

# INTERNATIONAL AIRCRAFT SYSTEMS FIRE PROTECTION WORKING GROUP MEETING

December 11-12, 2000

Civil Aviation Authority, Gatwick, United Kingdom

**MONDAY, DECEMBER 11, 2000**

Systems Fire Protection Presentations/Discussion

Task Overview – B. Cavage

B-747 Project/Future System Specification – R. Hill

Boeing Flight Test Overview – B. Cavage

A new 8-channel analyzer system was developed in order to obtain repeatability. Currently going through an extensive safety analysis. This is near completion. Boeing will supply a B-737-900 for the testing. The testing is currently scheduled to begin the first week of February 2001. Member question: Are you going to do any analysis at the wing tips? The test plan has been circulated to the ARAC Group on Fuel Tank Inerting for comments similar to this one.

Preliminary O<sub>2</sub> Evolution from Fuel at Different Loads – B. Cavage

Bill described the test apparatus and how the tests are conducted. He also presented the remaining work planned in this area.

Model Data/Exact Solution to Ullage Washing – B. Cavage

Bill presented an updated review of the ullage washing work that was conducted at the FAATC.

ARAC Interface – R. Hill

The FAA created an ARAC Group (Aviation Rulemaking Advisory Committee) to provide input and develop wording for possible rulemaking on a flammability reduction in fuel tanks (ie: fuel tank inerting is one way to reduce the flammability in fuel tanks). This ARAC Group's final report is due to the FAA on July 14, 2001. An ARAC Group is designed to harmonize the FAA and foreign aviation authorities and U.S. and foreign industry work. This ARAC Group on Fuel Tank Inerting is divided into a number of subgroups dealing with areas such as: forecasting, design, etc.

Review of Fuel Tank Flammability at Altitude Work – R. Hill

Dick presented work done in the FAATC Pressure Chamber by Steve Summer. He described the test apparatus and test set up within the Pressure Chamber. The Goals of this test program are: 1) To determine the oxygen concentration needed to fully inert a fuel tank at different altitudes; and 2) To quantify the difference in severity of the fuel tank ignitions, both a altitude and reduced oxygen concentration. The Test Program was also presented. The test results obtained to date were also presented. Steve Summer at the FAATC may be contacted directly with questions or comments on this test work. His email address is [Steven.Summer@tc.faa.gov](mailto:Steven.Summer@tc.faa.gov).

### FAA Fuel Tank Flammability and Inerting Models – I. Thomas

Ivor explained the background on the work previously done by the FAATC and through the NTSB. He presented an example of the model inputs chart (includes variables) and demonstrated the model using a number of variable inputs. He gave detailed explanation of this model, its use, and the terminology of this test program. A copy of this presentation will be available on the FAATC Fire Safety Section website ([www.fire.tc.faa.gov](http://www.fire.tc.faa.gov)).

### Additional Systems Fire Protection Discussion – R. Hill

Dick showed a viewgraph of incorrect installation of a cargo liner around nozzle for extinguishing system on a D to C cargo compartment conversion in an aircraft. The cargo liner should fasten to the flange on the nozzle attachment. In this case, double-stick tape was used to hold the liner in place against the nozzle flange—this did not work.

Dick reviewed a few of the TSB (Transportation Safety Board of Canada) Recommendations after the Swissair 111 Accident Investigation that relate to the work of this Working Group.

### **TUESDAY, DECEMBER 12, 2000**

#### Update on Handheld Extinguishers and Approval Process – R. Hill

Dick updated the group on the status of the Handheld Extinguisher Hidden Fire Test Program. U.L. will begin familiarization with the FAA Handheld Extinguisher Test after January 2001.

#### Seat Fire/Toxicology Requirement Test Status – R. Hill

Tests of all submitted replacement candidates have been completed at the FAATC. Those replacement agents are: FE 36, FE 36/FE 13, Halotron 1, Envirogel, P IV, FM-200. A Task Group has been formed to study this toxicology issue. If anyone has another alternative agent to be tested, contact Harry Webster at the FAATC (email: [Harry.Webster@tc.faa.gov](mailto:Harry.Webster@tc.faa.gov)). The MPS (except for the toxicity issue) has been completed. U.L. has indicated that they will have familiarized themselves with the test by the end of January 2001 and will be ready to run tests on extinguishers with any of the agents listed above to approve for aviation use (U.L. will place a sticker for aviation use on those that are approved at their facility).

#### Halon 1301 Replacement for Lavatory Trash Receptacle Fire Extinguishers – R. Hill

The Minimum Performance Standard has been finalized for this test. Boeing changed their part numbers for the lavatory trash receptacle extinguishers in line with this MPS. Current Plan: The bottle assembly qualification tests are being conducted December 11-15, 2000 (Boeing has borrowed the FAATC facilities for these tests). Conduct bottle installation certification tests at Boeing by February 2001. Revise Boeing specification to indicate non-halon agent/bottle assembly/part numbers by March 2001. Lavatory vendors may then revise their drawings to add non-halon agent/bottle assembly to their laws.

#### Halon Alternative Agents Report Update – R. Hill

The references in the toxicity section were out of date. The EPA provided guidelines for more current references. Louise Speitel (FAATC) has updated the toxicity section references. The publication of the final report is expected in early 2001.

### Engine Nacelle Testing Update – R. Hill

Dick presented the results/outcome of the recent Task Group meeting and other items of note since the August 2000 Systems Working Group meeting in New Jersey. A copy of this presentation will be included on the FAATC Fire Safety Section website ([www.fire.tc.faa.gov](http://www.fire.tc.faa.gov)). The Halonyzer II instrumentation has broke down again. The Fire Safety Section personnel are currently working on a computer program to replace the outdated instrumentation. Doug intends to have the Halonyzer operational by the end of 2000, and have new information to present at the Spring 2001 Systems Working Group meeting.

### Current Status of Halon Stores/Consumption Rate Data:

B. Glaser: Has there been a recent study on the halon store consumption rate similar to the one done in coordination with Thor Eklund (FAATC) several years ago? R. Hill: We should possibly discuss conducting a new study later in the meeting as part of the New Business discussion.

### Cargo Compartment Work Update – J. Reinhardt

John reviewed the three test protocols of the Minimum Performance Standard (MPS): bulk load tests, containerized tests, and surface burn tests. A copy of John's presentation will be included on the FAATC Fire Safety Section website ([www.fire.tc.faa.gov](http://www.fire.tc.faa.gov)). He also covered the test requirements and acceptance criteria as indicated in the MPS. The results of tests conducted at the FAATC were also presented and discussed.

### Aircraft Cargo Compartment Fire Detection – R. Hill

Dave Blake (FAATC) has been researching the false alarm rate. Dick gave an update on the work Dave has done to date. A copy of this presentation will be included on the FAATC Fire Safety Section website ([www.fire.tc.faa.gov](http://www.fire.tc.faa.gov)). Dave's planned future activities were also discussed. Sandia National Laboratories is developing the model for Dave. B. Nixon: Has anyone looked at air aspirated systems or high sensitivity systems? The risk can be tailored to these systems. Dick: Less sensitive detectors seem to be preferred for use in cargo compartments. The results of Dave's research will be reported to the FAA Aircraft Certification Office at the Transport Airplane Directorate in Seattle, Washington, for review and consideration.

### Update on NASA OBIGGS/OBOGS Program – D. Rohn (NASA)

Doug reviewed the NASA Fire Protection Projects currently underway. OBIGGS/OBOGS Concept: nitrogen generation for fuel tank inerting and fire suppression. These efforts are being coordinated with the research being done by the FAATC. The report Brian Palaszewski mentioned during his presentation at the August 2000 Systems meeting will be available on the NASA website in the near future. A NASA Research Announcement (NRA) will be published in Spring 2000 to look at an integrated system (OBIGGS/OBOGS) on the space side of NASA. Explore possible OBIGGS/OBOGS flight tests using NASA's B-757 to conduct inerting tests similar to those that will be conducted on the ground at the FAATC.

### Update on OBOGS Program in France – G. Caudy (DGAC)

Gregory explained the role of Aeronautical Training and Technical Department (SFACT) of the Direction Generale d'Aviation Civile (DGAC) in France. He also explained how the SFACT Research Program is designed and its coordination with the JAA, FAA, TCCA, JCAB, and CASA. An OBIGGS/OBOGS

Study has recently been launched by the DGAC in conjunction with Air Liquide and Aerospatiale. This is a one-year study that will be completed by the end of 2001.

#### FAATC Work On-going on Fire Protection Testing of Hazardous Materials – R. Hill

##### Oxygen Bottle Testing:

Research began as an outcome of ValuJet Accident on May 11, 1996, involving transport of oxygen generators.

Dick described the tests conducted by the FAATC using an LD-3 container. As a result of this test work, a Proposed Oxygen Cylinder Overpack Performance Test was developed. RSPA is going to include information obtained through the FAATC tests in their NPRM for Overpacks for the transport of oxygen bottles in cargo compartments. If you have any questions or comments on this research, contact Tim Marker at [Tim.Marker@tc.faa.gov](mailto:Tim.Marker@tc.faa.gov).

##### Lithium Battery Testing:

Research is ongoing at the FAATC on Lithium Batteries Transported as Cargo as a result of a fire involving 120,000 lithium batteries in Japan being transported as cargo. Halon 1301 is not an extinguishing agent for lithium fires. If you have any questions or comments on this research, contact Dave Blake at [Dave.Blake@tc.faa.gov](mailto:Dave.Blake@tc.faa.gov).

#### Working Group Member Presentations

##### Advanced Agent Working Group (AAWG) – D. Catchpole/A. Chattaway/E. Ural

Dave Catchpole gave an introduction to the Advanced Agent Working Group (AAWG) that is looking for a total flood agent for fire suppression and inerting. This group initially did a literature search to find a chemical agent to have a short atmospheric lifetime. Approximately one dozen were chosen from the initial search and further narrowed the group down to six for toxicology screening. After these tests, three agents were chosen from the six. Cardiac sensitization tests are going to be run on these three agents. Some good initial results have been achieved on the agent this group calls Agent #873. Adam Chattaway described this agent's composition ( $\text{CF}_3 - \text{CBrCH}_2$  [double bond]). Some small-scale, total flood tests and some full-scale cup burner tests have been conducted using this agent. This is a chemically acting agent. This agent has a liquid density of approximately 1.6. Its atmospheric life is about 4 days. This agent is currently manufactured to order. Erdem Ural explained that this group has interest in this agent for explosion protection as well. The explosion protection tests have been conducted in a closed chamber.

##### FAA Compliant Cargo Hold Fire-Test Chamber – D. Olander (BFGoodrich Aerospace)

A copy of Don's presentation will be included on the FAATC Fire Safety Section website ([www.fire.tc.faa.gov](http://www.fire.tc.faa.gov)).

##### Additional Discussion/New Business – R. Hill

EC Environmental Document and Overview is on the HUNC website at [www.HUNC.org](http://www.HUNC.org).

### Next Meeting

The spring 2001 meeting is currently in the planning phase. Once the date/location has been finalized, the meeting details will be posted to the Fire Safety Section website.

### Task Group Meetings

Task Group on Potential Additional Agents for Testing in Cargo Compartments: Seeking new Task Group leader as Al Gupta has changed jobs at Boeing and will no longer be involved in the Systems Working Group.