INTERNATIONAL AIRCRAFT SYSTEMS FIRE PROTECTION WORKING GROUP MEETING

October 30-31, 2002

Trump Plaza Hotel-Casino, Atlantic City, New Jersey

WEDNESDAY, OCTOBER 30, 2002

Dual Flow Inerting System – I. Thomas (FAA)

Ivor reviewed issues discussed by the ARAC FTIRHWG that was established in 2000. He also mentioned the FAA work conducted since the ARAC report. The design and function of the ASM (Air Separation Module) was explained. A question was asked regarding using one orifice instead of two orifices (as currently designed) in the inerting system. He reviewed the current work in progress on this program. The Spot Amendment to SFAR 88 allows the use of inerting as part of alternate means of compliance.

Altitude Testing of a Single ASM System – S. Summer

Steve reviewed the objectives of these tests. The controlled parameters of these tests were explained. These were inlet pressure, ambient pressure, inlet air temperature and purity, and orifice sizes. The test plan was explained. A detailed diagram of the test set-up/design was presented and explained. Steve also reviewed the flight simulation results of this test program. The conclusions: the system performed favorably at static point and throughout a given flight simulation. Steve and Ivor fielded a number of questions from Working Group members. This was the first time we looked at ASMs at altitude pressure.

Nitrogen Inerting Requirements – A Literature Review – S. Summer

The background for this literature search was provided. Two things have caused values lower than 11 –12%: a difference in ignition criteria and safety factors added on to experimental values. Previous jet fuel data was reviewed dating as far back as 1946. In conclusion, all reported levels that were lower than 11-12% were due to either to a disparity in ignition criteria or excessive safety factors added onto the experimental data.

Flight Testing of the FAA Concept OBIGG System on Boeing 747SP – B. Cavage

The background of this test program was reviewed. The work plan was explained. Photos of the Simplified OBIGG System on the FAATC 747SP were presented. Bill described the current status of this test program.

Inerting of a Scale 747SP Center Wing Fuel Tank During a Typical Commercial Flight Profile- (B. Cavage)

Bill explained the background of the scale fuel tank testing program at the FAATC. A description of the scale model was given. A 747SP Bay Diagram with Volume Data was presented and explained. Bill described the instrumentation system used. The block diagram of the onboard oxygen analysis system was displayed. Bill reviewed the scope of the testing to date. All testing involved a single deposit in bay 6. The inerting efficiency formulas were explained. The volume inerting results were described. The inerting efficiency results were also described. The descent inert gas distribution results were presented. Data from the 747SP scale fuel tank interting was presented. The 'system' was run for 15 and 30 minutes at sea level in low flow mode. A few points discussed in the summary: interting the tank at altitude was consistent with previous GBI research, preliminary descent modeling illustrates good distribution of inert gas with resulting average tank oxygen concentrations of approximately 12%, and short holds a 5k feet will improve the inert gas distribution in tank and help lower the tank average oxygen concentrations. The Advisory Circular that has been out for about 6 to 8 months will be updated as a result of the new information available through the current test program.

NASA Update on OBIGGS/OBOGS–C. Chang

Most of the proposals NASA received were for hollow fiber membrane gas separation technologies. The goal is to generate gas beyond what is currently capable. The selection was based on technical performances. Clarence described the proposals that were chosen and why NASA chose each one. These are all similar in that they include some form of hollow fiber membrane in their systems. Boeing will work with each contractor on airframe integration. NASA also has a Fire Safe Fuels program underway. There is a NASA chemist currently investigating this topic. A copy of his presentation is available on the FAA Fire Safety Branch website.

FAATC 737 Test Facility – R. Hill

The Fire Safety Branch is in the process of purchasing a 737 aircraft to be used for ground testing. The aircraft is a Boeing 737-275. The FAA final inspection of this aircraft will take place next week (week of November 4, 2002) with a goal for delivery to the FAATC in early November 2002. A RFP for an inerting system for this test aircraft will be opened soon. An FAATC Fire Safety technician will fly back to the FAATC with this aircraft to record bleed air pressure for taxi, takeoff, and in-flight. This information will be included in the RFP. Companies interested in submitting a proposal will be able to come to the FAATC and take any desired measurements on the aircraft during a set period of time that will be identified in the RFP.

Modeling Smoke Transport in Aircraft Cargo Compartments – J. Suo-Anttila

Jill reviewed the goal and requirements of this project. The software design: a preprocessor, analysis module, and a post-processor. Each of these components was described in more detail. The flaming source characterization data was presented. The FAA full-scale validation experiment set-up and data collection were described. Feedback is welcome. A copy of this presentation is available on the FAA Fire Safety Branch website.

Aircraft Cargo Compartment Fire Detection – D. Blake (FAATC)

Objective: standardize the fire(s) that should be detected (smoke, gas, heat output)

The FAR relating to cargo compartment fire detection is: Part 25.858 Cargo Compartment Fire Detection Systems. Dave presented photos of the standardized fire source. The project status was reviewed. A copy of this presentation is available on the FAA Fire Safety Branch website.

Handheld Extinguishers – R. Hill

The MPS for Handheld extinguishers has been published. Underwriters Laboratories is performing the tests to the MPS for equivalency of Halon 1211 extinguishers. Tom Cortina suggested resending the letters from FAA/EPA that were sent out approximately six months ago, because several of the organizations these letters were to be sent to had not received them as of last week when they were contacted by HARC. Dick said he would contact John Petrakis at FAA headquarters to have the letters sent out again.

Mike Thompson (FAA – Northwest Mountain Region Office) is sending a policy letter to the FAA Certification Offices describing the use of the handheld MPS to show equivalency to Halon 1211. This policy letter will be posted to the Systems Group section of the FAA Fire Safety Branch website.

User Preference Survey Handheld Extinguisher Halon Alternative Agent – R. Mazzone

Airlines and agent manufacturers were asked to participate in a Task Group. Anyone interested in participating in this Task Group was asked to contact Rich Mazzone (Boeing) during the afternoon break. Louis Speitel will be the FAATC representative on this Task Group. As of the close of this meeting the following is a list of the participants in this Task Group: Daniel Moore, Fred Trede, Louise Speitel, Rich Mazzone, Gilles Weyland, Klaus Spengler, James Lonergan, Don MacElwee. If there is anyone else interested in participating in this Task Group please contact Rich Mazzone (see attendee list for contact details) or April Horner.

Chemical Oxygen Generator Furnace Tests – D. Blake

These tests were conducted at the request of RSPA (Research and Special Projects Administration). At what ambient temperature do the canisters self-activate? Dave described the test design. Results: the minimum temperature that these canisters were self-activated was 600 degrees F. Only two different manufacturers generators with mechanically activated

primer caps were tested, therefore, there may be generators from other manufacturers that self-activate at a lower temperature.

Cargo Compartment MPS – J. Reinhardt

The agent selection guidance includes: environmental, toxicology. The test cell requirements were reviewed. An example of the test cell set-up including instrumentation set-up was presented and described. The instrumentation requirements for the test were described. The specs/requirements for each instrumentation component were presented. John reviewed the four fire scenarios to be used: bulk load, containerized, surface burn, and aerosol explosion. John described the fire suppression system design requirements. The minimum agent concentration and system configuration were reviewed. The acceptance criteria were reviewed, and the reason for no longer using the Waibul method was given.

Alternative Agent Update – L. Speitel (FAATC)

The "Options to the Use of Halons For Aircraft Fire Suppression Systems – 2002 Update" Report was published in February 2002. This report can be found on the FAATC Fire Safety Branch website (www.fire.tc.faa.gov). Louise described the agents currently under EPA SNAP Review. The EPA anticipates publishing the results of the SNAP review of these agents in early 2003. New agents included in the February 2002, report were described. As of January 2002, the EPA does not set use conditions for halon alternative agents. It has been deferred to the latest version of NFPA 2001. Has there been a study concerning the use of CF_3I relating to the use at altitudes indicating that it may be as bad or worse than Halon 1301 at altitude? B. Leach: There was a group studying the release of this agent's ODP (relating to its use on the F-16 military aircraft).

International Environmental Update – R. Hill (information provided by John O'Sullivan)

John O'Sullivan (British Airways) was unable to attend this WG meeting, however, he provided some notes for the International Environmental Update as follows:

Update on the EUC in relation to ODS's:

1. EU Regulation 2037/2000 is currently being reviewed and the technical amendment is being proposed and is due to be issued in April or May 2003. It will deal with the following issues.

(a) Allows the export of Halon for critical systems as defined in Annex 7 in bulk containers which includes aviation.

(b) The Commission is going to put time limits on the exemptions contained in Annex 7. This includes critical uses having to be reviewed at a frequency to be determined by the EU.

(c) Address new substances that are contained in the Montreal Protocol but

are not currently in the regulation, e.g. Bromochloromethane.

(d) Allows the export of equipment containing ODS, other than domestic refrigerators and freezers.

At this time the Halon Critical Uses Advisory Group is reviewing Annex 7 and H1211 is going to be added to the list for military applications in addition to H1301.

There is also a lot of debate and discussion regarding the use of HFCs and it is very likely that there will be some control measure put in place in the not too distant future.

A number of European countries are putting it into their legislation and will not allow its use for fire fighting purposes.

Tom Cortina commented that Item B: There is an EU critical use list that includes aviation uses. The EU may put a time limit on some of these critical uses in this regulation.

Dick mentioned the following concerns: The MPS for Lavatory Extinguishers and for Handheld Extinguishers are complete, and there are viable replacement agents and extinguishers for both of these. How does this affect the exemptions for use in Europe? Underwriters Laboratories in the U.S. is the only facility conducting equivalency tests for handheld extinguishers at this time. What does this mean for European carriers?

Test Hydrostatic Standardization Update – R. Hill

The letter requested by the Task Group has been sent to the U.S. DOT (Department of Transportation). Copies of this letter were sent to the FAA Environmental office and the U.S. EPA. The DOT response is as follows: The "Flight Standards Handbook Bulletin for Airworthiness" (HBAW 02-01A, Order 8300.10, Appendix 3) has been modified. The Amendment to the Handbook is dated September 4, 2002.

THURSDAY, OCTOBER 31, 2002

Engine Nacelle Update – D. Ingerson

Doug reviewed the April-July 2002 testing conducting in the FAATC Engine Nacelle test facility. Some issues with the HSI (hot surface ignition) were discovered during this test period. As a result, the Task Group met July 23-24, 2002, to discuss issues involving the MPSE and HSI and agreed on revisions to the MPSE. He explained the revisions incorporated into Version 3 of the MPSE as a result of the issues addressed by the Task Group during summer 2002. Doug presented a photograph and diagram explanation of the test design configuration. He explained the concept validation for the revision of the MPSE. The foundation testing was described in detail including the presentation and explanation of the

results of these tests. The Task Group will meet on the afternoon of October 31, 2002, at the FAATC to discuss several unresolved issues.

Lithium Battery Fire Tests – R. Hill (for Harry Webster)

This work was conducted at the request of RSPA. They are tasked with regulating the transport of hazardous materials including aircraft. There is no current limitation on the number of batteries that may be carried. The CR2 lithium batteries referred to are the ones contained in a wristwatch. These batteries are usually shipped on palettes that contain from 100,000 to 500,000 lithium batteries. There has to be an ignition source in order to ignite a fire. The FAATC investigated ignition sources in its lithium battery test program involving 1 to 128 lithium batteries. The results of these tests were described. Cargo liner integrity tests were also conducted at the FAATC. The test results were forwarded to RSPA. Other slightly larger batteries were then tested at the FAATC including PL123 A and laptop computer batteries (lithium ion batteries). The conclusions of the tests were reviewed. Oven tests were then conducted to determine the risk of battery ignition due to smoldering suppressed fire in a cargo compartment. A description of the oven tests conducted on Panasonic PL123 A batteries was provided. Explosion tests were also conducted to measure magnitude of pressure rise in an enclosed space due to battery ignition. These tests were conducted in the FAATC Pressure Modeling Facility. Graphs of these test results were presented. The conclusion of theoven/explosion tests: the temperatures found in a suppressed smoldering cargo fire are sufficient to ignite a primary lithium battery and the pressure rise due to battery ignition sufficient to compromise the integrity of a cargo compartment (these tests were conducted in the pressure modeling facility). The FAATC forwarded their recommendations to RSPA at the conclusion of this test program. Harry will be publishing a report on this test program. The final report will be available on the FAATC Fire Safety Branch website.

Active Fire Protection in Hidden Areas – T. Marker

The FAATC Fire Safety Branch purchased a B727 in 2001, to use as a test article. The Fire Safety Branch is in the process of coordinating the relocation of the aircraft to the Fire Safety Branch research facilities in the FAATC R&D area. The relocation of the aircraft is on hold until the budget is resolved. Some FAATC research will be done as a result of NTSB new recommendations (for 2002) based on four incidents/accidents that related to cabin crew access to fires in hidden areas. Tim presented photos of these four hidden fire incidents/accidents and a few others described each one. The FAATC Fire Safety Branch will take a coordinated approach including the following areas: accessibility, detection, and suppression. A key issue in all of these is: "What is the role of ventilation?" Currently, work has begun using the aft section of the Fire Safety Branch's B747 test aircraft to study the effectiveness of hand held extinguishers in wide body hidden areas and cheek areas.

Benefit Analysis for Water Mist Update – R. Hill

The U.K. Civil Aviation Authority (CAA) is currently publishing this report. It will have a FAA report number.

Hydrostatic Test Standardization Comments – H. Humfeldt

This Task Group is requesting service information data from Kidde and Pacific Scientific (the manufacturers). Is there a problem to submit this information by the end of 2002? Representatives from each manufacturer agreed that this information would be provided to the Task Group by the end of 2002 (December 31, 2002).

Next Meeting

The next meeting will be held March 26-27, 2003, in Phoenix, Arizona. It will be hosted by Goodrich Corporation. Specific meeting location details will be available on the Fire Safety Branch website closer to the meeting dates.

Working Group Member Presentations

Fuel Tank Explosion Protection System (Based on OBIGGS) – E. Riegel (Alenia)

Do We Need Halon Replacements to Extinguish Cabin Fires? – K. Spengler (Pingo)