U.S. Department
of Transportation
**Federal Aviation
Administration**

Technical Center

Atlantic City Int'l Airport
New Jersey 08405

November 21, 1994

Dear International Halon Replacement Working Group Member:

Enclosed is a copy of the Minutes/Information Package from the November 15-16, 1994, meeting held at the Trump Castle Casino-Hotel in Atlantic City, New Jersey.

I would like to take this opportunity to thank everyone who attended for their participation. I believe the meeting was a successful one.

The next meeting will be held overseas the week of April 17, 1995. Further details on that meeting will be mailed at a later date.

Sincerely yours,

Richard G. Hill
Program Manager

Enclosure

LIST OF ATTENDEES

INTERNATIONAL HALON REPLACEMENT WORKING GROUP MEETING

NOVEMBER 15-16, 1994

NAME			ORGANIZATION
Atkinson	Dale		Consultant
Bein	Don		United Technical Resource Services
Bennett	Mike		U.S. Air Force/Wright Lab
Blackburn	John		Avro International Aerospace
Bucke	Michael		American Airlines
Caloras	Jack		Tec-Air Services, Inc.
Combs	Todd		U.S. Air Force/Wright Lab
Cortina	Tom		HARC/HRC
DeSipio	Paul		NAWC Warminster
Dierdorf	Doug		Pacific Scientific
Dunker	Bernd		Deutsche Aerospace Airbus
Dvorak	Larry		Raytheon Aviation Company
Feist	Rudi		Solvay Performance Chemicals
Filipczak	Bob		FAA Technical Center
Frid	Kevin		GEC-Marconi Avionics, U.K.
Gibson	Jeff		American Pacific Corporation
Glaser	Bob		Walter Kidde Aerospace
Grabow	Thomas		Deutsche Aerospace Airbus
Grimstad	Greg		Boeing Commercial Airplane Company
Grosshandler	Bill		NIST/Building & Fire Research Lab
Guglielmi	Elio		North American Fire Guardian
Gupta	Alankar		Boeing Commercial Airplane Company
Harwood	John		Royal Australian Air Force
Henry	Tim		DuPont Fluoroproducts
Ingerson	Doug		FAA Technical Center
Jacobson	Ester		Spectrex, Inc.
Kent	Dale		3M
Kolleck	Matt		Booz-Allen & Hamilton, Inc.
Krinsky	Joel		NAVSEA
Leach	Bill		Navy-Lakehurst
Lewis	Claude		Transport Canada (Aviation)
Louie	W. Christopher		Sikorsky Aircraft/Propulsion
Marker	Tim		FAA Technical Center
May	Charles		Mass Systems, Inc.
McCutcheon	Bill		GEC-Marconi Avionics, U.K.
Meck	Werner		Airbus Industrie
Mehta	Harendra		Boeing Commercial Airplane Company
Moore	Daniel		DuPont Fluoroproducts
Mossel	John		J.W. Mossel & Associates
O'Sullivan	John		British Airways
Paillet	Jean		Aerospatiale
Petrakis	John		FAA/AIR-120
Povey	Nick		CAA (U.K.)

Roduta	Bud		United Airlines
Rountree	Glynn		Aerospace Industries Association
Sarkos	Gus		FAA Technical Center
Sears	Richard		Walter Kidde Aerospace
Simpson	Terry		Walter Kidde Aerospace
Stossel	Felix		Swissair Ltd.
Tapscott	Bob		NMERI/University of New Mexico
Walter	Gerald		Great Lakes Chemical

INTERNATIONAL HALON REPLACEMENT WORKING GROUP MEETING

Held at
Trump Castle Casino-Hotel, Atlantic City, New Jersey

TUESDAY AND WEDNESDAY,
NOVEMBER 15-16, 1994

TUESDAY, NOVEMBER 15, 1994

D. Hill: Gave brief overview and background on creation of this Working Group.

FAA SUBGROUP REVIEWS/PRESENTATIONS

CARGO - D. Hill

D. Blake unable to attend meeting. D. Hill reviewed several of the tests Dave has conducted recently. Dave has been tabulating data on types of fires that can occur in cargo compartments. He will make this information available in the near future. We are looking to purchase another agent to compare to FM200.

CARGO - WATER MIST SYSTEMS WORK - T. Marker (FAATC)

Reviewed FAA Technical Center's Cargo-Water Mist Systems test program and tests recently conducted. Explained FAATC's cargo area fire load. Discussed upcoming tests. Tim addressed a number of questions from Group members concerning recycling, freezing of water, and other factors such as false alarms in the cargo area. Per A. Gupta (Boeing): LD3 container with cardboard should be one of the design fires that any agent should be tested with (suggested other info such a depth of fire, etc., should also be documented). However, D. Hill explained that FAA is not ready to state a specific design fire for pass/fail testing at this point. D. Hill disagreed with A. Gupta's explanation of wrong test and wrong conclusions - it is possible that group members' tests may be producing correct conclusions. We selected this design fire as worst case in a containerized cargo area. F. Stossel (Swissair) also raised question on test configuration - everyone should test using a similar test configuration in order for test to be meaningful. D. Hill stated that the Revised Cargo Compartment Halon Replacement Agent/System Proposed Minimum Performance Standard would be discussed in more detail later in the meeting. D. Hill stated that cargo containers with cardboard have been determined to be a representative fire load at this point. Maybe within D. Blake's Small Scale Task Group we can come up with a representative fire load for these tests. Remember worst case for one agent may not be worst case for another agent.

ENGINES - M. Bennett (WPAFB)

Reviewed recent information on testing cleared for the public. Final candidate is scheduled to be disclosed on Thursday, November 17, 1994. In FY1995, we plan to run Phase III of our testing - we are currently looking at using different fuels, airflows, and sizes in the Phase III testing. We plan to look at cold air temperatures in FY1995. We are working on an airbag concept. Next Generation Program - DoD is still going forward with this program as far as we know. We are also looking for suggestions for Phase III. D. Hill: we do not have the manpower or the facilities/resources at the FAATC to work on engine testing to

compliment what the airforce and the navy are doing. We are presently relying on Mike Bennett's engine work at WPAFB. At this time, I can not say if or when we at the FAATC will have the manpower or funding in the future to do engine or handheld extinguisher testing.

HANDHELD - N. Povey (U.K. CAA)

Reviewed purpose of Handheld extinguishers in aircraft. A copy of Nick's presentation is included in this package. Aviation authorities are looking for no loss of safety in an alternative agent. We need to develop an aviation specific test. What is the JAA? It is the European Joint Aviation Authority-it comprises 23 countries (more than the number of countries in the European Community). The initiation of joint research is to some extent a new endeavor. Halon is one of the JAA's new research topics. CEAT and DGAC in France plan to do some work in this area. The DLR in Germany has fire test facilities is an agency that would like to do the work, but needs funding. DLR has received some money from the German Department of Transport-they are going to evaluate 4 agents for handheld extinguishers for seat fires and gasoline fires. CAA receives no government funding in the United Kingdom-it gets money from charging industry for its work. CAA plans to contract work by the end of this year, and hopes to have some results to present to this group at our April 1995 meeting. A. Gupta: when will aviation specific tests be defined for others working on this testing? when we look at alternative agents, do we have to look at a pound for pound basis? N. Povey: the handout contains some of this information. A. Gupta requested that the authorities provide details on aviation specific tests. The response was that was the reason for writing the minimum performance standards, and the details will be included in the standards. D. Hill stated that the goal of this group is to develop test methods and standards for handheld extinguishers (we want to come up with the same test for all the different agents for all of us to conduct).

TASK GROUP REVIEW - D. Hill

Gave brief overview of Task Group concept. If anyone has suggestions for additional Task Groups, please tell us.

TASK GROUP PRESENTATION #5 - ENGINES - M. Kolleck (Booz-Allen Hamilton)

Update on Engine Report. It should be given to WPAFB by end of November 1994. We are looking for suggestions on how data should be presented. If you have any suggestions, please tell me or write me with them. D. Hill spoke with Bill Allen who said he had a contract with WPAFB, and he said he was working on halon alternatives for engine nacelles. How confident are you that the data in your survey is correct? M. Bennett and M. Kolleck - in the report, it is made clear where the information came from (sources). M. Bennett: we have requested in this report that people reviewing it please give us feedback if they see something that is questionable. M. Kolleck: the survey was quite extensive and would have taken someone a great deal of time to complete, so there could be some errors in the data supplied to us. If you find something that is questionable or incorrect, call us and we will give you the source to contact directly.

TASK GROUP PRESENTATION #6 - CURRENT ALTERNATIVE AGENTS - B. Tapscott (NMERI)

We turned in this Task Group's final draft report. I want any comments you have on this report within one week. Reviewed information/materials/alternative agents that this Task Group explored and gave overview of information in report. CFC's and HBFC's are not addressed in this Task Group's report. Contact Bob if you want a copy of the report. This

Task Group should recommend a most likely agent to use, but A. Gupta disagrees. He believes there should be a test protocol for testing gaseous agents and liquid agents. D. Hill wants a suggestion of the best one or two agents to use in the development of the protocol. D. Hill: what you are saying is that you want us to develop a protocol without running any tests with possible alternative agents? D. Hill: we will develop a common test method. A. Gupta: we would like to know what tests you run so that we can run those tests ourselves and not rely on FAA.

TASK GROUP PRESENTATION #8 - HALON RESTRICTIONS - J. O'Sullivan (British Airways)

Brief overview and background on Montreal Protocol and the Basel Convention. Reviewed recommendations of Halons Technical Options Committee to the Parties of the Montreal Protocol. D. Hill: has there been any talk of legislating the destruction of halon through the Montreal Protocol? Is there talk of mandating its destruction by a certain date? J. O'Sullivan: currently, there is not.

TASK GROUP PRESENTATION #9 - SMALL SCALE SCREENING TEST FOR CARGO AGENTS - D. Hill (FAATC)

D. Blake unable to attend. Dave sees that the problem is that the Task Group has gotten away from its main objective - it seems that the group was headed toward developing a small scale certification test.

TASK GROUP PRESENTATION - #7 POTTY BOTTLES - R. Sears (Walter-Kidde)

Gave overview of Task Group including members, background, test set-up, test article, and explanation of tests. Briefed group on issues that still require resolution. Reviewed Test Procedure presented by Bob Glaser at July 26-27, 1994, Working Group meeting. Showed design of potty bottle. A. Gupta: your group has developed a test protocol using FM200 - can it be used with other agents? R. Sears: yes.

POTTY BOTTLE PROPOSED MINIMUM PERFORMANCE STANDARD- R. Hill

This draft was mailed to all group members with Preliminary Agenda. We have received several comments on this draft. R. Sears: we need to look at both ends of the temperature? B. Glaser: we need input from the airframe manufacturers on minimum temperature, and we will give it to John to review. A. Gupta: what happens to this Standard after it is finalized? D. Hill: we will write a cover letter and send it to the appropriate international regulatory authorities for review. Does anyone have a comment after reviewing this Standard?

WORKING GROUP MEMBER PRESENTATIONS

1. Dan Moore - DuPont

FE-36 is DuPont's agent targeted as a replacement for Halon 1211. He gave status of this agent. It is a development product currently being produced and sold for R&D purposes. Showed video DuPont produced during 1960s on Halon 1301.

2. Elio Guglielmi - North American Fire Guardian

We have developed NAF P-III as a replacement agent for Halon 1211.

TASK GROUP #9 MEETING MINUTES, NOVEMBER 15, 1994

The Task Group #9, "Small Scale Screening Test for Cargo Agents", held a meeting after the International Halon Working Group meeting.

The meeting was attended by:

Richard Hill (FAA Technical Center)
Robert Glaser (Walter Kidde Aerospace)
Richard Sears (Walter Kidde Aerospace)
Bill McCutcheon (GEC-Marconi)
Kevin Frid (GEC-Marconi)
William Grosshandler (NIST)
Bernd Dunker (Airbus)
Felix Stossel (Swissair)
Doug Dierdorf (Pacific Scientific)
Greg Grimstad (Boeing)
Alankar Gupta (Boeing)

In the absence of Mr. Dave Blake (Task Group Leader), Alan Gupta chaired the meeting. For the benefit of new members joining the Task Group, Alan gave a brief summary of the group's objectives in general and the screening test (apparatus and method) submitted to the group in particular. There was lively discussion and there was a general consensus that some sort of screening test for gaseous and liquid agents was necessary to reduce the available options. Number of different methods to achieve this goal were discussed including the use of heptane cup burner test data for gaseous agents and a small chamber, approximately 6 ft3, for test of agents under similar conditions. The following action items resulted and the committed dates for completion of action items volunteered is indicated:

1. Screening test of gaseous agents using class A fire or simulated class A fire - William Grosshandler (NIST) before the next meeting of the International Halon Replacement Working Group.

2. Screening test of non-gaseous agents using class A fire or simulated class A fire - Doug Diredorf (Pacific Scientific) - January 1, 1995.

3. Fire load and ignition method for screening test of agents - Richard Hill (FAATC) - January 1, 1995.

It was mentioned at the meeting that screening tests of both gaseous and non-gaseous agents are required to keep open the options. Each type of agent has pros and cons and it is only by test under identical conditions that the agents can be evaluated. It was further mentioned that the screening tests are intended only for the purpose stated (screen agents) and not for replacing full scale tests that the FAATC may determine necessary to show "equivalent performance". The screening tests are not intended to replace FAA tests; they are intended to complement FAA testing.

It is requested that material in response to the identified Action Items be submitted to Dave Blake (FAATC) (Group Leader).

DISCUSSION ON REVISED CARGO COMPARTMENT HALON REPLACEMENT AGENT/SYSTEM PROPOSED MINIMUM PERFORMANCE STANDARD

D. Hill addressed a number of questions from group members. B. Grosshandler (NIST): (F) Ground Test Conditions: (4) change wording here to tie-in with worst case as rest of document reads

Page 1 (a): A. Gupta (Boeing): instead of "national and international" standards, site specific standards. D. Hill: if anyone has exception to this, give us new wording in writing (we asked for this after the discussion at the last meeting and no one sent us anything J. Walter (Great Lakes Chemical): why don't you combine Paragraphs (a) and (b) and eliminate some words? (see notes). N. Povey (CAA): add a statement at end that manufacturer will have to check into requirements/regulations. G. Sarkos: I think that (a) should be left in because it states that agent must meet recognized standards. We wanted to keep a statement like this in all the Minimum Performance Standards. Maybe we should just change the wording slightly. A. Gupta: give us the minimum requirements only. F. Stossel (Swissair): leave (a) and add the words "as for example" and follow it by (b). D. Hill: final note: Write down your suggestions for wording changes and submit them to us for review, since it seems the group does not totally agree with what we have for (a) and (b) now.

After discussion on Paragraphs (a) and (b), in response to a number of questions concerning the term "demonstrate", D. Hill stated: "demonstrate does not necessarily mean perform tests but documented information and analysis may be adequate".

Some discussion on carriage of animals. If you know that animals will be killed by discharge of a toxic agent, authorities should not let animals be carried on board that aircraft. D. Hill: write down your comments on this and send them to us.

Page 1 (c): (1) F. Stossel: It is not reality for the mechanic or worker to wear a safety mask or breathing apparatus every time they enter the compartment. D. Hill: In the U.S., workers are required to wear safety apparatus. Airlines will have to prove safety by some means, and it may be demonstrated differently in different countries depending on their country's requirement.

Maybe clarify that the reference is to aerosol "cans". Include the word "can".
B. Grosshandler (NIST): I suggest being very explicit on "aerosol cans" and what they contain and size, etc. D. Hill: the Proposed Standards for all the test methods are part of a three to four year program - so there are going to be some areas where we need additional information.

Toxicity: we are looking to equate toxicity to that of Halon 1301.

(f) Ground Test Conditions: this is a rough outline, please send us your comments on this area to be considered for incorporation. H. Mehta: The document is written in a confusing manner. D. Hill: John Petrakis wrote it in the government format. We will see what we can do about the format.

DISCUSSION ON MINIMUM PERFORMANCE STANDARD FOR ENGINES

M. Bennett reviewed draft "Proposed Minimum Performance Standards for Aircraft APU and Engine Component Fire Extinguishing Systems". Request copies of this Proposed Standard from Mike Bennett. Suggestion: include a time for reignition for purpose of consistency also set a minimum for extinguishment time. M. Bennett: we also need to consider - how

long do we want to assume the fuel is going to run in the compartment (fuel continuation)? I would like some input from industry on this. B. Grosshandler: I suggest you include some of wording similar to those in the Cargo Minimum Performance Standard -- as far as Halon 1301 as baseline. P. DiSipio: fuel flow rate maybe should be backed up with flame temperature--is there some other information that can be included? B. Grosshandler: fuel flow rate is important and maybe include heat release rate as back-up. M. Bennett: our committee could use some assistance in this area from other Working Group members. B. Glaser: I don't think there is a facility that can test at the level of detail that you have in the Minimum Performance Standard - except maybe your facility. M. Bennett: it was not planned that way. H. Mehta: a lot of this is being driven by past experience and ideas about the future. We should try to measure the concentration in a given location. I don't think you can have the fire in the same test where you are measuring the concentration. B. Glaser: your facility has limited capacity and it also is committed right now; if we do have a new idea (new agent/system), how long would a new system be run against your Minimum Performance Standard? M. Bennett: the Standard is just newly drafted, so it's hard for me to estimate at this time. Our facility is booked up for the next year. H. Mehta: if it is acceptable to the FAA, we can reduce the size of the facility indicated in the Minimum Performance Standard and have another facility built somewhere else on a smaller scale.

DISCUSSION ON MINIMUM PERFORMANCE STANDARD FOR HANDHELD EXTINGUISHERS - N. Povey (U.K. CAA)

N. Povey: reviewed outline for Minimum Performance Standard included in his Handheld extinguisher handout. Additional suggestion has been that all extinguishers used In the cabin should have flexible hoses. Maybe this is something we should research. Is there anything that isn't in the spec that should be? What does U.L. approval do? B. Glaser: I am not an expert on this, but I think there is a series of leakage tests and fire tests that the extinguisher goes through in about 12 months. It costs about $30,000-$35,000 per extinguisher. D. Hill: do you think that having an extinguisher TSO'd would be less expensive? B. Glaser: yes, I do. D. Moore (DuPont): the standards in Europe are not the same as U.L. and FM. N. Povey: I have tried to put forward the specification for the extinguisher not the extinguisher's use. Do we need a Task Group for this? No one has identified any issues that I have not included, is that correct? Yes, that's correct. B. Roduta (United Airlines): will check for test data on use of hoses with handheld extinguishers done several years ago at United Airlines. N. Povey: asked for volunteers to be in Handheld Task Group. J. Petrakis: will this group investigate the feasibility of a TSO?

GENERAL DISCUSSION

D. Hill: I have one general comment from yesterday morning: possibly we should have some time for Task Group meetings prior to the full meeting of the Working Group. Should we have maybe half a day the first day for Task Group meetings and then have reports from the Task Groups at the Working Group meeting. Group Concensus: yes.

A. Gupta: I suggest we review minutes of previous meeting for clarity, etc., as a standard part of all of our future meetings. D. Hill: We will make this an agenda item for the next meeting.

TASK GROUP ASSIGNMENTS

TASK GROUP #6: B. Tapscott will revise and make some additions to the report.

TASK GROUP #7: B. Glaser- there is still the issue of temperature. We will have some data before the next meeting on this. We would like to get some low temperature start-up data from Airbus (W. Meck). W. Meck: we will try to get that for you.

Handheld Extinguishers Task Group (N. Povey-Chairman): John Petrakis (FAA Air-120), Claude Lewis (Transport Canada), Gregory Grimstad, Doug Dierdorf, Dale Kent, John Mossel, B. Glaser, Larry Dvorak, John Blackburn, Michael Bucke, Jeff Gibson, John O'Sullivan (British Airways), Dan Moore (DuPont), Bob Tapscott (NMERI).

ADMINISTRATIVE NOTES

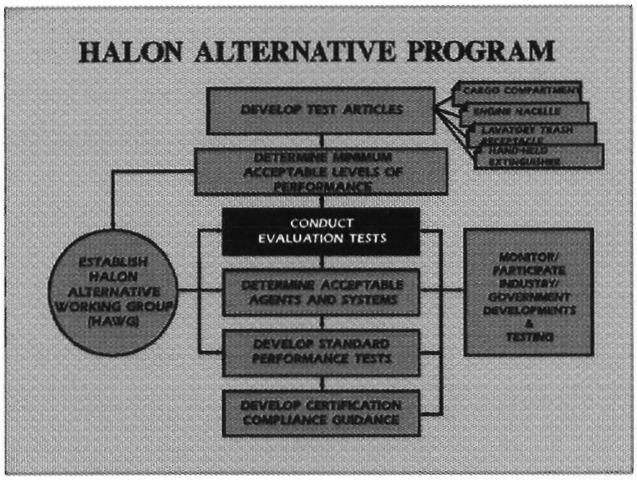
Minutes/Information Package will be sent only to those who attend meeting and those who send the Return Form back to us requesting the minutes if they cannot attend the meeting.

If any of the Task Group chairmen want information from their Task Groups included in minutes, give April the information, and she will include it in the minutes.

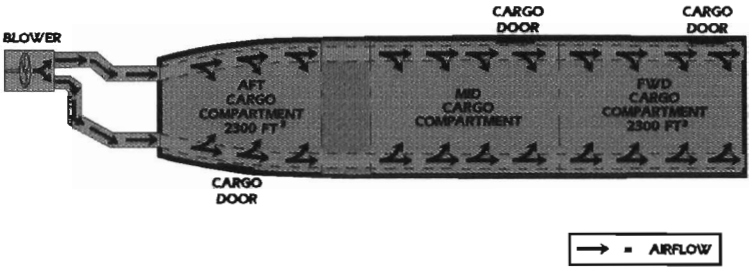
NEXT MEETING

The next meeting will be held overseas during the week of April 17th. Complete information on the next meeting will be mailed under separate cover as soon as all the arrangements have been finalized.

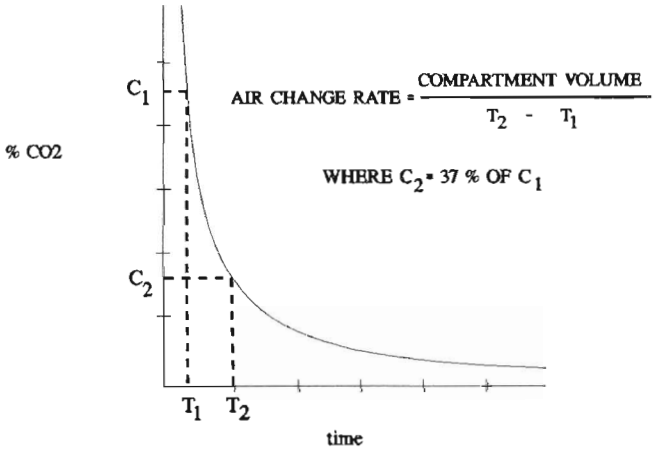
HALON ALTERNATIVE PROGRAM



TC-10 TEST ARTICLE VENTILATION SCHEMATIC



VENTILATION RATE CALCULATION



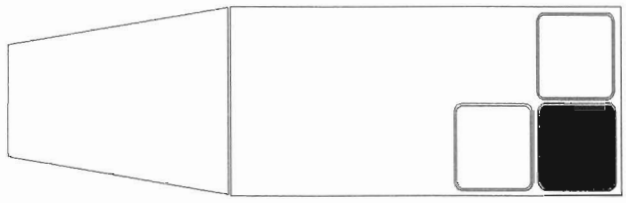
CARGO COMPARTMENT FIRE LOAD

CONTAINERIZED TESTS

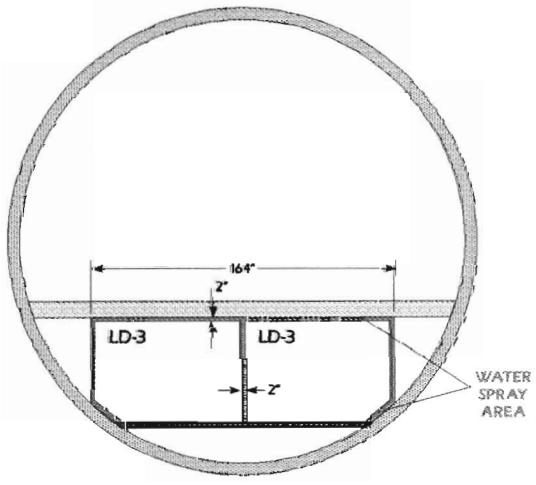
LD-3 CONTAINER WITH PAPER FILLED CARDBOARD BOXES

LD-3 NESTED BETWEEN 2 EMPTY LD-3 CONTAINERS

LEXAN WALLED LD-3 ALLOWS FIRE TO BURN THROUGH



TC-10 FUSELAGE CROSS SECTION



DUAL FLUID NOZZLE SYSTEM

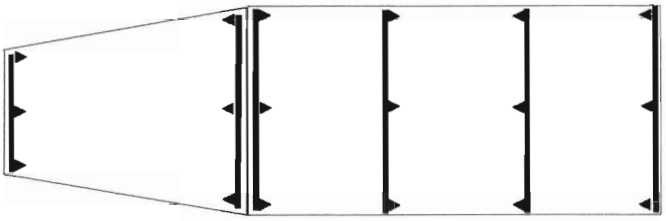
SUPPLIED by GEC/MARCONI

80 psi AIR/ 60 psi WATER

2.5 LITER/MIN FLOWRATE

ZONED CONFIGURATION (18 NOZZLES, 4 ZONES)

INDIVIDUAL ZONE ACTIVATION BASED ON TEMPERATURE

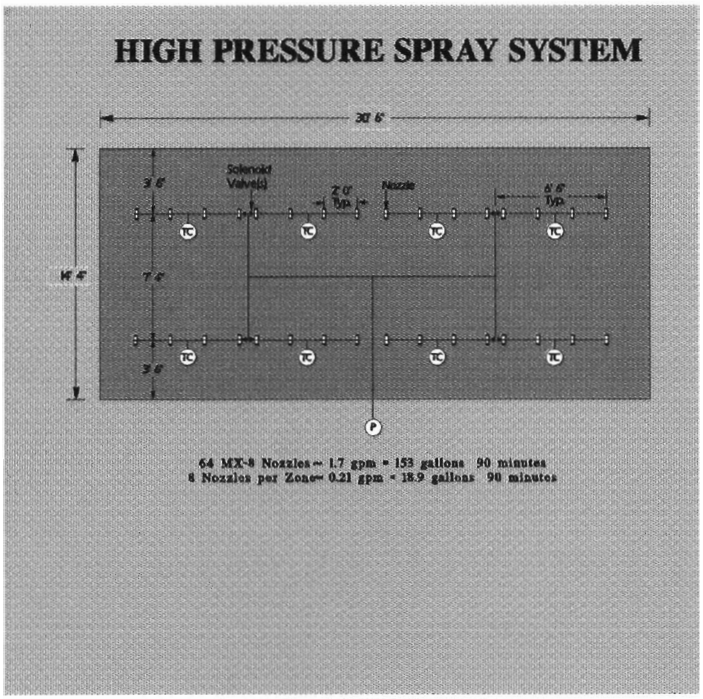


TEST RESULTS
DUAL FLUID NOZZLE

8 TESTS CONDUCTED

- *TEST DURATION BETWEEN 50 and 90 MINUTES*
- *WATER USAGE BETWEEN 80 and 110 U.S. GALLONS*
- *AVERAGE CEILING TEMP BETWEEN 200°F and 300°F*
- *MINIMUM OXYGEN CONCENTRATION 12 % TO 16 %*

HIGH PRESSURE SPRAY SYSTEM



TEST RESULTS
HIGH PRESSURE SINGLE FLUID NOZZLE

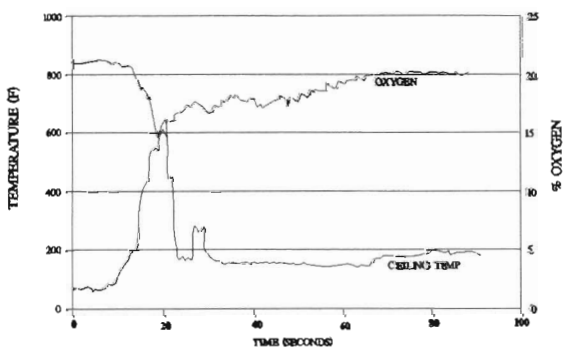
TEST 1: 250 F ACTIVATION, 10 SECOND SCAN, 60 MINUTE DURATION
CEILING TEMPS REACHED 1000 F, 40 GALLONS USED
ACTION ➡ *INCREASE ZONE SIZE, INCREASE FLOWRATE*

TEST 2: 250 F ACTIVATION, 10 SECOND SCAN, 90 MINUTE DURATION
CEILING TEMPS LOWERED, 44 GALLONS USED
ACTION ➡ *DECREASE ACTIVATION TEMP, INCREASE FLOWRATE*

TEST 3: 200 F ACTIVATION, 10 SECOND SCAN, 90 MINUTE DURATION
CEILING TEMPS EXCEEDED 1000 F, 85 GALLONS USED
ACTION ➡ *DECREASE SCAN RATE, INCREASE FLOWRATE*

TEST 4: 250 F ACTIVATION, 5 SECOND SCAN RATE, 90 MINUTE DURATION
400 F - 500 F CEILING TEMPS, 65 GALLONS USED

SINGLE FLUID NOZZLE TEST 4
OXYGEN and TEMPERATURE PROFILES

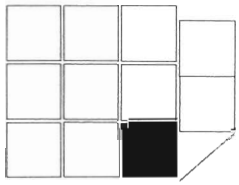


FUTURE TESTWORK

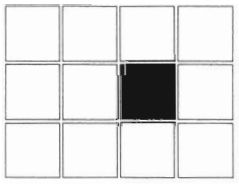
- SINGLE FLUID NOZZLE TESTS USING DIFF ZONE CONFIG
- 360° DUAL FLUID NOZZLE TESTS
- WATER COLLECTION/RECYCLING SYSTEM
- CONDUCT BULK LOADED FIRE TESTS USING SINGLE and DUAL FLUID SPRAY SYSTEMS
- HALON BASELINE TEST IN FORWARD COMPARTMENT
- CLASS A FOAM CONCENTRATE ???
  (SYNTHETIC DETERGENT HYDROCARBON SURFACTANT)

FIRE LOAD PARAMETERS AND PROCEDURES FOR CONDUCTING CONTAINERIZED CARGO COMPARTMENT FIRE TESTS

- A total of 33 boxes were arranged in one LD-3 container.
- Outer dimension of the cardboard boxes: 18" X 18" X 18".
- Cardboard wall thickness: 1/8".
- Average weight of empty box: 2.4 lbs.
- Average weight of shredded paper: 1.6 lbs.
- Cardboard boxes are folded together, no tape.
- 18 guage nichrome wire is used to start fire. 7 feet of wire is wrapped 22 times around 10 sheets of 3 3/4" X 10" "C-fold" paper towels. All towels are tightly folded lengthwise in half, to make a paper stack 1 7/8" X 1/2" X 10".
- The nichrome "fire starter" is placed in the bottom area of the "fire box", nested in the shredded paper.
- The "fire box" is placed on the bottom row, centered, nearest the angled side of the container.



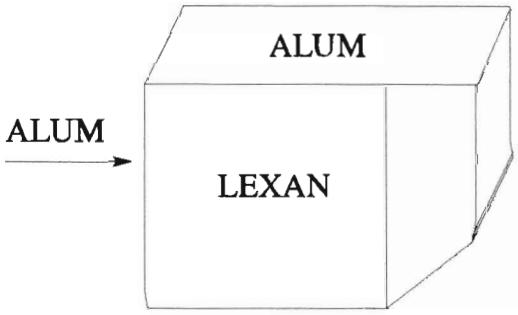
SIDE



TOP

- A thermocouple is placed in this fire box, as well as on top of it, to indicate when fire is started.
- Smoke detection usually occurs within several minutes of paper ignition.
- Future tests will be run using a "standard" LD-3 container configured as follows:

1/8" aluminum top and inner side panel
Lexan on the front face
22 guage steel in remaining areas



INTERNATIONAL HALON REPLACEMENT WORKING GROUP

TASK GROUP #7

"POTTY BOTTLES"

SUMMARY

REPORTED ON NOVEMBER 15, 1994
TRUMP HOTEL
ATLANTIC CITY, NEW JERSEY

BY
R. F. SEARS

INTERNATIONAL HALON REPLACEMENT WORKING GROUP
TASK GROUP #7
SUMMARY

- DEVELOPMENT OF EQUIVALENT LEVEL OF SAFETY TEST PROCEDURE:
  - USE OF 1 ⅛ ft^3 TEST ARTICLE
  - BURIED NICROME RESISTANCE IGNITOR TO DEVELOP DEEP SEATED COMBUSTION
  - USE OF 815 GRAMS WEIGHT CRUMPLED PAPER TOWELS AS FIRE LOAD
  - USE OF LOW LEVEL VENTILATION HOLES TO ASSIST REPEATABLE IGNITION. CLOSED WHEN EXTINGUISHER DISCHARGES
  - IF NO FIRE AND TEMPERATURE IS FALLING, OPEN AFTER 5 MINUTES
  - OBSERVE FOR A FURTHER 2 MINUTES
  - IF NO RE-IGNITION, SPREAD WASTE MATERIAL AND NOTE EXTENT OF CONSUMPTION BY FIRE, EVIDENCE OF SMOLDERING
  - TEST IS "PASSED" IF TEMPERATURE SHOWS A DECREASING TREND AFTER EXTINGUISHER DISCHARGE AND NO FLARE-UP AFTER ACCESS PANEL IS OPENED
  - TEST IS AT THRESHOLD OF CURRENT 1301 EXTINGUISHER CAPABILTY

INTERNATIONAL HALON REPLACEMENT WORKING GROUP
TASK GROUP #7
SUMMARY

- JUNE '94 TASK GROUP MEETING, WKA WILSON:

TASK GROUP: CHAIRMAN, R GLASER, WALTER KIDDE AEROSPACE

MEMBERS;

T GRABOW,	DEUTSCHE AEROSPACE
G GRIMSTAD,	BOEING COMMERCIAL AIRCRAFT GROUP
G HARRISON,	WALTER KIDDE AEROSPACE
D INGERSON,	FAA TECHNICAL CENTRE
T KLEMS,	AIRBUS INDUSTRIE
M ROBIN,	GREAT LAKES
R SEARS,	WALTER KIDDE AEROSPACE
R TETLA,	USAF

INTERNATIONAL HALON REPLACEMENT WORKING GROUP
TASK GROUP #7
SUMMARY

- OTHER ISSUES;
  - MINIMUM OPERATING TEMPERATURE, AFTER DISCUSSION THE GROUP AGREED THAT THIS ASPECT SHOULD BE A SCD ITEM. THIS POSITION WAS BASED ON THE FOLLOWING GROUP ASSUMPTIONS;
    - ♦ THE POTTY BOTTLE IS INTENDED TO PROTECT AN OCCUPIED AIRPLANE
    - ♦ AN AIRPLANE WILL NOT BE OCCUPIED UNTIL THE INTERIOR IS AT A HABITABLE TEMPERATURE
    - ♦ NO TRASH WILL BE PRESENT IN THE RECEPTACLE UNTIL THE AIRCRAFT IS OCCUPIED

INTERNATIONAL HALON REPLACEMENT WORKING GROUP
TASK GROUP #7
SUMMARY

- JULY '94 IHRWG, MEETING SEATTLE:
- TASK GROUP #7 FINDINGS PRESENTED TO CONFERENCE, TWO ISSUES RAISED:
  - PAPER MOISTURE CONDITIONING, A CONDITIONING PROCESS TAKEN FROM NFPA 701 (Fire Tests for Flame Resistant Textiles and Films) WAS PROPOSED. The FAA SUBSTITUTED THEIR OWN PROCESS
  - EFFECT OF VARIATIONS IN PAPER WET STRENGTH TREATMENT ON FLAMMABILITY CHARACTERISTICS, CURRENT "STRONGEST" PAPER TOWELS (BOUNTY) HAVE A MAXIMUM 1.25% BY WEIGHT WET STRENGTH TREATMENT

INTERNATIONAL HALON REPLACEMENT WORKING GROUP
TASK GROUP #7
SUMMARY

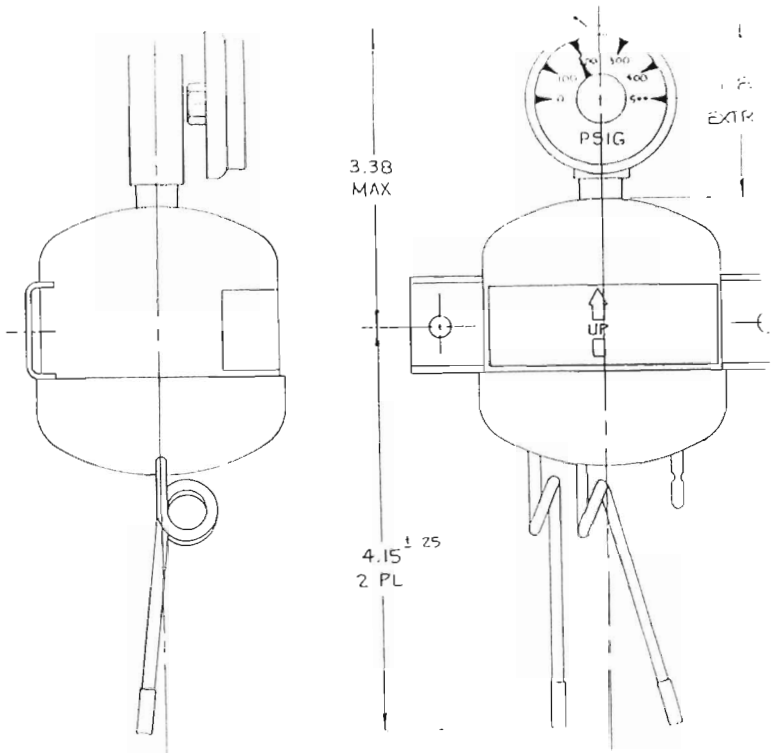
WALTER KIDDE AEROSPACE
[illegible]TY BOTTLE REPLACEMENT AGENT CONFERENCE
JUNE, 1994

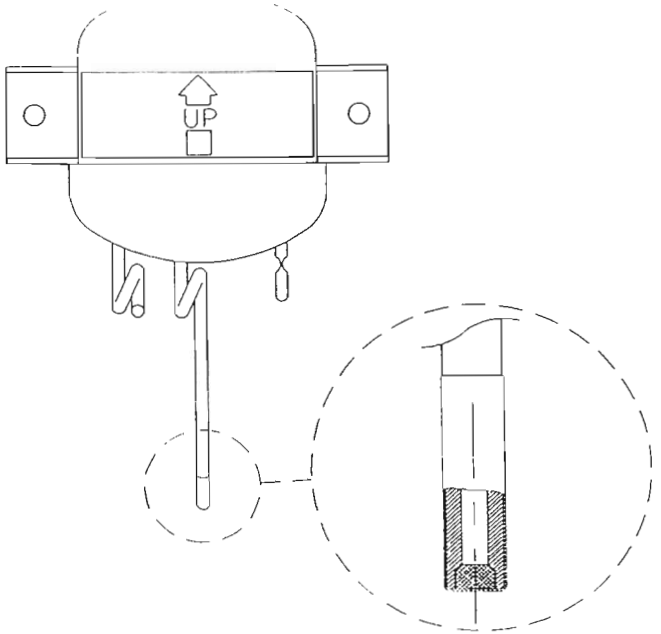
- FAA DRAFT MINIMUM PERFORMANCE STANDARD:

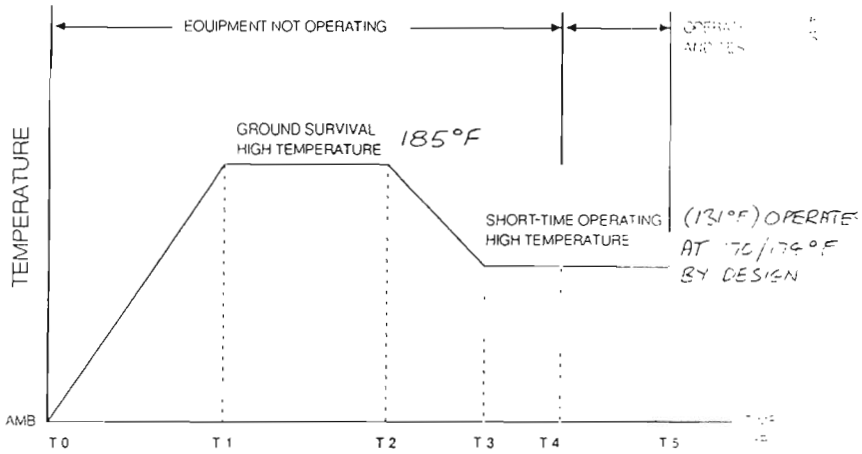
  - DRAFT WAS CIRCULATED TO WORKING GROUP, ONLY BCAG/WKA COMMENTED

  - DRAFT GENERALLY OK HOWEVER, OPERATING LOW TEMPERATURE BASED ON RTCA STANDARD AT 5°F WHICH REQUIRES SUPERPRESSURISATION OF LIKELY REPLACEMENT AGENT TO WORK.

    - ♦ AN AIRCRAFT IS NOT OCCUPIED AT 5°F
    - ♦ SUPERPRESSURISATION HAS A RETROFIT IMPACT
    - ♦ A NEW DESIGN WILL POTENTIALLY DELAY THE INTRODUCTION OF AN ZERO ODP AGENT







NOTES: 1) Temperature rates from T0 to T1 and from T2 to T3 are not specified.
2) T1 to T2 is time for equipment temperature stabilization time, plus a minimum of three hours.
3) T3 to T4 is 0.5 hours, minimum.
4) T4 to T5 is 0.5 hours, minimum.
5) If the short-time high and ground survival high temperatures are identical, the period T2 to T4 is zero.
6) See Note 2 of the test procedure if the short-time high operating temperature is the same as the operating high temperature.

FIGURE 4-2

GROUND SURVIVAL HIGH TEMPERATURE AND SHORT-TIME OPERATING HIGH TEMPERATURE TEST

[illegible] A1 CONTROLLED TEMPERATURE [illegible]

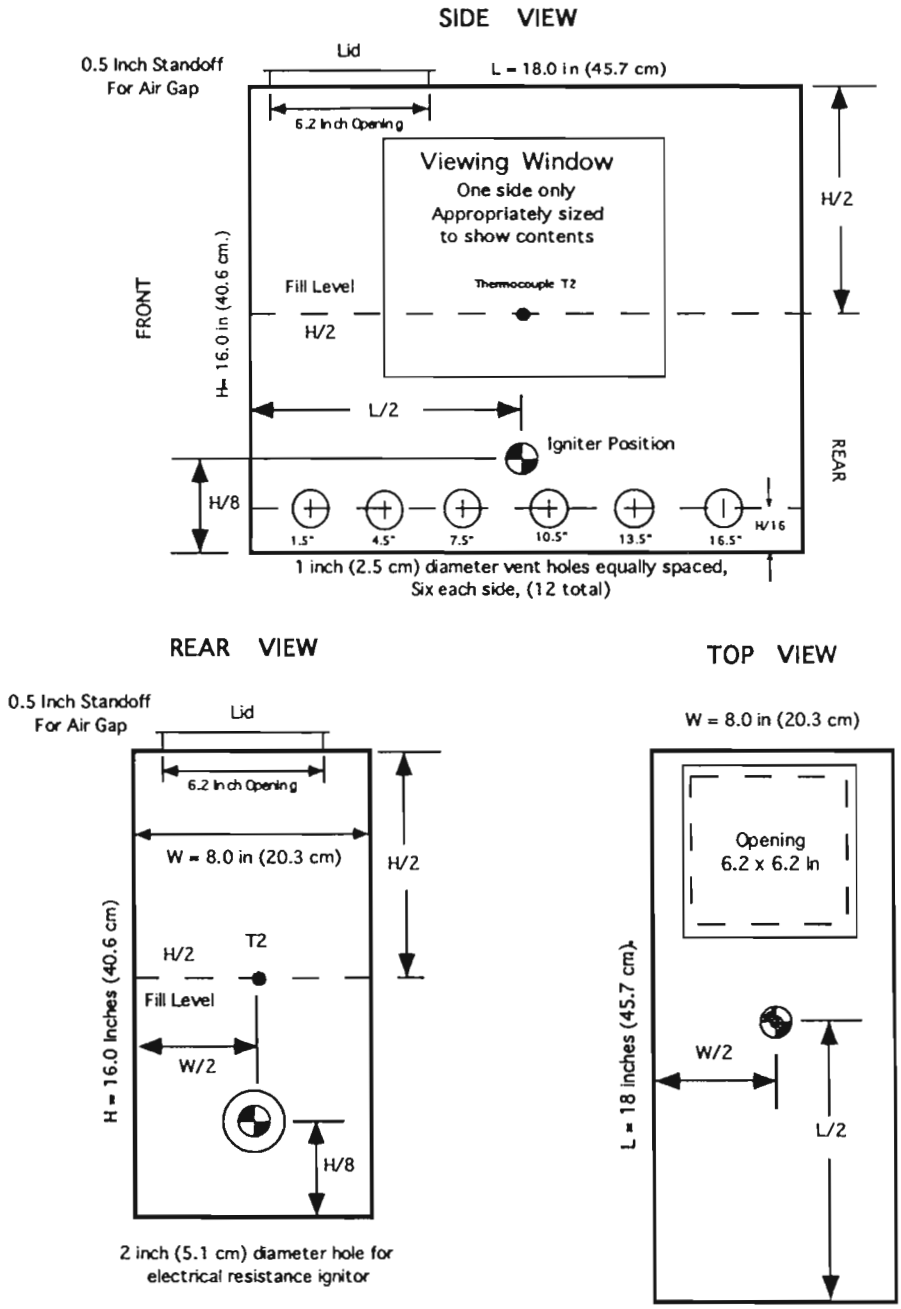


Figure 1: Standard Lavatory Disposal Receptacle For Evaluating Fire Extinguishing Agents

UNITED NATIONS

ENVIRONMENT PROGRAMME

MONTREAL PROTOCOL ON SUBSTANCES THAT DEPLETE THE OZONE LAYER

HISTORY

1985

Vienna Convention for the protection of the ozone layer

1987

Montreal Protocol for the protection of the ozone layer

- 24 Nations signed the Protocol

1989

January 01, Montreal Protocol became effective

1991

68 nations had ratified the protocol

Represented 90% of the worlds production

London - amendments

1992

Copenhagen - amendments

1994

January 01, production of H1211/1301 ceased

About 50 nations are signatory

MONTREAL PROTOCOL

ARTICLES

2. General obligations
3. Research and systematic observations
4. Legal, scientific and technical fields
6. Conference of partics

Secretariat

13. Ratification, acceptance or approval
17. Entry into force

PANELS

- Science
- Environmental effects
- Technology and Economics

TECHNOLOGY AND ECONOMICS PANEL

TECHNICAL OPTIONS COMMITTEES

Foams

- Solvents, coatings and adhesives
- Halons

Economics

Refrigeration

- Aerosols, sterilants and miscellaneous uses

APPOINTMENT OF MEMBERS

- Parties
- Chairman
- Committee size 25 (approx)

MEMBERSHIP GUIDANCE

- The technical expertise of the member would contribute strongly to the committee effort
- The member would provide a geographical balance and provide representative advice to the committee

The member would provide advice representative of the viewpoint of an interest category that would assist the committee in achieving a balance of expertise

COMMITTEE MEMBERS

Gary Taylor, Co-Chair, Taylor/Wagner Inc. Canada

Major E. Thomas Morehouse Jr. Co-Chair, Department of the Air Force, USA

Herve Bineau, CNPP, France

Dr Walter Brunner, Envico, Switzerland

David Catchpole, BP Exploration (Alaska), USA

Tom Cortina, Halon Alternatives Research Corporation, USA

Robert Darwin, Department of the Navy, USA

Philip DiNenno, Hughes Associates, USA

Zhu Hailin, Tianjin Fire Research Institute, PR China

H.S. Kaprwan, Defence Institute of Fire Research, India

Takaaki Konno, Fenwal Controls of Japan, Japan

Dr. Nikolai P. Kopylov, All Russian Research Institute for Fire Protection, Russia

Barbara Kucnerowicz-Polak, State Fire Services Headquarters, Poland

Arthur Lim, Institution of Fire Engineers, Singapore

Yvon Marty, CTFHE, France

Michelle Maynard, NASA, USA

[illegible]n McQuaide, Ministry of Defence, United Kingdom

John O'Sullivan, British Airways, United Kingdom

Erik Pedersen, Danish Fire Protection Association, Denmark

Dr. Joseph Senecal, Fenwal Safety Systems Inc. USA

Dr. Ronald S. Sheinson, Naval Research Laboratory - Department of the Navy, USA

Mohamad Rodzi Sulaiman, Fire Services Department, Malaysia

Dr Robert E. Tapscott, NMERI - University of New Mexico, USA

Dr Daniel P. Verdonik, Department of the Army, USA

Brian Ward, Kidde Graviner, United Kingdom

Roy Young, The Loss Prevention Council, United Kingdom

David Ball, Kidde Graviner Limited, United Kingdom

Ding Kangsheng, ODS Alternatives Engineering and Technology Centre, China

Chris Hanauska, Hughes Associates, USA

Maj. Gen. B.S. Kataria, Defence Institute of Fire Research, India

Ted Moore, NMERI - University of New Mexico, USA

Dr. Gennadi Ryzhov, All Russian Research Institute for Fire Protection, Russia

1. The Basel Convention has the potential to be a serious impediment to the transshipment of 'recycled' halons, or halons to be 'recycled'

2. The Montreal Protocol allows unrestricted trade in 'recycled' halons between signatories.

3. The Basel Convention could be used to restrict trade.

4. Not all signatories to the Montreal Protocol are signatories to the Basel Convention.

5. Technically signatories cannot trade with non-signatories unless a bilateral agreement exists.

Best available advice at this time and should not be considered as a definitive or a legal opinion

UNITED NATIONS

ENVIRONMENTAL PROGRAMME

BASEL CONVENTION

ON THE

CONTROL OF TRANSBOUNDARY

MOVEMENTS OF HAZARDOUS WASTES

AND

THEIR DISPOSAL 1989

HISTORY

1981

Montevideo recognised as a serious problem

1987

Cairo guidelines for environmentally sound management accepted

1989

Basel Convention adopted control of transboundary movements of hazardous wastes and their disposal

1992

Uruguay - adopted 23 decisions

1994

Geneva - the transboundary movement of hazardous wastes for recycling or recovery operations from OECD to non OECD status is to be phased out by 31 December 1994

68 contracting parties

Y41	Halogenated organic solvents
Y45	Organohalogen compounds other than substances referred to in this Annex

UN Class	Code	Characteristics
	H12	Ecotoxic Substances or wastes which if released present or may present immediate or delayed adverse impacts to the environment by means of bioaccumulation and/or toxic effects upon biotic systems.
9	H13	Capable by means, after disposal, of yielding another material, e.g. leachate, which possesses any of the characteristics listed above.

1 **"Management"**

Means the collection, transport and disposal of hazardous wastes or other wastes, including after-care of disposal sites.

2. **"Collection"**

Means the collection including storage for the time being at an approved site or facility of hazardous wastes and other wastes including those generated in small quantities within ...

3. **"Transport"**

Means the movement of hazardous wastes from the place at which they are generated until they arrive at an approved site or facility for disposal.

4. **"Disposal"**

Means any operations specified in Annex IV to the Basel Convention or further defined in ...

5. **"After-care indisposal"**

Means the after-care of a site which is still operation as well as of a site which is no longer in operation

NOTIFICATION FOR TRANSBOUNDARY MOVEMENT

- ☐ Notification for a single shipment
- ☐ Notification for a multiple shipments for the period
- ☐ Export of Hazardous Waste to:
- ☐ Transit of Hazardous Waste through:
- ☐ Import of Hazardous Waste from:
- ☐ Waste destined for recovery operations
- ☐ Waste destined for final disposal

1. EXPORTER (NOTIFIER) (1)

Name: Address:	Telephone Telefax:
Contact Person (name, address, telephone, telefax):	
Reason for export:	

2. GENERATOR OF WASTE

Name: Address:	Telephone: Telefax:
Contact Person (name, address, telephone, telefax)	
Process by which the waste was generated:	
Site of generation:	

3. CONSIGNEE (RECEIVER)

Name Address	Telephone Telefax
Contact Person (name, address, telephone, telefax	

MOVEMENT DOCUMENT

4 DISPOSAL OF THE WASTE

Disposer of the waste (unless same as Consignee)
Name — Telephone
Address — Telefax

Contact Person (name, address, telephone, telefax):

Site of Disposal

Method of disposal — D code — R code.

Description of the disposal methods and its soundness from environmental point of view

5 COUNTRIES OF EXPORT, IMPORT AND EXPECTED TRANSIT

Country of Export	Competent Authority: Name Address	Telephone Telefax:
Country of Import	Competent Authority: Name: Address:	Telephone Telefax:
Country of Transit 1	Competent Authority: Name Address:	Telephone: Telefax:
2	Competent Authority: Name. Address.	Telephone Telefax:
3	Competent Authority Name Address	Telephone. Telefax

Notification for waste shipment wa ed.
Date of issuance

☐ Notification for a single shipment

☐ Notification for a multiple shipment for the period

This shipment is nb. _____ of total shipments included in the general notification: _____

1. EXPORTER (NOTIFIER) (1)

Name: Address:	Telephone: Telefax:
Contact Person (name, address, telephone, telefax):	

2. GENERATOR(S) OF WASTE

Name: Address:	Telephone: Telefax:
Contact Person (name, address, telephone, telefax)	
Process by which the waste was generated:	
Site of generation:	

3. DISPOSER OF THE WASTE

Name: Address: Telephone: Telefax:	TO BE COMPLETED BY THE DISPOSER
Contact Person in case of emergency (name, address, telephone, telefax):	Certification of receipt of waste at designated disposal facility
Approximate date of Disposal:	Method of disposal (3) D code R code
Actual Site of Disposal	Date Signature Actual date of disposal Signature of disposer

Description of the waste

Y number	H number	UN class	UN number	UN Shipping name	IWIC code

Physical state at 20 degree C

☐ powder ☐ solid ☐ paste/viscous ☐ sludge ☐ liquid

☐ gaseous ☐ other

Estimated quantity per shipment (Kg or L):	1st	2nd	3rd	4th	5th

Type of Packaging
Number of packages

Special handling requirements, including emergency provisions in case of accidents:

5. ITINERARY

Country of export:
Point of exit (when designated).

Transit countries:

1) Point of entry (when designated)
Point of exit (when designated)

2) Point of entry (when designated)
Point of exit (when designated)

3) Point of entry (when designated)
Point of exit (when designated)

4) Point of entry (when designated)
Point of exit (when designated)

Country of import
Point of entry (when designated)

6 CARRIER OF THE WASTE or his agent

1) Name
Address
Telephone — Telefax
Contact Person (name, address, telephone, telefax)
Means of transportation ☐ road ☐ rail ☐ sea ☐ air ☐ inland waters
License (when applicable)
Date of transboundary movement started
Signature of the carrier(s) or agent

2) Name
Address
Telephone — Telefax.
Contact Person (name, address, telephone, telefax):
Means of transportation ☐ road ☐ rail ☐ sea ☐ air ☐ inland waters
License (when applicable)
Date of transboundary movement started
Signature of the carrier(s) or agent

3) Name
Address
Telephone — Telefax
Contact Person (name, address, telephone, telefax)
Means of transportation ☐ road ☐ rail ☐ sea ☐ air ☐ inland waters
License (when applicable)
Date of transboundary movement started
Signature of the carrier(s) or agent

CONSENT OF THE COMPETENT LOCAL AUTHORITY	TO BE COMPLETED BY THE GENERATOR OR EXPORTER
	Declaration that the information is correct Declaration indicating no objection from the competent authorities of all States concerned which are Parties to the BC Date of consent of Exporting State Date of consent of Importing State Date of consent of Transit State

DECISIONS ADOPTED BY THE SECOND MEETING OF THE CONFERENCE OF THE PARTIES IN GENEVA, SWITZERLAND ON 25 MARCH 1994

DECISION II/15

POSSIBLE EFFECTS OF THE BASEL CONVENTION ON THE TRANSBOUNDARY MOVEMENTS OF WASTE OZONE-DEPLETING CHEMICALS, INCLUDING HALONS, INTENDED FOR RECOVERY

Halons Technical Options Committee recommends that the Parties to the Montreal Protocol consider:

(a) Adopting a decision that recycled halons that are certified to the usable purity specifications ISO 7201 or ASTM ES 24-93 are considered recycled material and not a waste.

(b) Adopting a decision that international transfers of halons that cannot meet the purity specifications of ISO 7201 or ASTM ES 24-93 should only be allowed if the recipient country has 'recycling' facilities that can process the received halon to either of these standards.

Having considered the report by the Secretariat on possible effects of the Basel convention on the transboundary movements of waste ozone-depleting chemicals, including halons, intended for recovery contained in document UNEP/CHW.2/11.

Also noting the consideration of the Technical Working Group in regard to its role in the case of a need for technical interpretation of the Convention:

1. **Requests** its Technical Working Group in close cooperation with the Ozone Secretariat to further work on the issue of the classification of the waste ozone-depleting chemicals as hazardous wastes in accordance with the Basel Convention definition.

2. **Also requests** its Technical Working Group to perform the functions of its advisory body in case of a need for technical interpretation of the Convention.

3. **Further requests** its Technical Working Group to report on the issue of waste ozone-depleting chemicals and any cases involving a technical interpretation of the Convention to the Third Meeting of the Conference of the Parties.

DuPont Fluoroproducts

FE-36 FIRE EXTINGUISHING AGENT

Formula	1,1,1,3,3,3 - hexafluoropropane
Molecular Weight	152
Boiling Point	-1.5°C, 29.3°F
ODP	Zero
GWP	Not determined
Liquid Density @25°C	1370 Kg/m^3, 85.53 lb/ft^3
Vapor Pressure @25°C	275.1 kPa, 39.9 psia
Heat of Vaporization @25°C	38.67 cal/gm, 69.61 BTU/lb
Extinguishing Concentration	5.29%, cup burner, n-heptane
ALC	>135,000 ppm
Cardiac Sensitization	10% NOAEL, 15% LOAEL
Application	Fire Extinguishing Agent, Refrigerant
Availability	Small lot (ton) production
Cost	>$100.00/Kg
Long Term Price and Availability	Dependent on results of current tests and evaluation

D. W. Moore
November 15, 1993

STATUS OF FE-36

- A DEVELOPMENT PRODUCT
- BEING PRODUCED & SOLD FOR R&D PURPOSES
- EFFECTIVENESS AS STREAMING AGENT NOT FULLY DEFINED (UL RATING?)
- COMPLETE TOXICITY TESTING UNDERWAY
- GOAL IS COMMERCIAL PRODUCTION PENDING
  - FAVORABLE PERFORMANCE
  - MARKET DEMAND
  - NO SURPRISES

Hand Held Extinguishers - 15 November 1994
Slides presented by:- Nick Povey

Introduction

- Purpose of hand held extinguishers
- What research is needed
- How the research will be managed
  - JAA and its role in the IHRWG
- Details of proposed research

1

Who am I ?

- Nick Povey
- Research Project Manager
  - Civil Aviation Authority, Safety Regulation Group, Aviation House, Gatwick, West Sussex, RH6 OYR, U.K.
- JAA Focus for halon issues
- Telephone 44 (0)293 573347
- Facsimile 44 (0)293 573554

2

Purpose of hand held fire extinguishers in aircraft

- Extinguish fires in the cabin and cockpit
- In 99% of cabin fires the source of the fire is obvious and the fire can be extinguished easily
  - Ovens, cigarettes, light fittings
- Some fires are of great concern
  - Deliberate cabin fire involving flammable fluid
  - Hidden fires of indeterminate source

3

What do the aviation authorities want from an alternative agent ?

- NO loss of safety

4

How can this be demonstrated?

- An approved extinguisher
  - *PLUS*
- Coping with arson attacks
- Tackling hidden fires
- Agent must not affect vision, electrical equipment, components or aircraft structure
  - *AND IN ADDITION BECAUSE IT WILL BE USED IN A CONFINED OCCUPIED SPACE*
- Toxicity

5

Research needs

- Demonstrate and quantify the capability of Halon 1211
- Demonstrate the need for a similar performance from alternative agents
- Develop aviation specific tests to ensure that no loss in safety will occur if alternatives are used
  - Fire fighting performance
  - Toxicity
  - Secondary effects

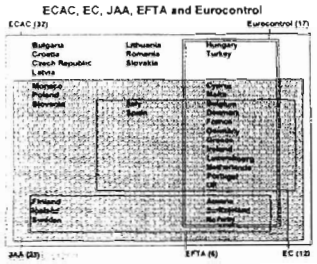
6

Hand Held Extinguishers - 15 November 1994
Slides presented by:- Nick Povey

JAA Structure

- JAA = Joint Aviation Authorities
  - 23 Countries in Europe, but not necessarily members of the European Community
- JAA Research Committee
  - French, Italian, German, U.K., Dutch
  - Has identified research topics of interest to the JAA and is attempting to get industry support and EC funds
  - Halons is one of 11 "pilot" projects presented to industry and the EC 8th November

European Aviation Alliances



JAA "Research Proposal"

- Framework for a comprehensive programme
- Identifies hand held extinguishers as the most urgent topic

Work in Europe

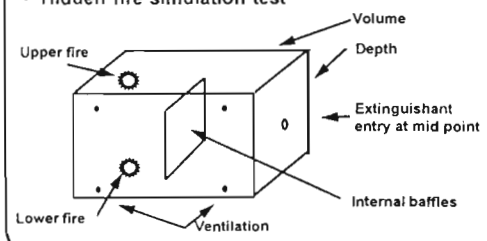
- France (CEAT)
  - Toxicology
- Germany (DLR)
  - Fire tests - cargo hold, engine and hand held
- U.K.
  - Test methods - hand held

Funding

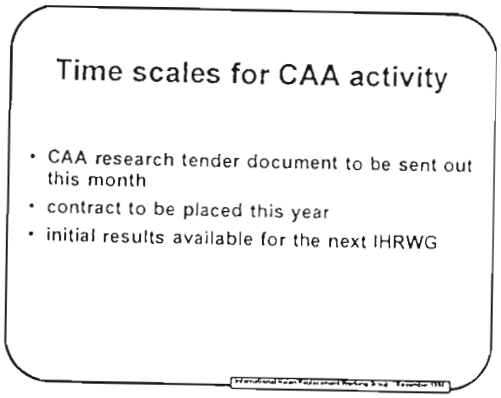
- Authorities
- Industry
- European Commission

CAA Initiative

- Hidden fire simulation test



Hand Held Extinguishers - 15 November 1994
Slides presented by:- Nick Povey



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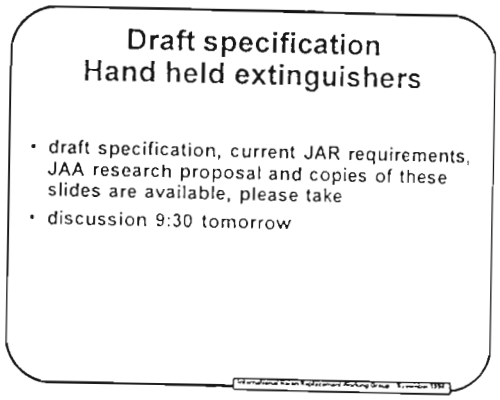

14

DRAFT

Proposed minimum performance standard for hand held fire extinguishers to be used in aircraft

Note:

- *FAR/JAR 25.851 Refers.*
- *Extinguisher used in the context of this specification refers to a specified container, release mechanism and agent which is identified as a single unit*

1. The extinguisher must be approved. [and have a xxx rating]

2. The quantity of extinguishing agent used in each extinguisher must be appropriate for the kinds of fires likely to occur.

   - A single extinguisher will be capable of extinguishing a burning aircraft seat doused with 1 US quart of gasoline at least 2 times out of 3 when operated by a range of cabin crew personnel.

   - A single extinguisher when used in the hidden fire simulation test (in accordance with test specification xxxx) will extinguish each of the fire types and at each location at least 2 times out of 3.

3. The physical characteristics of the extinguisher, especially weight and size. must be compatible with its intended use.

4. The extinguisher design must minimise the hazard of toxic gas concentration.

FIRE PROTECTION

JAR 25.851 Fire extinguishers

[(a) *Hand fire extinguishers.* (See ACJ 25.851 (a).)

(1) The following minimum number of] hand fire extinguishers must be conveniently located and evenly distributed in passenger compartments. (See ACJ 25.851 (a)(1).):

Passenger capacity	*Number of extinguishers*
7 to 30	1
31 to 60	2
61 to 200	3
201 to 300	4
301 to 400	5
401 to 500	6
501 to 600	7
601 to 700	8

(2) At least one hand fire extinguisher must be conveniently located in the pilot compartment (see ACJ 25.851 (a)(2)).

(3) At least one readily accessible hand fire extinguisher must be available for use in each Class A or Class B cargo or baggage compartment and in each Class E cargo or baggage compartment that is accessible to crew members in flight.

(4) At least one hand fire extinguisher must be located in, or readily accessible for use in, each galley located above or below the passenger compartment.]

[(5)] Each hand fire extinguisher must be approved.

[(6) At least one of the required fire extinguishers located in the passenger compartment of an aeroplane with a passenger capacity of at least 31 and not more than 60, and at least two of the fire extinguishers located in the passenger compartment of an aeroplane with a passenger capacity of 61 or more must contain Halon 1211 (bromochlorodifluoromethane, $CBrClF_2$), or equivalent, as the extinguishing agent. The type of extinguishing agent used in any other extinguisher required by this paragraph must be appropriate for the kinds of fires likely to occur where used.

(7) The quantity of extinguishing agent used in each extinguisher required by this paragraph must be appropriate for the kinds of fires likely to occur where used.]

[(8)] Each extinguisher intended for use in a personnel compartment must be designed to minimise the hazard of toxic gas concentration.

ACJ 25.851(a)
Fire Extinguishers (Interpretative Material)
See JAR 25.851(a)

1 Each extinguisher should be readily accessible and mounted so as to facilitate quick removal from its mounting bracket.

2 Unless an extinguisher is clearly visible, its location should be indicated by a placard or sign having letters of at least 0·375 inches in height on a contrasting background. Appropriate symbols may be used to supplement such a placard or sign.

[ACJ 25.851(a)(1)]
Fire Extinguishers (Interpretative Material)
[See JAR 25.851(a)(1)]

1 The number and location of hand fire extinguishers should be such as to provide adequate availability for use, account being taken of the number and size of the passenger compartments and the location of toilets, galleys, etc. These considerations may result in the number being greater than the minimum prescribed.

2 Where only one hand extinguisher is required it should be located at the cabin attendant station, where provided, otherwise near the main entrance door.

3 Where two or more hand extinguishers are required and their location is not otherwise dictated by consideration of paragraph 1 above, an extinguisher should be located at each end of the cabin and the remainder distributed throughout the cabin as evenly as is practicable.

[ACJ 25.851(a)(2)]
Fire Extinguishers (Interpretative Material)
[See JAR 25.851(a)(2)]

There should be at least one fire extinguisher suitable for both flammable fluid and electrical equipment fires installed in each pilot's compartment. Additional extinguishers may be required for the protection of other compartments accessible to the crew in flight (e.g. electrical equipment bays) or from consideration of JAR 25.851(a)(2).

NOTE: Dry chemical fire extinguishers should not be used in pilot compartments because of the adverse effects on vision during discharge and, if non-conductive, interference with electrical contacts by the chemical residues.

JAA RESEARCH COMMITTEE

RESEARCH PROPOSAL ON NON-HALON FIRE SUPPRESSION SYSTEMS FOR AIRCRAFT

I.0 INTRODUCTION

I.1 Purpose

This paper proposes a research project to the JAA Research Committee in order to support JAA's tory activities about non-halon fire suppression systems for aircraft If the Research ittee agrees this project will be submitted to a wide and formal consultation.

I.2 Scope

Despite preventative measures, fires can start in various parts of an aircraft Fire suppression systems equip aircraft. Because of their good volume to effectiveness ratio, low toxicity, weight and ready availability, halons are used to fight most types of aircraft fires. Halon 1211 is employed in hand held extinguishers: Halon 1301 to control fires in engines and auxiliary power units, cargo compartments and lavatory waste receptacles

In the near future, new non-halon systems will replace the existing halon ones. This paper analyses the problems that this change raises and proposes research actions to help JAA define appropriate safety requirements.

I.3 Problem Definition

The Montreal Protocol has banned the production of CFC's including halon used for fire extinguishment. Therefore, manufacturers are now developing non-halon systems. In the next 1 to 3 years Authorities will be asked to approve non-halon fire suppression systems.

But halon has been the agent of choice for many years in aeronautics. It has never been found necessary to define criteria for alternative systems and agents.

Aviation authorities have identified research needs to enable the definition of certification criteria and means of compliance that will ensure that no loss of safety occurs when non-halon systems replace halon ones.

II.0 PROBLEM ANALYSIS

II.1 Operational matters

There is an urgent need to find alternative agents and systems which can replace the halons This is a task that the airframe manufacturers together with the chemical and fire extinguishment industry are tackling with vigour. No alternatives have been proposed which will match both the performance and method of operation of halon In their operation future systems will probably differ significantly to current halon systems

It is expected that in the next 1 to 3 years the authorities will be asked to approve non-halon fire suppression systems Insufficient knowledge exists at this time to perform this task

II.2 Safety matters

halon was first introduced as a fire suppression agent for cargo and cabin areas its full tial had not been identified. Since then a number of incidents have shown additional benefits of halon For example it has been found to suppress the explosive combustion of aerosol cans in smouldering luggage and in incidents such as the Delta Airlines L1011 fire in March 1992 the exceptional capability of halon to tackle hidden fires was demonstrated In setting certification criteria for new agents the authorities must decide if all the safety features inherent with the use of halon need to be made mandatory for future systems

II.3 Environmental matters

Because of their high Ozone Depletion Potential (ODP) halon production has been banned and trade severely restricted by the Montreal Protocol. Individual States have introduced legislation restricting the use of halons Currently, most States have granted the aviation industry exemption to continue using halon for fire fighting on-board aircraft With increasing environmental concerns it is not certain that these exemptions will be renewed in the future.

II.4 Economics

II.4.1 The move away from halon is being forced by environmental legislation and a desire not to use ozone depleting substances. The price of halon from existing stocks is rising and this may well accelerate the move away from halon use

II 4.2 During the development of new fire suppression systems, manufacturers want to reduce the risk of certification over cost. Industry needs to know details of the Authorities' safety requirements and means of compliance Today Authorities cannot answer as precisely as a potential certification applicant would like

II 4.3 The certification criteria to be developed for non-halon systems must include consideration of the economic impact of their implementation

II.5 Regulation issues

With the exception of JAR 23 & 25.851 and JAR OPS Part 1, Sub-part K, 1.790 the use of halon is not specified in JARs. Appendix 1 lists the specific JAR requirements.

A considerable quantity of test data and in service experience has been collected over the past 25 or so years which has enabled certification authorities to be confident that when halon is used it will readily provide a satisfactory level of safety. No airframe manufacturer has used any other extinguishing agent in recent years.

There are no proposed replacement agents or systems that will be exactly equivalent to halon At t it appears that it will be difficult for the proposed replacements to be as effective

It is necessary to conduct research to firstly define the performance level achieved by the use of halon and relate this to the standard that the Authorities believe must be achieved in order to maintain the current safety level

Design objectives need to be defined in terms of performance It will assist industry if a method demonstrating this performance were also defined

The following examples illustrated some of the areas where research is needed

- What is the maximum temperature that will arise in a cargo hold which contains a smouldering fire suppressed by Halon 1301? Is this temperature close to the maximum that the cargo hold could withstand? Does a replacement agent need to be as good as halon in this respect? If a temperature were specified and replacement agents were not as effective as halon it may then be necessary to limit the use of structure having a low temperature tolerance (e.g composite floor beams) in the vicinity of cargo holds.

- It is believed that Halon prevents the explosive combustion of aerosol cans if this is proven should this feature be a requirement for replacement agents?

- Halon 1211 hand held extinguishers have been found to be very effective at extinguishing hidden fires beneath cabin floors and behind side-walls There is no test method available to compare the effectiveness of alternative agents in tackling these hidden fires which are specific to aviation. A test method is required.

The research findings must be carefully considered in order to define certification criteria. Supporting studies to look at in-service experience and define the risk of fires occurring will be required.

A JAA/FAA co-operative effort on pre-regulation research will enable the Authorities to harmonize more effectively.

II.6 Scientific context

No Aviation authority has sufficient knowledge to certificate alternative systems and be confident of achieving an adequate safety level

In Europe, JAA and the European Commission wish to start research on the subject

The Federal Aviation Administration has a planned programme of research At the March 1994 meeting of the International Halon Replacement Working Group industry was concerned that the FAA programme was too slow.

International research co-operation would enable essential data to be available considerably earlier.

II.7 Consequence of not doing research

If the research was not carried out, the authorities would require certification applicants (i.e. industry) to carry out all of the necessary research and to demonstrate that no loss of safety is possible. Industry might not accept to do all the research with its own resources without certainties on the cost, time and results required by the authorities. Because of this, Authorities might not be able to certificate alternative systems and be confident of achieving an adequate safety level

If the FAA/JAA harmonisation process led to an acceptance of JAA criteria the new regulation might not be optimised for the European industry

III.0 ACTION PLAN

III.1 Objectives

The aim of the planned programme is to give information to the aviation authorities for future certification and regulatory work and to define specific performance requirements for extinguishing fires in the various parts of the aircraft Therefore methods for the testing of possible alternative agents and systems have to be developed first at full scale and then a laboratory measuring technique.

III.2 Research actions

Discussions between the DGAC, LBA and CAA have identified the possibility of conducting research at the DLR in Germany, where extensive fire test experience and facilities exist, and at CEAT in France who have good experience of toxicology testing.

The following tests are possible at the DLR facilities:

1 Hand held extinguishers
An alternative agent shall be able to extinguish hidden fires, for example as occurred on a Delta Airlines aircraft in March 1992. A fire hardened full-scale mock-up test facility is available. Beyond that a wide body fuselage is available for tests In the mock-up hidden fires shall be simulated and different alternative agents will be evaluated in comparison with halon 1211. From this testing, a small-scale laboratory test method shall be derived which will ensure that alternative agents are equivalent to halon when tackling hidden fires

2. Cargo compartment fires
In the above mentioned test set-up cargo compartment fires can also be carried out to test flooding agents. The fire load in the cargo compartment has to be defined and different halon replacing agents tested in respect to their behaviour and efficiency in comparison to halon 1301 Many parameters will be recorded.

3. Engine fires
A test mock-up has to be built The air supply and the jet engine is already available. In this mock-up different halon replacing agents can be compared in their behaviour and efficiency to halon 1301, which is in use today.

Testing of the toxic nature of the fire atmosphere and agent breakdown products could be undertaken by CEAT in France who have the necessary expertise.

The U.K. CAA will be exploring the design and build of a prototype hand held extinguisher test facility in 1994. The results from this work will be made available to the JAA.

Through the International Halon Replacement Working Group Industry has devised a performance test for agents in lavatory waste receptacles This test method needs to be evaluated by the Authorities

III.3 Deliverables

Reports of the test results will be written in the English language. Tests will be documented by means of photos and videos
out to the JAA for further distri
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III 4 Management

The research actions presented above have been discussed at a meeting 6 June 1994 between the FAA, DGAC, LBA, CAA and Transport Canada. At this meeting it was agreed that there was scope for complementary programmes of research. JAA would pursue item 1 above as its initial priority.

One person will be nominated as the JAA focus on all matters pertaining to Halon replacement. They will be responsible for monitoring progress of the programme and for interfacing with the JAA Research Committee. Mr N. J. Povey of the U.K. CAA will under take this function.

It is proposed that a "Halon research management group" be formed. This will have representation from those Authorities active in managing or funding the research, those experts conducting the research and representation from authority certification specialists. The halon research management group will be responsible for ensuring that the research programme is satisfactorily progressed and that data required by the Operations, Power plant, Cabin Safety, D & F and Regulation groups of the JAA is obtained to enable the definition of certification criteria and means of compliance that will ensure that no loss of safety occurs when non-halon systems replace halon ones.

The already established International Halon Replacement Working Group will be used as the means by which consultation with, and the involvement of Industry on research matters will take place. European industry is already well represented. (Air France, Swissair, Aerospatiale, Kidde Graviner, GEC Marconi, British Airways, KLM, SAS, Lufthansa, Avro International and Deutsche Aerospace Airbus have all attended meetings). Three meetings per year are planned, at least one of which will be in Europe.

The time-scale of the above described programme will be approximately four years, first results, especially for hand-held extinguishers, will be available in about one year.

October 1994
ISSUE 2

APPENDICES

Requirements involved

In JAR 23 & 25 halon is only directly referenced in requirement 851, the following requirements relate to systems which typically employ halon.

23 & 25.851	Fire Extinguishers (a) Hand held extinguishers (b) Built-in fire extinguishers
25.854	Lavatory fire protection (b) Built in fire extinguisher
23X855	Cargo and baggage compartment fire protection.
25.857	Cargo compartment classification (e) (2) Built in fire extinguishing systems
23 & 25.1195	Fire extinguishing systems Advisory Circular 20-100
23 & 25.1197	Fire extinguishing agents
23 & 25.1199	Extinguishing agent containers
23 & 25.1201	Fire extinguishing system materials
JAR OPS	Part 1, Sub-part K, 1.790

Bibliography

(1) Department of Transportation, Federal Aviation Administration, Notice 93-1, Published 17 June 1993 starting at page 33477 of the Federal Register. This notice details the FAA proposed research programme to develop performance test methodologies which would lead to recommended airworthiness criteria for the evaluation of non halon fire suppression agents and systems.

(2) Montreal Protocol on substances that deplete the ozone layer and it's amendments. Available from HMSO publications Cm283 and Cm977 or from the UNEP IE/PAC, Paris, France.

(3) EC Regulation 3922/91

(4) EC Regulation 3952/92

(5) Halons Technical Options Committee Reports 1989 - 1994

DRAFT

Proposed minimum performance standard for hand held fire extinguishers to be used in aircraft

Note:

- *FAR/JAR 25.851 Refers.*
- *Extinguisher used in the context of this specification refers to a specified container, release mechanism and agent which is identified as a single unit.*

1. The extinguisher must be approved. [and have a xxx rating]

2. The quantity of extinguishing agent used in each extinguisher must be appropriate for the kinds of fires likely to occur.

   - A single extinguisher will be capable of extinguishing a burning aircraft seat doused with 1 US quart of gasoline at least 2 times out of 3 when operated by a range of cabin crew personnel.

   - A single extinguisher when used in the hidden fire simulation test (in accordance with test specification xxxx) will extinguish each of the fire types and at each location at least 2 times out of 3.

3. The physical characteristics of the extinguisher, especially weight and size, must be compatible with its intended use.

4. The extinguisher design must minimise the hazard of toxic gas concentration.

NJP 9 November, 1994

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I.2 Scope

Despite preventative measures, fires can start in various parts of an aircraft. Fire suppression systems equip aircraft. Because of their good volume to effectiveness ratio, low toxicity, weight and ready availability, halons are used to fight most types of aircraft fires. Halon 1211 is employed in hand held extinguishers; Halon 1301 to control fires in engines and auxiliary power units, cargo compartments and lavatory waste receptacles.

In the near future, new non-halon systems will replace the existing halon ones. This paper analyses the problems that this change raises and proposes research actions to help JAA define appropriate safety requirements.

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The Montreal Protocol has banned the production of CFC's including halon used for fire extinguishment. Therefore, manufacturers are now developing non-halon systems. In the next 1 to 3 years Authorities will be asked to approve non-halon fire suppression systems.

But halon has been the agent of choice for many years in aeronautics. It has never been found necessary to define criteria for alternative systems and agents.

Aviation authorities have identified research needs to enable the definition of certification criteria and means of compliance that will ensure that no loss of safety occurs when non-halon systems replace halon ones.

II.0 PROBLEM ANALYSIS

II.1 Operational matters

There is an urgent need to find alternative agents and systems which can replace the halons. This is a task that the airframe manufacturers together with the chemical and fire extinguishment industry are tackling with vigour. No alternatives have been proposed which will match both the performance and method of operation of halon. In their operation future systems will probably differ significantly to current halon systems.

It is expected that in the next 1 to 3 years the authorities will be asked to approve non-halon fire suppression systems. Insufficient knowledge exists at this time to perform this task.

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When halon was first introduced as a fire suppression agent for cargo and cabin areas its full potential had not been identified. Since then a number of incidents have shown additional benefits of halon. For example it has been found to suppress the explosive combustion of aerosol cans in smouldering luggage and in incidents such as the Delta Airlines L1011 fire in March 1992 the exceptional capability of halon to tackle hidden fires was demonstrated. In setting certification criteria for new agents the authorities must decide if all the safety features inherent with the use of halon need to be made mandatory for future systems.

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II.4.1 The move away from halon is being forced by environmental legislation and a desire not to use ozone depleting substances. The price of halon from existing stocks is rising and this may well accelerate the move away from halon use.

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III.3 Deliverables

Reports of the test results will be written in the English language. All tests carried out will be documented by means of photos and video recordings. The reports and other data will be handed out to the JAA for further distribution. Regular conferences on the progress of the works will be carried out in arrangement with the JAA.

III.4 Management

The research actions presented above have been discussed at a meeting 6 June 1994 between the FAA, DGAC, LBA, CAA and Transport Canada. At this meeting it was agreed that there was scope for complementary programmes of research. JAA would pursue item 1 above as its initial priority.

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October 1994
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	(a)	Hand held extinguishers
	(b)	Built-in fire extinguishers
25.854		Lavatory fire protection
	(b)	Built in fire extinguisher
23X855		Cargo and baggage compartment fire protection.
25.857		Cargo compartment classification
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