Cargo Compartment Halon Replacement Advisory Group (CCHRAG) Update

October 31, 2018
IASFPF
Atlantic City, New Jersey, USA

By
Robin Bennett (Boeing, AIA), CCHRAG Chair
Andre Freiling (Airbus, ASD), CCHRAG Co-Chair

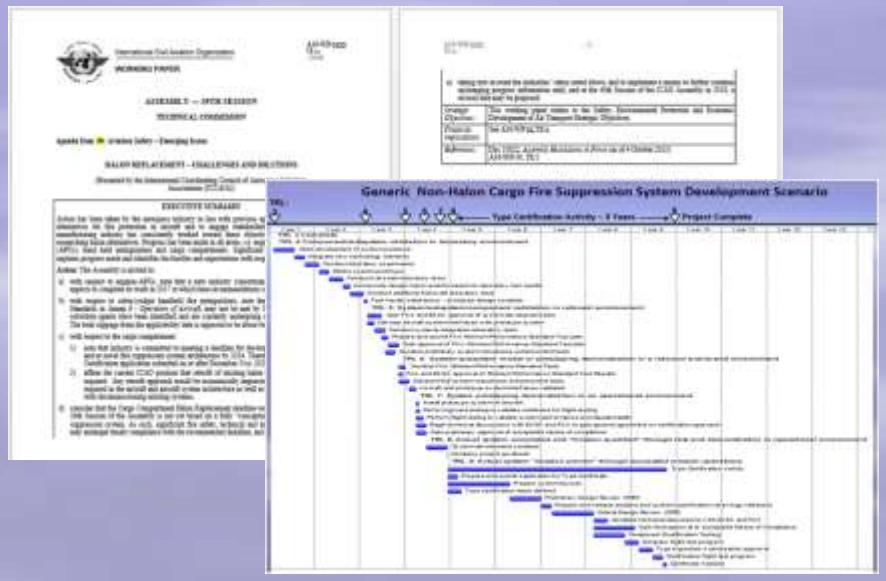
Agenda

- Background
- Recent CCHRAG Developments
- Cargo Compartment Technical Assessment Overview

Background:

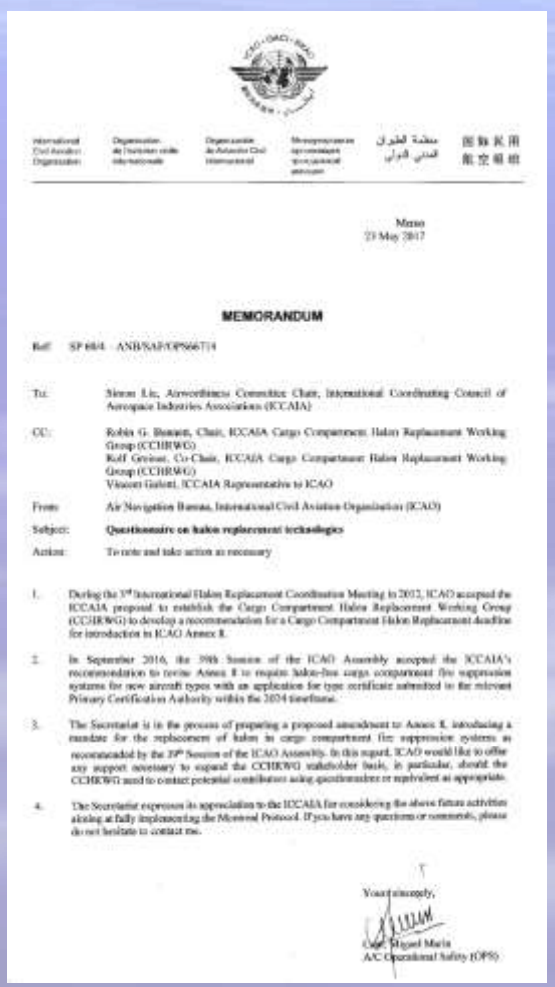
Solution requires stakeholder commitment

- ICCAIA Cargo Compartment Halon Replacement Advisory Group (CCHRAG) continues to support Terms of Reference (ToR)
  - Established in 2013 with representatives from Airbus, Boeing, Bombardier, Embraer, Mitsubishi
  - By 2015, developed a recommendation for cargo compartment halon replacement deadline for new TC applications after 2024
    - Based on timeline to develop, implement and certify new technology
    - Working Paper submitted to ICAO 39th General Assembly
    - Ongoing stakeholder coordination to support the deadline



ICAO & ICCAIA moving forward together

- ICAO May 23, 2017 memo
  - ICAO offer of support for questionnaire on halon replacement technologies
  - "The Secretariat expresses its appreciation to the ICCAIA for considering the above future activities aiming at fully implementing the Montreal Protocol."
- CCHRAG questionnaire sent to all stakeholders for interest in participating in Technical Assessment of potential solutions
  - By June 2018, 9 organizations responded
  - Representing chemical manufacturers, system suppliers and others
  - Technical Assessment in-work



Memo
23 May 2017

MEMORANDUM

Ref: SP 88/8 ANB/SAF/OPS66714

To: Simon Liu, Airworthiness Committee Chair, International Coordinating Council of Aerospace Industries Associations (ICCAIA)

CC: Robin G. Bonam, Chair, ICCAIA Cargo Compartment Halon Replacement Working Group (CCHRWG)
Rolf Greiner, Co-Chair, ICCAIA Cargo Compartment Halon Replacement Working Group (CCHRWG)
Vincent Galotti, ICCAIA Representative to ICAO

From: Air Navigation Bureau, International Civil Aviation Organization (ICAO)

Subject: **Questionnaire on halon replacement technologies**

Action: To note and take action as necessary

1. During the 3rd International Halon Replacement Coordination Meeting in 2012, ICAO accepted the ICCAIA proposal to establish the Cargo Compartment Halon Replacement Working Group (CCHRWG) to develop a recommendation for a Cargo Compartment Halon Replacement deadline for introduction in ICAO Annex 8.

2. In September 2016, the 39th Session of the ICAO Assembly accepted the ICCAIA's recommendation to revise Annex 8 to require halon-free cargo compartment fire suppression systems for new aircraft types with an application for type certificate submitted to the relevant Primary Certification Authority within the 2024 timeframe.

3. The Secretariat is in the process of preparing a proposed amendment to Annex 8, introducing a mandate for the replacement of halon in cargo compartment fire suppression systems as recommended by the 39th Session of the ICAO Assembly. In this regard, ICAO would like to offer any support necessary to expand the CCHRWG stakeholder basis, in particular, should the CCHRWG need to contact potential contributors using questionnaires or equivalent as appropriate.

4. The Secretariat expresses its appreciation to the ICCAIA for considering the above future activities aiming at fully implementing the Montreal Protocol. If you have any questions or comments, please do not hesitate to contact me.

Yours sincerely,

Capt. Miguel Marín
A/C Operational Safety (OPS)

Technical Assessment will identify potential solutions

- Technical Assessment supports CCHRAG Work Plan key deliverable to report status of cargo halon replacement solutions to ICAO
- Responses received from 8 Participants with 9 potential halon replacement solutions
  - Chemical manufacturers, fire protection suppliers, and aircraft system suppliers
  - Technologies include chemical agents, inerting systems and new/ novel equipment
  - Varied stages of development, e.g. most not yet tested to FAA MPS, US EPA SNAP approvals pending
  - Integration requirements still undetermined, e.g. weight, size, operational impacts
- Key criteria identified to evaluate status and potential

Technical Assessment Criteria Categories

Category	Criteria	Compliance	Value (whenever applicable)	Evidence of Value	Expected Completion Date	Notes
Fire Fighting Performance	**Cup burner fire extinction/suppression concentration established (ISO, NFPA)**					
	Other Industry Standards met (UL, ANSI, NFPA, etc.)					
	FAA MPS testing concentration determined					
	Test method determined to demonstrate compliance with paragraph 25.851(b)(2)					
Physical	**Agent & System Weight is less than or equal to Halon system**					
	Agent & Systems Size is less than or equal to Halon system					
	Long & short range applicability					
	Clean agent (gaseous) – no clean up required					
	Boiling Point					
	No damage to aircraft materials after agent discharge					
	Freezing point is less than normal operating conditions					
	Freezing point is less than minimum operating/storage conditions					
	Decomposition temperature is greater than fire conditions (or HF formation and thermal decomposition products are under the dangerous toxic level for humans)					
	Not thermally conductive					
	Not electrically conductive					
	No aircraft hydromechanical interfaces required (e.g. bleed air, fuel tank inert gas, etc)					
	Operational impacts have been identified & mitigated					
	System (knockdown & metered) available whenever airplane is powered					
Production	Currently used in other industries and/or applications					
	Supply chain established					
	Agent readily available					
	Agent modification not needed for aircraft application					
	Risks for system adaptation is mitigated or low					
Environ-mental, Health & Safety	Not a Montreal Protocol listed ODS					
	Not a Kyoto Protocol listed GHG					
	Not GHS-listed Hazardous material					
	US EPA SNAP approved					
	US EPA TSCA Inventory listed					
	EU REACH Registered, Authorised, and/or Restricted					
	Not a PBT, POP, or endocrine disrupter					
	Present on other regulatory lists					
	US OSHA Regulated					
	Not a Carcinogenic, mutagenic, repro-tox substance (CMR)					
	Cardiac sensitization: LOAEL, NOAEL is ~~less~~ greater than or equal to Halon 1301					
	Oral, inhalation, dermal toxicity is ~~less~~ lower than or equal to Halon 1301					
Schedule	**Current TRL is greater than 3**					
	Aviation Authority Certification experience					

Technical Assessment Draft Summary Report

ICCAIA CARGO COMPARTMENT HALON REPLACEMENT ADVISORY GROUP
TECHNICAL ASSESSMENT REPORT

1. EXECUTIVE SUMMARY

Overview
Description of Technical Assessment & Participants
Data Collection Process

2. FIRE FIGHTING PERFORMANCE

2.1 OVERVIEW

The technical assessment of the firefighting performance properties of the extinguishing agent was covered by the following items:

- Cup burner fire extinction/suppression concentration established (ISO, NFPA)
- Other Industry Standards met (UL, ANSI, NFPA, etc.)
- FAA MPS testing concentration determined
- Test method determined to demonstrate compliance with paragraph 25.851(b)(2)

2.2 IDENTIFICATION OF KEY CRITERIA

Some of these criteria have been identified to be of key importance to the industry . . .

2.2.1 Cup burner fire extinction/suppression concentration established

All participants who stated compliance have either conducted cup burner testing or refer to existing standards . . .

2.2.2 FAA MPS testing concentration determined

Two participants have stated compliance with FAA MPS testing . . .

2.2.3 Test method determined to demonstrate compliance with paragraph 25.851(b)(2)

Over half of the participants responded that their solution test method was not yet determined . . .

2.3 NON-COMPLIANCES TO NON-KEY CRITERIA

2.4 SUMMARY

The core group provides the following summary based on their current understanding of the solutions provided by the participants. Please note the definitions for their conclusions.

- **Not Achievable:** Technology, including mitigating measures, cannot meet criteria within compliance timeframe.
- **Achievable:** Technology, including mitigating measures, can meet criteria within compliance timeframe.

Criteria	Conclusion
Cup burner fire extinction/suppression concentration established	
FAA MPS testing concentration determined	
Test method determined to demonstrate compliance with paragraph 25.851(b)(2)	

3. PHYSICAL PROPERTIES OF EXTINGUISHING AGENT

3.1 OVERVIEW

3.2 IDENTIFICATION OF KEY CRITERIA

3.2.1 Agent & System Weight is less than or equal to Halon system

3.2.2 Clean agent (gaseous) - no clean up required

3.2.3 Operational impacts have been identified and mitigated

3.2.4 No damage to aircraft materials after agent discharge

3.2.5 System (knockdown & metered) available whenever airplane is powered

3.3 NON-COMPLIANCES TO NON-KEY CRITERIA

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Decomposition temperature is greater than fire conditions (or HF formation and thermal decomposition products are under the dangerous toxic level for humans)	
Not thermally conductive	
Not electrically conductive	
No aircraft hydromechanical interfaces required (e.g. bleed air, fuel tank inerting, etc.)	
Operational impacts have been identified & mitigated	
System (knockdown & metered) available whenever airplane is powered	

4. PRODUCTION

5. ENVIRONMENTAL, HEALTH & SAFETY

6. SCHEDULE

Next Steps

- CCHRAG will continue evaluation and coordination with Technical Assessment Participants
- Final report to be provided at ICAO 40th General Assembly

DATE	DELIVERABLE	ASSIGNED TO:
11 May 2017	Stakeholder meeting to invite halon replacement suppliers to participate in a technical assessment by CCHRWG to identify potential candidates in support of the ICAO 2024 deadline.	CCHRWG Core Group & Stakeholders
June - Sept 2017	CCHRWG finalizes and distributes questionnaire, confirms participants, develop plan for information management, establishment of assessment criteria, and participant coordination schedule.	CCHRWG Core Group
Nov 2017	Stakeholder meeting to confirm plan and commitment with participants.	CCHRAG Core Group & Stakeholders
Dec 2017 – April 2018	CCHRAG executes technical assessment plan including participant (TAP) input and coordination.	CCHRAG Core Group & Stakeholders
March 2018	CCHRAG status report to ICAO	CCHRAG Core group
May 2018	Update at FAA Systems Mtg; core team meeting to continue evaluation	CCHRAG Core Group
June - Sept 2018	CCHRAG to review and compile responses, draft Assessment Summary	CCHRAG Core Group
Oct 2018	CCHRAG Update at FAA Systems Mtg	CCHRAG Core Group
Nov - Dec 2018	CCHRAG to finalize Draft Assessment Summary and review w/TAPs & Stakeholders	CCHRAG Core Group, TAPs & Stakeholders
Jan - April 2019	CCHRAG to prepare final TA Summary report (ICCAIA WP) for ICAO General Assembly	CCHRAG Core Group
May 2019	Stakeholder meeting to share final report and discuss next steps (if any)	CCHRAG Core Group & Stakeholders
June – Sept 2019	CCHRAG to prepare for ICAO General Assembly	CCHRAG Core Group
Oct 2019	ICAO General Assembly accepts ICCAIA WP & recommendation (if any).	CCHRAG Core Group
Oct 2019	Stakeholder meeting to share ICAO General Assembly outcome and potential next steps, if appropriate	CCHRAG Core Group & Stakeholders

Questions & Answers

Thank you!

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