

INTERNATIONAL AIRCRAFT SYSTEMS FIRE PROTECTION WORKING GROUP MEETING

October 21-22, 2015

Agenda

Hosted by FAA Fire Safety Branch
Tropicana Hotel- Casino, Atlantic City, New Jersey, USA

WEDNESDAY, OCTOBER 21, 2015

9:00-9:15 AM	Welcome and Meeting Logistics – D. Blake (FAATC)
9:15-9:30 AM	Attendee Introductions
9:30-9:45 AM	Smoke Source Project Plan – R. Morrison (FAATC)
9:45-10:00 AM	Modeling of Hidden Fire Smoke Signature in Aircraft– D. Blake (FAATC)
10:00-10:15 AM	<i>Break</i>
10:15-10:35 AM	Status of NexGen Burner for Powerplant Testing – S. Summer/S. Rehn (FAATC)
10:35-10:50 AM	Fire Test Burner Evaluation - Daniel Laborie (GE)
10:50-11:05 AM	Effect of Setup and Test Cell Conditions on Burnthrough of AI Panels – Ryan Hasselbeck (University of Cincinnati)
11:05-11:20 AM	SAE/ISO Standards on Fire Containment Covers and Fire Resistant Containers (FAA)
11:20-11:35 AM	Smoke, Fire, Fume Events Study – R. Hill (FAATC)
11:35 AM-1:30 PM	<i>Lunch</i>
1:30-1:50 PM	Class E Cargo Compartment Fire Suppression Testing – D. Dadia (FAATC)
1:50-2:10 PM	Water Mist – Path to Realization – Albrecht Hopfe (AOA)
2:10-2:30 PM	UPS Update – Bob Brown (UPS)
2:30-2:50 PM	Class C Cargo Compartment ULD Suppression Agent Penetration – D. Blake (FAATC)
2:50-3:10 PM	Battery & Fuel Cell Industry Working Group Updates – S. Summer (FAATC)
3:10-3:30 PM	<i>Break</i>
3:30-4:00 PM	Destructive Fuel Cell Testing – S. Summer (FAATC)
4:00-4:30 PM	Energetics of Lithium Ion Battery Failure – R. Lyon (FAATC)
4:30-4:55 PM	Lithium Battery Thermal Runaway Vent Gas Analysis – T. Maloney (FAATC)
4:55-5:10 PM	Flammability of Mixed Battery Gases and the Inerting Effects of Halon – Matt Karp (Rutgers)

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THURSDAY, OCTOBER 22, 2015

9:00-9:15 AM	Test Results of A Lithium Battery Transport Containment – Nadine Gomm (Airbus)
9:15-9:30 AM	FCC Lithium Ion Battery Fire Test - Shakir Jamaldeen (AmSafe Bridport)
9:30-9:50 AM	Commercial Aviation Safety Team – J. Gardlin (FAA)
9:50-10:05 AM	Update of ICCAIA Presentation to the ICAO Dangerous Goods Panel – Doug Ferguson (Boeing)/ Nadine Gomm (Airbus)
10:05-10:20 AM	Status of ICAO Lithium Battery Activities – H. Webster (FAATC)
10:20-10:50 AM	Halon Replacement, Aircraft Engine Nacelle: Assessing a Blended Candidate – D. Ingerson (FAATC)
10:50-11:10 AM	Reconsidering Carbon Dioxide as a Nacelle Fire Extinguishing Agent – D. Ingerson (FAATC)
11:10-11:25 AM	<i>Break</i>
11:25-11:40 AM	Halon Replacement for Airplane Portable Fire Extinguishers – Progress Report – Jim Lonergan (American Pacific Corporation)
11:40-11:55 AM	Status/Update of New Agent Development – Mark Robin (The Chemours Company)
11:55 AM-12:10 PM	Results of Halon ARC – R. Hill (FAATC)/Tom Cortina (HARC)
12:10-12:25 PM	EASA Rulemaking Activities – R. Deletain (EASA)
12:25-12:40 PM	Montreal Protocol Decision XXVI/7 Report – Dan Verdonik
12:40-12:55 PM	Engine/APU Halon Replacement Industry Consortium - Halon Alternatives for Aircraft Propulsion (HAAPS) – Alan Macias (Boeing)
12:55-1:10 PM	Cargo Compartment Halon Replacement Working Group Update(CCHRWG) – Robin Bennett (Boeing)
1:10-1:30 PM	Working Group Member Presentations
1:10-1:20 PM	Development and Qualification of a halon-alternative 5BC cabin handheld fire extinguisher for Commercial Aircraft - Joachim Scholz (P3 Group)
1:20-1:30 PM	Kevlar® XF for Fire Resistant Containers– Ley Richardson (DuPont)
1:30-2:00 PM	Additional Discussion/Closing

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Smoke Source Project – D. Blake for R. Morrison (FAATC)

Two smoke sources have been investigated: ViCOUNT SDT theatrical smoke generator and Rosco 1700 theatrical smoke generator with FAA Helium injection box series. Hariram: on that battery fire, why did the smoke get to the flight deck? Blake: there is not much you can do with the airflow. There is a handle that directs all the smoke into the cockpit once it gets going. The smoke from the battery test was significantly hotter, and that's probably the biggest driver, and the second driver might have been when the batteries vented. Temperature was a huge difference for one and the pressure from the gases being released may have been one. Hariram: was the air conditioning running, how many packs were on? Webster: we used an external aviation system air pack to simulate the packs running. We had assistance from Boeing, and we felt that it was as close to simulating the in-flight condition with the packs running as we could get on the ground.

Modeling of Hidden Fire Smoke Signature in Aircraft – A Case Study of Overhead Area – D. Blake (E. Oztekin's Work)

Ezgi prepared this summary presentation of the work she completed on this project while working for a support contractor. The project is currently on hold. Ezgi decided on FireFOAM model most likely due to its ability to model more complex geometries. Question: do you plan to measure the smoke by using some sort of smoke meter? Blake: that was part of the original plan to look at the smoke and the gases. Ezgi decided it was better to look at the heat first.

Status of NexGen Burner for Powerplant Testing Applications – S. Summer/S. Rehn (FAATC)

Steve reviewed the results of the work completely so far on this project. They tested a few materials they had on hand and plan to test additional materials when they are received. The next Round Robin/Comparative Testing to be initiated in coming months. This will be discussed during the Task Group meeting. FAATC is in the process of lab modifications to be able to conduct composite and other testing under vibration.

Current Status AC 20-135 - S. Summer (FAATC)

A sub group had been formed with the goal of developing proposed rewording of AC 20-135 in a parallel effort with the NexGen burner development. After initial subgroup meetings, it became evident that a more formal involvement from FAA was required and it was suggested that a proposal be submitted to the FAA from industry with the request to form a chartered group. An internal FAA group of experts has been formed to initiate an evaluation of the AC. We are going ahead with it in two separate Phases. Anglin: are you planning to put all the guidance in the Aircraft Materials Fire Test Handbook into Chapter 12? Summer: yes, that is our initial goal unless we hit a roadblock with that.

Fire Test Burner Evaluation – Daniel Laborie (GE)

Comparison of fuel and propane burners: fuel burner (NexGen – horizontal) and gas burner (vertical). Daniel described the tests conducted and the assessment based on the results. Vuong: on your curves you show two different size panels, what was the rationale using two different size panels? Laborie: directly coming from the ISO requirements. Summer: it appears you are comparing two very different configurations (horizontal burner set up and vertical burner set up).

Effect of Setup and Test Cell Conditions on Burnthrough of Aluminum Panels – Ryan Hasselbeck (University of Cincinnati)

Project Objective: demonstrate the effect of burner inclination, test fixture design, and use of ceramic insulation on burnthrough times. Summary: test fixture design was shown to have minimal impact on burnthrough results. Recommendations: burner operation settings need to be defined for each inclination angle. Summer: on calibrating your burner at the various angles, were they kept at the same spacing? Hasselbeck: we kept everything the same, thermocouples were kept at the same distance. We do not have temperature mapping. L. Bennett: material? Hasselbeck: it was 20/20 aluminum used for all tests.

SAE/ISO Standards on Fire Containment Covers and Fire Resistant Containers – D. Blake (FAA)

TSO 203 (published July 2014) references SAE AS6453 standard with modifications. Modifications are mostly for removal of references to non-FAA requirements, maintenance, and pallet and net requirements. The most recent meeting was last week in Arlington, VA (October 13-14, 2015). Fire Resistant Containers (FRC): ISO/CD 19281 is in Stage 50 (Approval Stage). Stage 60 (Publication) to follow. SAE standard AS 6278 Fire Resistant Containers is under development. Differences exist between the two standards. These differences have to be worked out. SAE approval process will follow. New/revised FAA TSO or alternate approval method will be issued following the SAE standard publication. There are some unresolved issues that keep coming up for discussion: lithium batteries; possible delayed smoke detection from a fire originating in either an FCC covered pallet or inside an FRC; FRCs with built in detection and/or suppression systems. Hughson: The existing TSO for the FCCs is for Class A fires. I just wanted to make that clear. Blake: how to address other types of fires is the issue that is unresolved right now. Richardson: what would you consider to be the baseline – would it be a standard aluminum container like what is used now? Blake: the cert requirement is to generate a certain amount of smoke and must be detected within one minute. Richardson: is there guidance somewhere? Blake: there is general guidance in the AC. Jamaaldeen: the SAE also dictates testing of damaged FCCs, is there an allowance for a flame jumping through a gaping hole? Blake: the aim is that you don't want the external flame to be big enough to ignite the adjacent cargo. To me it's the same issue whether it's damage or off gassing. The easiest thing to say is no external flame, but that makes it more difficult to comply with the test. This is one of the issues. Hughson: in the TSO, we would not allow external flame. You will have to develop damage limits, so you don't have a flame that will do that. Blake: Thanks, Joan. That is an important distinction. There are issues like that that make it not straightforward.

Smoke, Fire, Fume Events Study – R. Hill (FAATC)

This work has been contracted to develop one database to populate one database with data from several databases on smoke, fume, and fire incidents in the form of an Excel spreadsheet. We are hoping to receive a draft report at the end of 2015 that is analysis based on the years the database covers. Dick gave a brief overview of what the database is and how it can be used. This database will be able to be used to answer thousands of questions related to these types of incidents.

Fire Suppression in a Class E Cargo Compartment – D. Dadia (FAATC)

Objective: determine the effectiveness of a water mist system in a Class E cargo compartment against three types of fires: Class A, Class B. AOA Water Mist System was used in the tests. Dhaval described the Class A tests conducted. Dhaval described the Class B tests conducted. Summary: the water mist was able to contain the Class A fires and able to successfully extinguish Class B fires. Salt water mist (sodium chloride) enhances the fire extinguishing capabilities of the mist. More tests will be conducted: multiple zone water mist; lithium battery fire tests with Fire Containment Bags and Covers.

Water Mist – Path to Realization – Albrecht Hopfe (AOA)

Albrecht described the lithium battery tests conducted at the FAATC. Experiments were conducted for freezing protection of the pipes in the water mist system. Blake: Can you recreate and get some numbers for the pressures and the nozzles and the locations for the tests that were successful for the Class B fires and the batteries for the tests you did with Dhaval? If you could do more work with Dhaval with the system already set up, I think that data might be useful to have. Chattaway: what was the temp for the water going into the anti-freezing system? Hopfe: 50°C water does not freeze. Chattaway: so, you have just finished proof of concept? Hopfe: yes.

UPS Airline Safety Enhancements Update – Bob Brown (UPS IPA Safety Team)

UPS: FRCs, FCCs, and improvements on flight deck. FRC: 2015 and future testing geared towards controlling ignition of flammable vapors; FRC modifications underway; testing will continue in 2016 – we are currently developing an aggressive test program for 2016. FCC: FCCs are treated fabric covers designed to starve a fire of oxygen and contain it for 4 hours. We rely on some of the testing that has been done at the FAATC. UPS engineered a solution that requires no additional time to place a FCC on a pallet than a cargo net. UPS has 575 FCCs in service and has covered 9000+ palletized shipments. Flight Deck Improvements: we have learned from you what risks and what threats are out there. We have equipped all of our cockpits with one piece full-face oxygen masks. One of the things we have learned from you is battery toxicity. We also learned a lot about smoke in the cockpit. Emergency Vision Assurance System: we are in the process of installing this system in all of our aircraft – installation in all of our aircraft will be complete by November 2015. Vuong: how did you get approval for EVAS, an STC? Brown: an STC for each aircraft type.

Class C Cargo Compartment ULD Suppression Agent Penetration – D. Blake (FAATC)

Dave described the test set up including gas analyzers used and agents used. Summary: very little suppression agent penetrates inside ULDs and would not be adequate to suppress flammable gas mixture from lithium ion batteries in thermal runaway. Agent concentrations outside of ULDs dissipate much faster than theoretical calculations would indicate for the conditions tested. Question: do you know where the leaks are coming from? Blake: no. There is no dedicated leakage point. We don't have a good mapping of where it is. Ferguson: there is an expectation that some leakage is around the door.

Battery and Fuel Cell Industry Working Group Updates – S. Summer (FAATC)

There are several industry working groups that we (FAATC Fire Safety Branch) are actively participating in. All of these deal with installed battery systems on aircraft not shipping of batteries. RTCA SC-225 Rechargeable Lithium Batteries and Battery Systems in aircraft: formed to provide cert guidance for lithium batteries and battery systems that are permanently installed in aircraft. Committee submitted DO-311A to the Program Management Committee in June 2015. The PMC rejected the initial document and requested some additional work/reevaluation. Committee is currently working on these – to hopefully resubmit revised final document in June or September 2016.

RTCA SC-235 Non-Rechargeable Lithium Batteries: this committee was recently formed and is holding its first meeting October 21-22, 2015. The outcome of this committee will be a document that provides guidance for non-rechargeable lithium batteries permanently installed in aircraft. Fuel Cells: EUROCAE/SAE WG80/AE-7AFC: this group has been meeting since December 2008. Steve provided the points of contact for this group. The short, medium, and long term goals of the group were outlined. Fuel Cells – Energy Supply ARC: formed by FAA to provide forum for aviation community to provide recommendations to the FAA – currently concentrating on PEM and SOFC Hydrogen Fuel Cells. There is a lot of knowledge-sharing between this group and the SAE group. Initial kick-off meeting was held September 21-23, 2015. Objective: to have a Final Recommendation Report submitted to the FAA by April 2017.

Destructive Fuel Cell Testing – S. Summer (FAATC)

Aviation industry is pursuing efforts to install Hydrogen Fuel Cells on aircraft for a number of potential operations such as main battery, ram air turbine, APU, galley power, etc. A Fuel Cell System is also being looked at to supply water onboard as well as oxygen depleted air for fuel tank inerting or cargo fire suppression. Steve described the tests that were conducted and showed video of some of the tests. The test results were presented. Summary: all failure conditions examined showed that there was ample opportunity to detect the system failure prior to any catastrophic events. Damage of the stacks remained localized in all the tests. The accidental H₂ leakage scenario shows the potential for additional failure conditions and risks with the storage and distribution of hydrogen that needs proper detection and mitigation. Question: what sensor did you use for the hydrogen? Maloney: it was an alloy metal, I'll get back to you on the specifics. Quintiere: did you have an ignition source? Summer: no. Quintiere: how hot did it get? Summer: on one test it got to 1700°F.

Fire Hazards of Lithium Ion Batteries – R. Lyon (FAATC)

Lithium Ion 18650 Batteries were used in this test project.

The Aircraft Hazards of Flammable Gases Produced by Lithium Batteries in Thermal Runaway – T. Maloney (FAATC)

Could a small collection of battery gases accumulate within a package and combust to dislodge the panels and prevent the halon system from working properly? Quantitative tests were first performed in the 10.8m³ chamber and then in the 737 test article. Verification tests: pressure chamber tests were repeated in forward cargo compartment of 737 with 70% loading. Summary: if gasses from 8 cells at 50% SOC or from 3 cells at 100% SOC, accumulate in a loaded 737 fwd cargo compartment, the halon system would be compromised. Quintiere: have you considered the effect of packaging? If you were to heat the cardboard you would produce the same set of gasses. Maloney: We haven't done that yet. Question: what effect would there be if it was in an LD3 container? Maloney: we did not look into that specifically.

Flammability of Mixed Battery Gases and the Inerting Effects of Halon 1301 – Matthew Karp (Rutgers)

Matt presented the Background and Scope of his research. A photo of the testing vessel was shown and described. The testing procedure was explained. Test Criterion was reviewed. Matt will use a 5% pressure rise for his tests. Matt presented the results of his tests at LFL, UFL, compared to Steve Rehn's results (Steve used 3% pressure rise for his tests), and Matt used 5% pressure rise for his tests. He plotted results with mixing fan and without mixing fan. Conclusion: Over 200 tests have been conducted in determination of current figures. The LFL and UFL of lithium ion battery gas – air Halon 1301 mixtures.

THURSDAY, OCTOBER 22, 2015

Test Results of Lithium Battery Transport Containment Concept – Nadine Gomm (Airbus)

Airbus tested three scenarios with an increasing quantity of batteries (NCR 18650; 3100mAh; 3.6V). Nadine described how the batteries were packaged for testing and the test set up. Nadine showed videos of the three test scenarios. The positives and negatives of the test results were reviewed. Summer: are you looking to conduct further tests with other chemistries of batteries? Gomm: No, we do have that planned. We chose this chemistry, because this chemistry was more violent. Question: have you considered filling the box with other fill. Gomm: we consider that the containers will not be fully packed for transport.

Fire Containment Cover Lithium Ion Battery Fire Tests – Shakir Jamaldeen (AmSafe Bridport)

We partnered with a passenger and cargo carrier to conduct tests with 18650 Li-Ion (Secondary) 2600mAH 3.7V batteries. We used 1500 Li-Ion batteries in the tests. Fire was successfully contained for 6 hours. There was a bit of a pressure pulse. All batteries vented. Battery box on front side collapsed against FCC. Net braid melted where battery box collapsed. Majority intact. No net flaming. Cardboard was seen burning through gaps between FCC and pallet. Shakir described the FCB test set ups. He reviewed the results of the tests. Question: you mentioned your batteries at some point fell onto the cover itself, were they in thermal runaway? Jamaldeen: Yes. It took about 2 or 3 hours to vent. Question: what was the chemistry of the cells? Jamaldeen: lithium cobalt.

Status of (Commercial Aviation Safety Team) CAST SE-126 Cargo Fire Protection – Jeff Gardlin (FAA)

Jeff reviewed the structure of CAST. Objective of this group: Improve the safety of carriage of hazardous materials. Jeff reviewed the CAST Methodology. This particular effort is in its second stage and the next potential update would most likely be spring 2016. Output 1 is completed. Output 2 – just nearing completion. Output 3: Research. There are a number of items identified that still need research. Much of the research fits within FAA's current R&D plan. Affected organizations agree to follow through and report back to CAST.

Transport of Lithium Batteries as Cargo via Air – Update on Recent Activity – Doug Ferguson (Boeing)

These are ICCAIA activities. ICAO Dangerous Goods Panel asked ICCAIA for their expertise with respect to cargo compartment fire protection capability; especially related to the carriage of lithium batteries as cargo. Doug reviewed the Synopsis of Issue: Lithium Battery and Existing Designs. Conclusion: the known and unknown risks associated with transporting lithium batteries by air coupled with the knowledge that the volume of such cargo is continually increasing, requires action to be taken. ICCAIA recommends that appropriate packaging and shipping requirements be established to safely ship lithium ion batteries as cargo on aircraft and that high density packages of lithium ion batteries and cells not be transported as cargo on passenger aircraft until such time as safety methods of transport are established and followed. There is also a concern with lithium batteries shipped via freighter aircraft. Recent Activity: some airframe manufacturers have provided guidance to operators consistent with the ICCAIA recommendations. The third Multi-Disciplinary Working Group on the Carriage of Lithium Batteries was convened by ICAO in July 2015: group identified high-level requirements for a lithium battery packaging standard to contain hazards. ICAO DGP now has an ICCAIA representative (Paul Rohrbach – Airbus) as an official panel member. There is a concern with the flammable vapor from the batteries. There are two Working Papers that will be discussed in the ICAO DGP next week. That ICCAIA discussed. Question: is there a concern that

after implementing some rules, there may be some batteries shipped by unreputable shippers, illegal means, etc.? Ferguson: Yes, that has been discussed. It is happening now, and it will continue to happen. I think that is why there is some resistance to a stricter standard. This is part of the discussion that is happening in the ICAO DGP. J. Green: are the other members of the DGP public information? Ferguson: All of the proceedings from the previous meeting are available on the ICAO website and meeting minutes after the meeting are also available on their website. There are approximately 18 members of the DGP. Question: cost benefit differences for freighters vs. passenger aircraft - or has a new classification of cargo compartment been considered? Ferguson: it may be important to identify that the difference between freighters and passenger aircraft goes well beyond lithium batteries. There are certain things that as freighters that their crews can do. It appears that one of the differentiators is the number of people on the airplane. With respect to some considerations with things you can do on a Class E: there is more room in a Class E, so perhaps you could have a monitoring system or other. The best method for trying to establish the cost benefit is to go to the Ray Cherry paper on different types of suppression strategies.

Third Int'l Multidisciplinary Lithium Battery Transport Coordinating Meeting Summary – H. Webster (FAATC)

The meeting was held in Montreal on July 28, 2015. Objective: develop performance standards, including a packaging performance standard as part of a comprehensive strategy to mitigate risks posed by lithium ion batteries. There was a discussion on definition of 'high density' shipments; discussion on external fire threats. High Level Packaging Standards were established. Interim Recommendations were outlined. A Meeting Report is available on the ICAO website's DGP page. Ferguson: although as Harry said the notion of an external fire doesn't seem to be considered in the normal packaging instructions for dangerous goods, but it is considered in the original classification of dangerous goods. Question: are we talking about defining a new classification of fires for lithium battery fires? Webster: it does spread across classifications of fires, but I don't think it is a new classification of fire.

Engine Nacelle Halon Replacement – Assessing a Blended Candidate – D. Ingerson (FAATC)

MPSHRe – is currently in its 4th revision (a working draft). Doug gave a brief review of the MPSHRe. Review of Recent MPSHRe Project: Owners: Airbus and Meggitt Safety Systems Inc. Industry team provided candidate, packaging/delivery, and concentration measurement. Candidate is named Blend A, and is manufactured by Meggitt. Cortina: when we tested Novec initially. You are saying this blend is 30%. Ingerson: yes. Cortina: has this been tested in cold situation. Ingerson: I cannot say. You will have to ask Airbus or Meggitt. Chattaway: have you thought about the issue when blending? Ingerson: yes, we have. Pugliese: made an acknowledgement for EASA's efforts in this project as well.

Engine Nacelle, Halon Replacement – Reconsidering Carbon Dioxide as a Fire Extinguishant– D. Ingerson (FAATC)

We will be doing some work with carbon dioxide. Doug reviewed background of usage of carbon dioxide as a fire extinguishing agent. He outlined reasons to reconsider CO₂ for powerplant fire extinguishing.

Halon Replacement for Aircraft Portable Fire Extinguishers – Progress Report – Jim Lonergan (AMPAC Halotron)

2-BTP or BTP update. Please direct technical questions to Brad Colton. FAA Handheld MPS requirements completed for: 5B:C pan test; FAA hidden fire test; FAA Seat Fire/Toxicity Test. We are

currently working with EPA TSCA/SNAP Submissions are complete. Acute Toxicity: very similar to halon 1211. There is a small amount of HF generation in seat fire test that is acceptable. There is a stabilizer added to protect against air and moisture. A video was shown. We believe that U.S. regulatory approvals will be received in 2016 with commercialization starting immediately afterward.

Status/Update of New Agent Development – Mark Robin (The Chemours Company)

Replacements for total flooding agents: we have developed a total flooding agent for occupied areas. Streaming Agents: we have two candidates for streaming agents for non-occupied areas. Blake: when would these be ready for large scale testing? Robin: We are looking for partners for large scale testing. Cortina: are you going to submit it for NFPA 2001 in the next cycle 2017 or 2018? Robin: It depends on when that cycle is. We may be ready to submit in 2018. It's hard to say at this point.

Halon ARC Report- D. Hill (FAATC)

The report is publicly available.

EASA Rulemaking Activity Regarding Halon – Remi Deletain (EASA)

RMT.0560, NPA 2014-26 in progress. Title: Halon Update of Part 26 to Comply with ICAO Standards. RMT.0273, NPA 2011-14 closed. RMT.0206, NPA 2015-02 issued. RMT.0368 planned for 2016 – protection against use of contaminated halons. This task has been deleted from rulemaking planning. Remi discussed Halon Replacement Dates. EASA/DG-CLIMA Discussion: clarification of EC Regulation no. 744/2010. EASA involvement in research is being assessed. Cortina: recycling activity is not going to happen? Deletain: that activity is stopped.

Montreal Protocol – Report on Decision XXVI/7 – Dan Verdonik

Decision XXVI/7 requested the TEAP through HTOC. Several members of the HTOC are here today. We do not think there is going to be enough recycled halon 1301 for all uses. 41,000-43,000 tons of halon 1301 in global bank (SAP data and HTOC model), however not all of it is available for commercial aviation use. This leaves potentially 14,000-17,000 tons might be civil aviation if every other gram of halon 1301 becomes dedicated to civil aviation. There is a lack of progress in implementing halon alternatives in Civil Aviation.

Engine/APU Halon Replacement Industry Consortium – Halon Alternatives for Aircraft Propulsion (HAAPS) – Alan Macias (Boeing)

This is a three Phase activity. Phase I is nearing completion. The goal is to sign JCA before the end of 2015. An invitation to: airframe manufacturers, fire extinguishing agent/system OEMs, airlines, engine companies, nacelle suppliers, etc., airworthiness and other regulatory authorities, etc. All interested parties are welcome and encouraged to contact OAI (Ohio Aerospace Institute) to explore participation. HAAPS Stakeholder Face-to-Face Meeting will be held at the Tropicana on Friday, October 23, 2015.

Cargo Compartment Halon Replacement Working Group Update (CCHRWG) – Robin Bennett (Boeing)

Last Stakeholder Meeting was May 23, 2015. It resulted in good feedback. We are in the process of preparing a Working Paper to submit to the ICCAIA. CCHRWG progressing on 2015 Plan: stakeholder meeting for broad coordination on October 23, 2015. Meetings with ICAO taking place including today's IHRCM/5 meeting this afternoon. Cortina: what do you see for this working group

after the ICAO recommendation next year? We have discussed this and are watching the HAAPS consortium to see if this is a viable option to keep the coordination moving at a good momentum.

Working Group Member Presentations:

Development and Qualification of a Halon-alternative 5BC Cabin Handheld Fire Extinguisher for Commercial Aircraft – Joachim Scholz (P3 Group)

Question: do you plan to qualify other ratings other than 5BC? Scholz: currently, we do not have demand for that. Currently, it is not planned because we do not see business for those areas at this time.

Kevlar® XF for Fire Resistant Air Cargo Containers – Ley Richardson (DuPont Protection Technologies)

Question: how thick is the panel you used in testing? Richardson: I can't give away the thickness or weight, but I will say that it is lighter weight than the other composites. Hughson: the material you are talking about is just for panels not the frame, correct? Richardson: yes, that is correct. Question: have you done any fire tests with the load on? Richardson: no, we have not. Laborie: have you conducted a 15-minute test? Richardson: we did a test to mimic what a corner would be like in a ULD and concluded this test at 15 minutes without flame penetration. We have not tried to go beyond that yet.

Next Meeting

The next meeting will **tentatively** be hosted by Airbus in Toulouse, France, in spring 2016. Confirmation and additional details will be sent as soon as they are available.