compartment fire extinguishing systems is unknown as approved halon alternatives are not currently available.

7. CONCLUSIONS

7.1 The hand-held replacement halon alternative currently being tested by industry requires validation by MPS and State regulators. Industry has agreed to implement currently approved hand-held halon replacement agents for its fire extinguishers if the validation of the hand-held halon replacement agent being tested is not successful. Allowing the industry to validate a hand-held halon replacement agent that may result in little to no negative environmental impact merits consideration of a delay to 2016.

7.2 Additional time is needed for the development of halon replacement alternatives for engine/APU and cargo compartment fire extinguisher systems. Further research and development of viable halon alternatives for cargo compartments, as well as guidance material thereon, is also needed. As the source for halon replenishment of aircraft fire extinguishing systems comes from recycled halon, it will be necessary that halon reserves be monitored on a global basis. The industry is confident that viable replacements will be available to meet the timeframes put forth in the attached amended draft resolution which has been revised to direct that the Council “establish” a mandate as opposed to “consider” a mandate for replacements to halon as currently indicated in Resolution A36-12.

APPENDIX

DRAFT RESOLUTION FOR ADOPTION BY THE 37TH SESSION OF THE ASSEMBLY

Resolution 33/1: Halon replacement

Whereas halons contribute to climate change and are no longer being produced by international agreement because they are ozone-depleting chemicals, and have been used as fire-extinguishing agents in commercial transport aircraft for 45 years;

Recognizing that ~~much~~ more needs to be done because the available halon supplies are dwindling and ~~that~~ the environmental community ~~is becoming more~~ continues to be concerned ~~with the lack of substantive progress~~ that halon alternatives have not been developed for all fire extinguishing systems in aviation 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 production and import/export of halon is prohibited by international agreement, thus halon is mainly available by recycling existing supplies. Thus recycling of halon gas needs to rigorously controlled to prevent the possibility of contaminated halon being supplied to the aviation industry.

Recognizing that ~~while some progress has been made in developing a halon replacement for several aspects of aircraft operation, no real progress has been made in cargo compartment halon replacement, which is by far the largest application of extinguishing agent; and~~

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

Recognizing that while halon alternatives for lavatories are available, and that progress has been made in the development of halon alternatives in hand-held fire extinguishers, more work is needed in the development of halon alternatives for cargo compartment and engine/auxiliary power unit fire extinguishing systems, and that regular reviews are necessary to evaluate and understand the implication of potential halon alternatives on the industry and the environment.

The Assembly:

1. *Agrees* with the urgency of the need to ~~develop~~ continue developing and ~~implement~~ implementing halon ~~replacement~~ alternatives for civil aviation;

2. *Urges* States to ~~advise their aircraft manufacturers, airlines, chemical suppliers and~~ intensify development of acceptable halon alternatives for fire-extinguishing ~~companies to move forward at a faster rate~~ systems in ~~implementing halon alternatives in cargo compartments and engine and~~/auxiliary

power units, and to continue work towards improving halon alternatives for hand-held fire extinguishers and lavatories; and investigating additional halon replacements for engines/auxiliary power units, and cargo compartments;

3. ~~Requests that~~ *Directs* the Council ~~consider a mandate to~~ establish a mandate for the replacement of halon ~~to be effective applicable in the:~~

- In lavatory fire extinguishing systems used in aircraft produced after a specified date in the 2011 timeframe; ~~for the replacement of halon in: lavatories for new production aircraft; and~~
- In hand-held fire extinguishers used in aircraft produced after a specified date in the 2016 timeframe; and ~~lavatories, hand-held extinguishers, engines and auxiliary power units for aircraft for which a new application for type certification has been submitted.~~
- In engine and auxiliary power unit fire extinguishing systems used in aircraft for which application for type certification will be submitted after a specified date in the 2014 timeframe;⁴. ~~Requests that the Council consider a mandate to be effective in the 2014 timeframe for the replacement of halon in hand-held extinguishers for new production aircraft;~~

4. *Directs* the Council to conduct regular reviews of the status of potential halon alternatives to support the agreed upon implementation dates given the evolving situation regarding the suitability of potential halon alternative agents as they continue to be identified, tested, certified and implemented;

5. *Urges* States to advise their aircraft manufacturers, approved maintenance organizations, air operator's, chemical suppliers, and fire-extinguishing companies to verify the quality of halon in their possession or provided by suppliers through effective testing or certification to an international or State recognized performance standard. States are also urged to require that the quality systems of air operator's, approved maintenance organizations, and manufacturers provide a means for requesting from halon suppliers certification documentation attesting to the quality of halon to an established and recognized international standard;

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

7. *Urges* States to inform ICAO of their halon reserves, and directs the Secretary General to report the results to the Council. Further, the Council is directed to report on the status of halon reserves at the next Ordinary Session of the Assembly;

6 8. *Resolves* that the Council shall report to the next ordinary session of the Assembly on progress made ~~with halon replacements in civil aviation.~~ developing halon alternatives for cargo compartments and engine/auxiliary power unit fire extinguishing systems as well as the status of halon alternatives for hand-held fire extinguishers; and

9. *Declares* that this resolution supersedes Resolution A36-12.