INTERNATIONAL HALON REPLACEMENT WORKING GROUP MEETING

April 15-16, 1997

Hosted by Douglas Aircraft Company, Long Beach, California

TUESDAY, APRIL 15, 1997

Discussion on Halon Replacement Schedule

This schedule was distributed to all Working Group members as part of the March 3, 1997, mailout. R. Hill discussed modifications to halon replacement schedule for the cargo area recently instated. H. Mehta: Do you plan to update the Halon Replacement Schedule to reflect these modifications? R. Hill: Yes, we will update the Schedule periodically and try to include a revision with the Minutes from time to time.

Update on Class 'D' Cargo Compartment to Class 'C' Cargo Compartment Meeting held February 6, 1997, in Seattle

New discussion on simulants and consideration to use HFC-125 as a simulant in cargo area certification. One of the new Task Groups established at the February 6, 1997, meeting will address this issue.

R. Hill discussed the purpose of the February 6, 1997, meeting and the formation of the 4 new Task Groups:

1) to define range of leakage for given models of aircraft so that the number of certification tests could be limited
2) to determine how leakage is currently being measured and address the following issues:
   - "What is a realistic way of measuring leakage at altitude or while the aircraft is ascending and descending and what kind of flight profile should we be concerned with?"
   - "How do you measure the concentration in a cargo compartment when you have stratification, where do you put the probes, do you take an average, etc.?"
3) to survey the present acceptable methods of smoke detection for certification and to develop a method to standardize the amount of smoke and how it is produced when certifying a detection system
4) to look into simulants for use in certifying halon 1301 systems in cargo compartments.

Task Groups 1, 2 and 3 have been combined into one Task Group chaired by Dave Blake of the FAA Technical Center. Task Group 4 is chaired by John Reinhardt of the FAA Technical Center. During the discussion at this meeting we learned that most people felt that as long as Halon 1301 was allowed to be used it would be the agent of choice in the cargo compartment. R. Hill: We hope to have a resolution within six to nine months. Please contact John if you would like to participate. At this point we are still defining the focus of this Task Group.

R. Hill: There have been a number of accidents over the years that have led us to believe there is a need for detection and suppression systems in the cargo compartments.

F. Stossel: Does the FAA plan to discuss this 'D' to 'C' conversion with the JAA? K. Larson: The JAA has been advised of this conversion. J.F. Detienne: The JAA and the European countries will try to harmonize their position with the FAA when the NPRM comes out. R. Hill: The JAA has been invited to attend the meeting that will be held April 22-25, 1997, at the FAA Technical Center for certification personnel around the world to discuss certification issues of the 'D' to 'C' conversion and the NPRM. R. Stark: Will there be a means of telling the rest of industry of the outcome of the April 22-25, 1997, meeting? R. Hill: There are members of industry who are DERs who should be at the April 22-25, 1997, meeting. D. Dierdorf: Will this group be issuing a minutes or outcome of the meeting? R. Hill: I do not know if there will be any type of advisory material prepared as an outcome of this meeting. K. Larson: A decision has not been made on the distribution of the meeting outcome yet. We plan to discuss that at the conclusion of the meeting.

Task Group Leader Presentations

Bob Tapscott - Task Group on Halon Options

This Task Group has published two reports through the FAA Technical Center. Draft of the third report is on the Internet. This draft can be located through this Website http://nmeri.unm.edu/cget/ihrwg.htm. Comments on the third report are requested. An update on this Task Group is included in this package.

Frank Hughes (for J. O'Sullivan) - Update on Montreal Protocol Meeting held in Melbourne in February 1997

Provided update on all areas of discussion at this February 1997 meeting. Discussion on importance of airline involvement.

R. Hill: There is no use restriction at the present time in the use of Halon 1301 in 'D' to 'C' conversions.

Bill Leach - Simulants Task Group Update

Gave background on simulants work within the Navy. This simulants Task Group saw little activity since its formation, but the simulant issue has been brought up through the discussion at the February 6, 1997, 'D' to 'C' cargo compartment conversion meeting in Seattle.

R. Hill: The group working on the engine nacelle should consider putting together a report on what has been done to date (including background on what has been done). D. Dierdorf: Is there a way that you are able to handle business confidential information in this? R. Hill: The FAA can do that, and I'm sure the Navy can do that, but if you are talking about a Task Group which includes members from industry that would be difficult because it is shared publicly.

Dave Blake - Final Minimum Performance Standard for Cargo Compartments Update

Report on April 14, 1997, Meeting- We outlined the areas that we felt needed to be covered by this Minimum Performance Standard and got feedback/comments from the Task Group members on this. We need to agree on the definition of a successfully suppressed fire - this is open for comment. We also need to determine what the ambient conditions will be in order to make it repeatable. Two draft documents are being distributed to Task Group

members for comments. These comments should be returned to Dave Blake by **June 15, 1997**. He will then try to incorporate the two documents into one working document including those comments. We (at the FAATC) have begun to do some work with aerosol cans.

Konstantin Kallergis - Handheld Work at DLR

Showed viewgraph of one hidden fire test rig and described its configuration. Explained results of tests conducted using this apparatus. A report on this work is available, if you would like a copy of the report contact Konstantin Kallergis.

Subgroup Leader Presentations

Lavatory - R. Hill

There has been a lot of work in this area. The test method was developed to what we thought was a final version some time ago and we then did a series of round robin tests and found that a number of variables made a difference in the results and repeatability. We made some adjustments we modified it and prepared a report including an Appendix that includes the Minimum Performance Standard. A copy of this report is included with this package. Working Group members not receiving this Minutes Package will receive a copy of the report in a separate mailing. This report went through the FAA and a Policy Letter was drafted through the FAA Northwest Mountain Region Transport Airplane Directorate. A copy of this Policy Letter is included in this Minutes Package.

Handheld - R. Hill

Some of the handheld work was previously done through the CAA when Nick Povey was involved in this Working Group. We (at the FAATC) have built the same test apparatus that was created through the CAA work to determine if it is a reproducible test and the test method is repeatable. R. Gautreau: CEAT is currently doing some work on toxicity and will have some information to present at the next Working Group meeting. R. Hill: Toxicity is probably the next area where we will have to create a Minimum Performance Standard. The Minimum Performance Standard references all requirements for replacements for handheld extinguishers (environmental issues, toxicity, hidden fire test method, seat fire test method, approval requirements). The Minimum Performance Standard is not a test or a list of tests, it references the test methods that the handheld extinguisher would have to meet. Harry Webster at the FAATC is now the Subgroup Leader for the handheld extinguisher work. Member Question: Is it still your best estimate that the Minimum Performance Standard will be complete by February 1998? R. Hill: It will definitely be the next Minimum Performance Standard that we will work to complete. There is still a chance that it will be ready next spring.

Engine - R. Hill

In October 1996, the Engine Task Group got together to discuss the work that had been done to develop a Minimum Performance Standard. We (FAATC) are working to get our engine nacelle simulator up and running. The FAATC engine nacelle simulator has been moved to a larger facility at the FAATC.

Cargo - D. Blake

Dave Blake showed graphs explaining test set-ups and data for cargo compartment testing done at the FAATC. Dave gave an explanation of the results of the tests of various agents conducted at the FAATC since the last Working Group meeting in February 1997. A copy of his presentation is included in this package.

Other Cargo Tests Recently Conducted at the FAATC - R. Hill

Oxygen Canister Cargo Test conducted April 11, 1997 - The idea was to detect the smoke and get a discharge of halon and determine how long it would take to suppress the fire. The fire load was cardboard boxes and shredded newspaper (similar to the fire load Dave Blake uses in his cargo tests with one modification). The difference was that this fire load also included 100 solid oxygen canisters. Dick Hill described the events of the test. He will have the test data available at the next meeting. This makes it evident that it is extremely important to have detection. In this particular fire with this particular source the smoke detector did not detect the fire early enough.

WEDNESDAY, APRIL 16, 1997

Task Group Meetings

New Task Groups 1, 2, 3, 4 met. The Handheld extinguisher subgroup met.

Task Group Reports

R. Hill - Handheld - Discussed the status of the two test methods that are still being developed: the large seat fire/toxicity and the hidden fire tests. Discussed approving extinguishers or approving an agent. The hidden fire test lends itself to approving extinguishers, and we will look at halon 1211 extinguishers on a pass/fail basis and test some new agents/extinguishing systems to see how they rate.

D. Blake - New Task Groups 1, 2, 3 - We have volunteers from Boeing, Douglas, Airbus, and Transport Canada who are going to go back and research how their organizations measure leakage rate, how systems are certified, and how smoke is generated in different models and provide this information back to Dave by May 31, 1997, and he will put it together and redistribute to the Task Group for further work.

J. Reinhardt - New Task Group 4 - Simulants for Cargo Bays - Planning to create a test plan in order to test FE-25 as a simulant. The group members will provide some information by May 15, 1997, to be reviewed prior to the testing.

B. Tapscott - Halon Options - A number of assignments were made during the Task Group meeting. Gave update on plans for next report and layout of next report.

FAATC INTERNET INFORMATION

We (Fire Safety Section - FAATC) will be providing more information on the Internet in the near future. We are in the process of bringing someone in to set this up.

Discussion on Minimum Performance Standards

Lavatory Trash Receptacle Minimum Performance Standard - Report Published February 1997 - Policy Letter #TAD-97-003, Dated March 31, 1997.

Copies of Policy Letter made available to those attending this meeting.

R. Hill: Briefly reviewed and explained layout and information provided in the report. Discussed the areas of environmental concerns, toxicity, test requirements, test conditions, how you conduct the test, what the pass/fail is, and a test report that would be issued from that data.

R. Hill: Are there any questions on the other Minimum Performance Standards?

Engine Nacelle Discussion

Member Question: When is Doug Ingerson actually going to start the engine nacelle testing? R. Hill: Doug has expanded the nacelle recently. The main problem is building the facility to meet the range of standards for the higher air temperatures. Would the group rather see us develop the facility to the point where it does everything that's in the Minimum Performance Standard and then do some testing or do some testing and then develop the facility to where it will meet the range of the Minimum Performance Standard specification? H. Mehta: I prefer that the facility be completely developed to meet the specs of the Minimum Performance Standard prior to testing. D. Dierdorf: I would like to see some confirmatory work done to show that the Minimum Performance tests are sound. If these tests are not sound, the whole facility might need to be reworked. We need to clarify the approach. S. Hariram: Why don't we go ahead and start testing so that we can get some data that we can all start looking at. H. Mehta: I don't have a problem with running a few tests to see how the facility is operating, however, we will eventually need to cover the entire range of temperatures covered in the Minimum Performance Standard. I believe that if we interrupt the work of building the facility, it will impact the construction. J. Paillet: What is the time difference between the two? R. Hill: I will talk to Doug and see what the time scales are for each. I do know that the big hold up is going to be the inlet air. H. Mehta: I discussed the project with Doug last week. He is hopeful that the facility will be ready for testing within two months if all goes as planned. R. Hill: The engine Task Group will meet after lunch and set some goals oriented toward time frame so that we don't keep slipping. See Engine Task Group update later in these Minutes.

Cargo Minimum Performance Standard - R. Hill

Copies of the two documents for comparison were provided at the meeting.

Additional Discussion

D. Blake - New Task Groups 1, 2, 3 - C. Lewis (Transport Canada) will provide some information on Bombardier Airplanes (CanadAir, DeHavilland) on the issues/questions raised during the Task Group meeting.

D. Blake - CF3I Testing - Do group members want to see more testing with CF3I in the Cargo Area? This question is addressed to the users. J. Paillet: We are interested in the possibility of using CF3I in the engine area. S. Hariram: We have concerns with toxicity, because we

would be concerned with leakage to the passenger deck. We would like to see the data and would like to see the toxicity levels. D. Blake: Conclusion: Nothing has changed.

Toxicity

R. Hill: One agent for cargo compartments and engines or two agents? F. Stossel: The agents will have to be evaluated on a case by case basis. One agent would be preferable, but Swissair can live with two agents if one has a high toxicity and cannot be used in the cargo compartment area.

Suggestion from J. O'Sullivan as presented by R. Hill - Develop the criteria for halon replacement, but work on areas where we can impact the accidental discharge of halon on the ground, etc., work with simulants, keep from discharging halon.

New Task Groups

Hydrostatic Testing Exemptions

R. Hill: The Navy has recommendations to stop hydrostatic testing of their extinguisher bottles. Our group should try to compile this information to show what the impact of these tests has on the release of halon and show what requirements the rest of industry has and what the military is doing, what impact this will have on environmental conditions. We (FAATC) agree that something should be done. B. Bowen: Certain airlines have gained an exemption from the DOT except when the rupture life comes due. This was done under a program with the Air Transport Association (ATA) airlines. This allows us to go 14 years without hydrostatic tests. R. Hill: We are aware of this program. We are thinking of putting a package together to try to get the DOT to change the requirement instead of having it only as an exemption. If we can compile all the data that the Navy and military and airlines have, we will put something together to forward to the DOT. Bill Leach said that he would be involved with this project. We would like a representative from an airline, an airframe manufacturer, and a systems manufacturer to participate in this Task Group. We can also show this to the environmental organizations to show them that we are taking action on this matter. If you are interested in participating in this Task Group, please contact April Horner by May 9, 1997.

Working Group Member Presentations

The following presentations were given by members of the Working Group:

Dennis Quirk - Cease Fire - "Cease Fire's Synergistic, Suppression Technology for Fire Extinguishment"

Matt Kolleck - Booz, Allen, Hamilton - "Fire Protection Technology Benefit Methodology Development Project" (A copy of Matt's presentation is included in this package.)

Lawrence Hardge - New Millennium Environmental Research "Knock Out Fire Suppressant"

Richard Dirks - KDI Precision Products - "Watchtower"

Ernie Dahl - "TW Arses Systems" "FAA Fire Detection Tests and Suppression Test at Atlantic City"

John Huntington - Hungtington Research and Engineering - Update on their Engine Nacelle Fire Suppression Work

Engine Nacelle Task Group Report

Outcome of April 16, 1997, afternoon meeting: The current plan is that the engine nacelle should be ready by the date of the next meeting (July 1997). The Task Group will keep in contact with each other prior to the meeting and will meet sometime during the next Working Group meeting to discuss the status. Should there be a delay in the completion, a decision will be made at the July Working Group meeting as to the course of action to take (see discussion under Engine Nacelle section of Minutes).

Final Discussion/Next Meeting/Closing

B. Tapscott - The Environmental Protection Agency (EPA) has a restriction that states "no testing using Halon". It may be a good idea to look into this. R. Hill: They are well-aware of what we are doing. In addition, they are in the process of putting together a paper for the exemption for certification tests. M. Sanders at the EPA is working on this exemption.

R. Hill: We would like feedback on whether Working Group members would still like Working Group members presentations.

The contacts for the various Task Groups are as follows:

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New Task Group 4 - Simulants - John Reinhardt (FAATC) Phone: 609-485-5034/Fax: 609-485-5582
Halon Restrictions Update - John O'Sullivan (British Airways) Phone: 44 181 562 5460/ Fax: 44 181 562 2928
Cargo Compartment Minimum Performance Standard - Dave Blake (FAATC) Phone: 609-485-4525/Fax: 609-485-4810
Engine Nacelle Minimum Performance Standard - Doug Ingerson (FAATC) Phone: 609-485-4945/Fax: 609-646-5229
Lavatory Trash Receptacle Minimum Performance Standard - Tim Marker (FAATC) Phone: 609-485-6469/Fax: 609-485-5580
Handheld Extinguisher Task Group - Harry Webster (FAATC) Phone: 609-485-4813

Next Meeting

The next meeting will be hosted by Claude Lewis of Transport Canada on July 8-9, 1997, at the Government Conference Center in downtown Ottawa, Canada. A Meeting Details package will be sent under separate cover.

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LIST OF ATTENDEES
INTERNATIONAL HALON REPLACEMENT WORKING GROUP MEETING
Hosted by Douglas Aircraft Company
April 15-16, 1997

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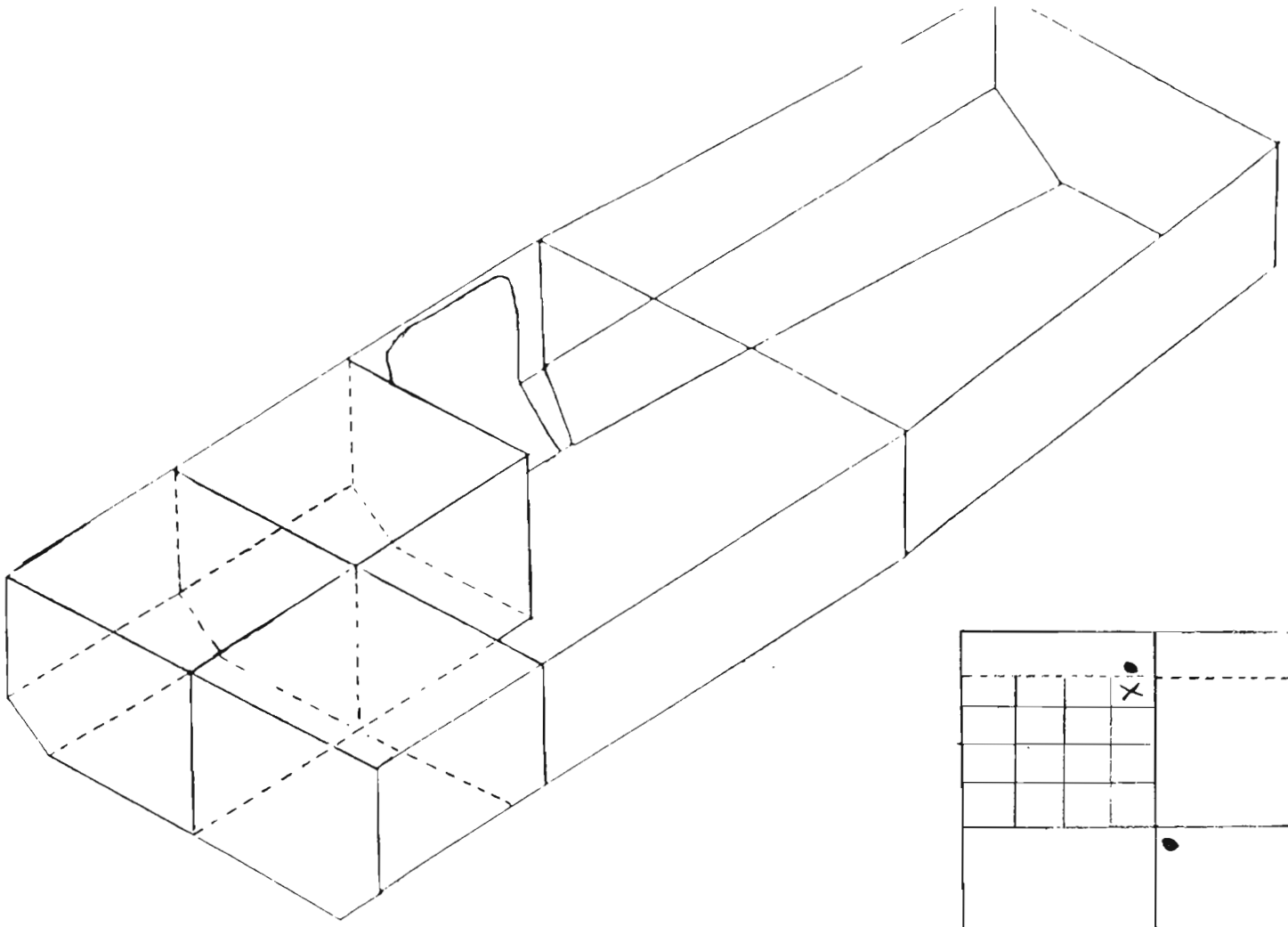
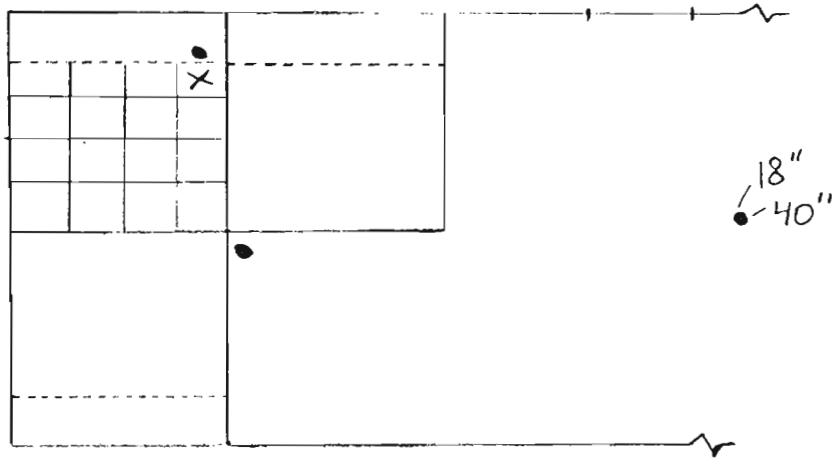
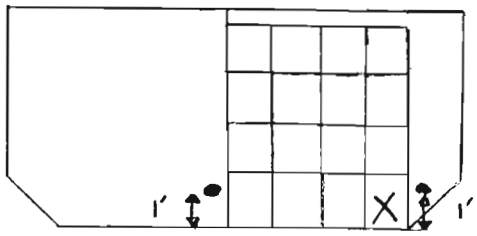
DAVE BLAKE'S PRESENTATION





Top View



End View

Gas Probe

Ignited Box

CARGO COMPARTMENT AGENT QUANTITY

Agent	Cup Burner Conc.	Cargo Conc.	Molecular Weight
Halon 1301	3.1 %	5.0 %	149
FE-25	8.8 %	14.2%	120
FM-200	6.6 %	10.6 %	170
Triodode	3.2 %	5.2 %	196

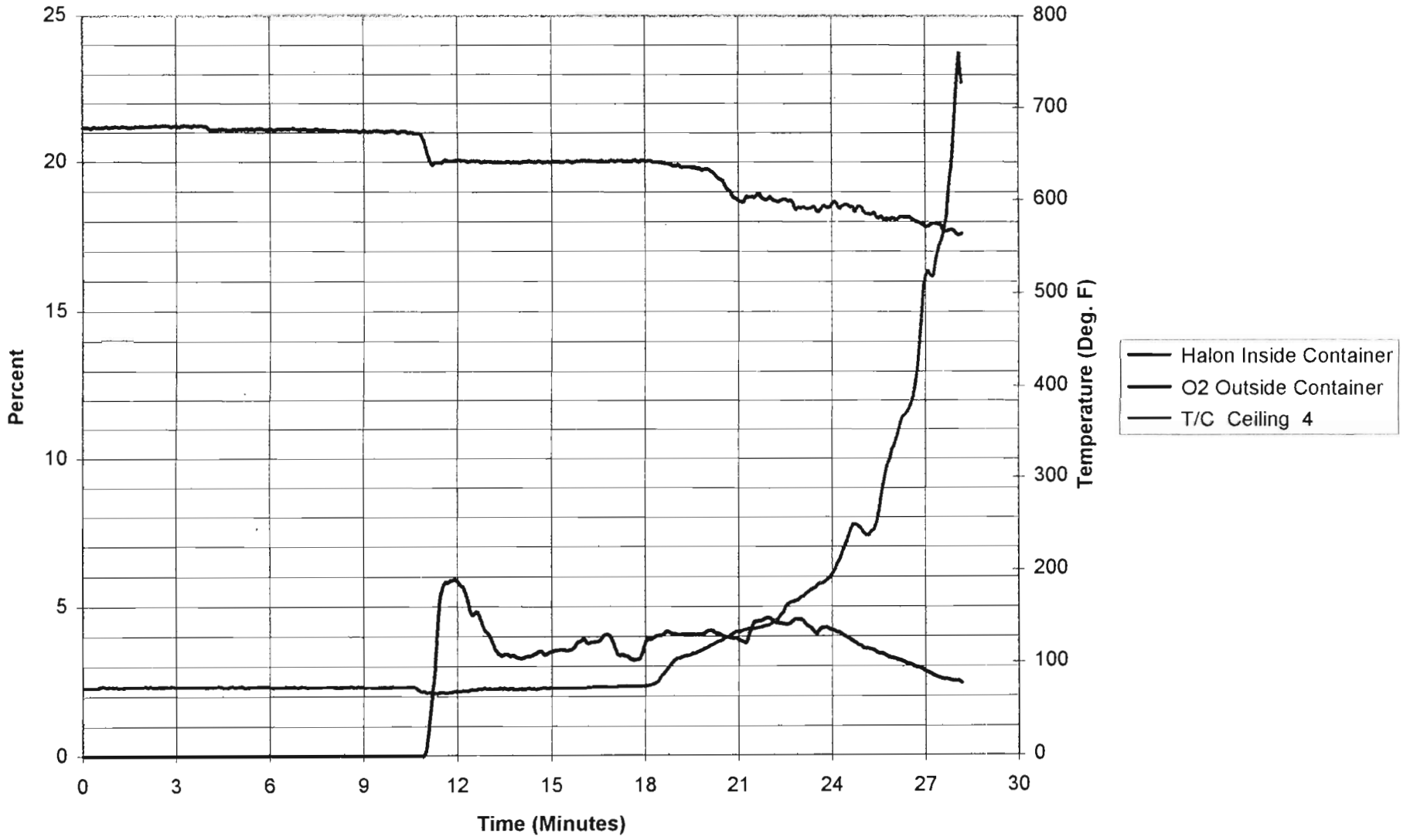
Halon 1301: (.05)(2357 ft3)(28.3l/ft3)(1 mole/24.13l)(149 g/mole)(1 lb/454 g)= 45.4 lbs

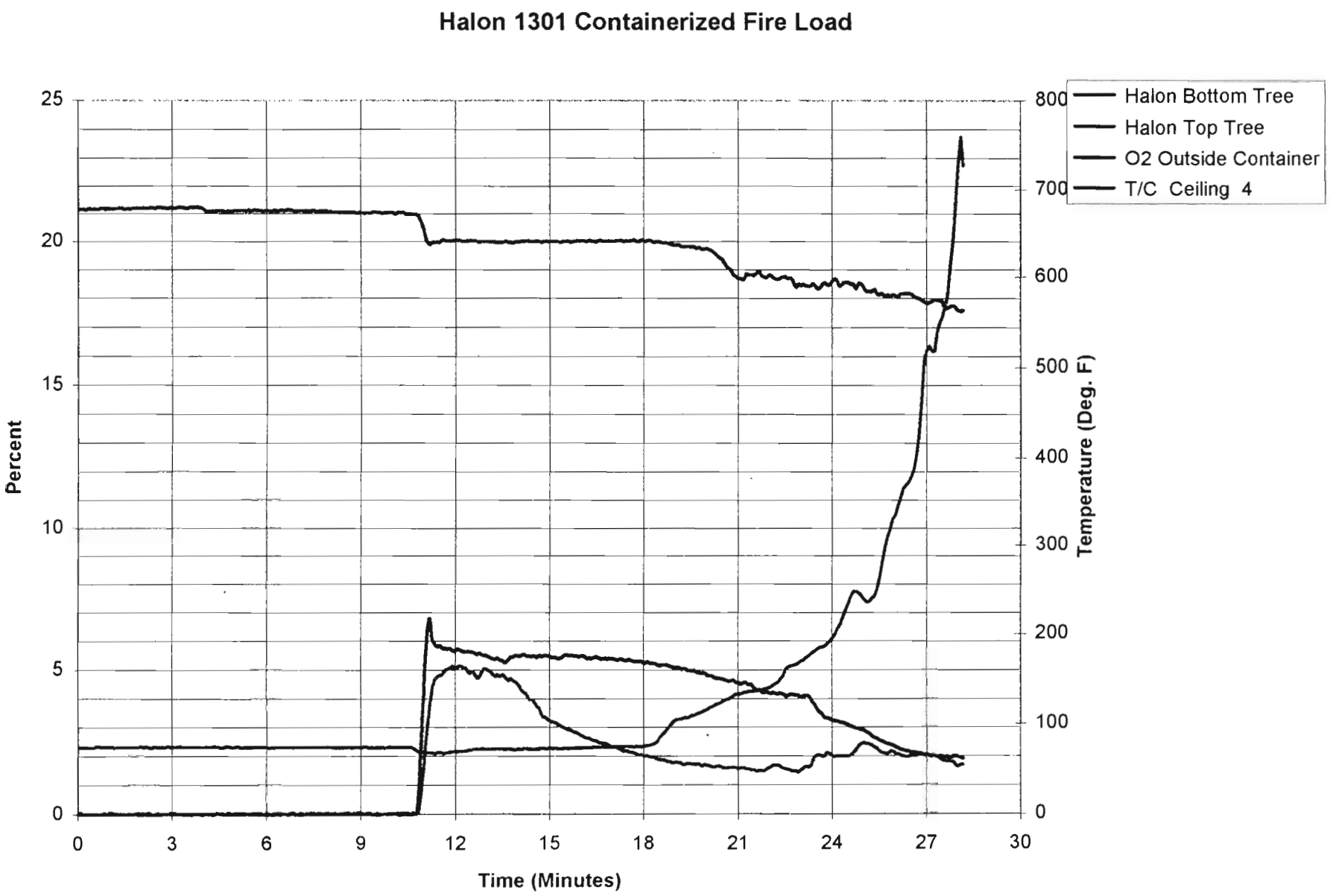
FE-25: (.142)(2357 ft3)(28.3l/ft3)(1 mole/24.13l)(120 g/mole)(1 lb/454 g)= 103.7 lbs

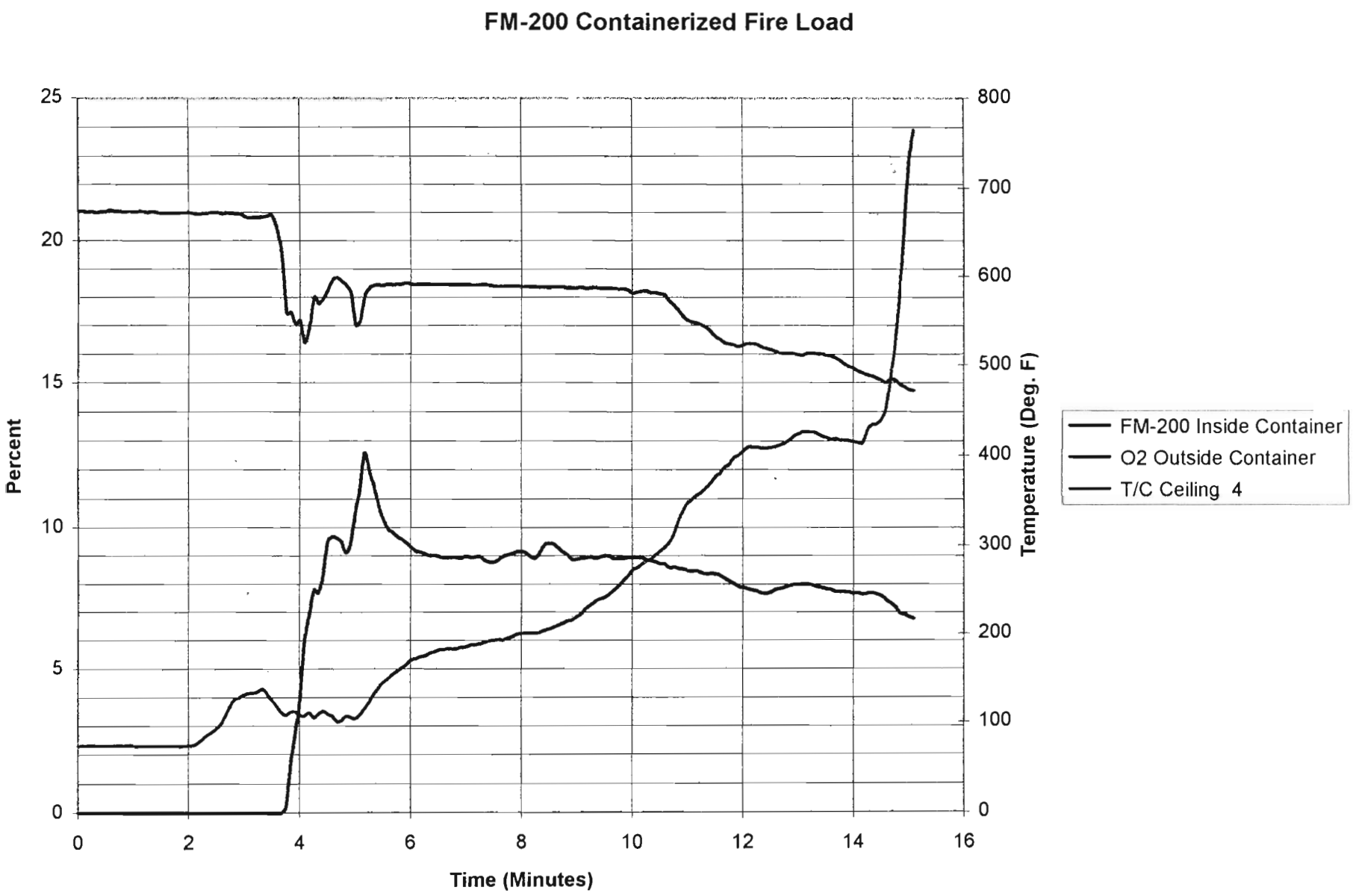
FM-200: (.1065)(2357 ft3)(28.3l/ft3)(1 mole/24.13l)(170 g/mole)(1 lb/454 g)= 110.2 lbs

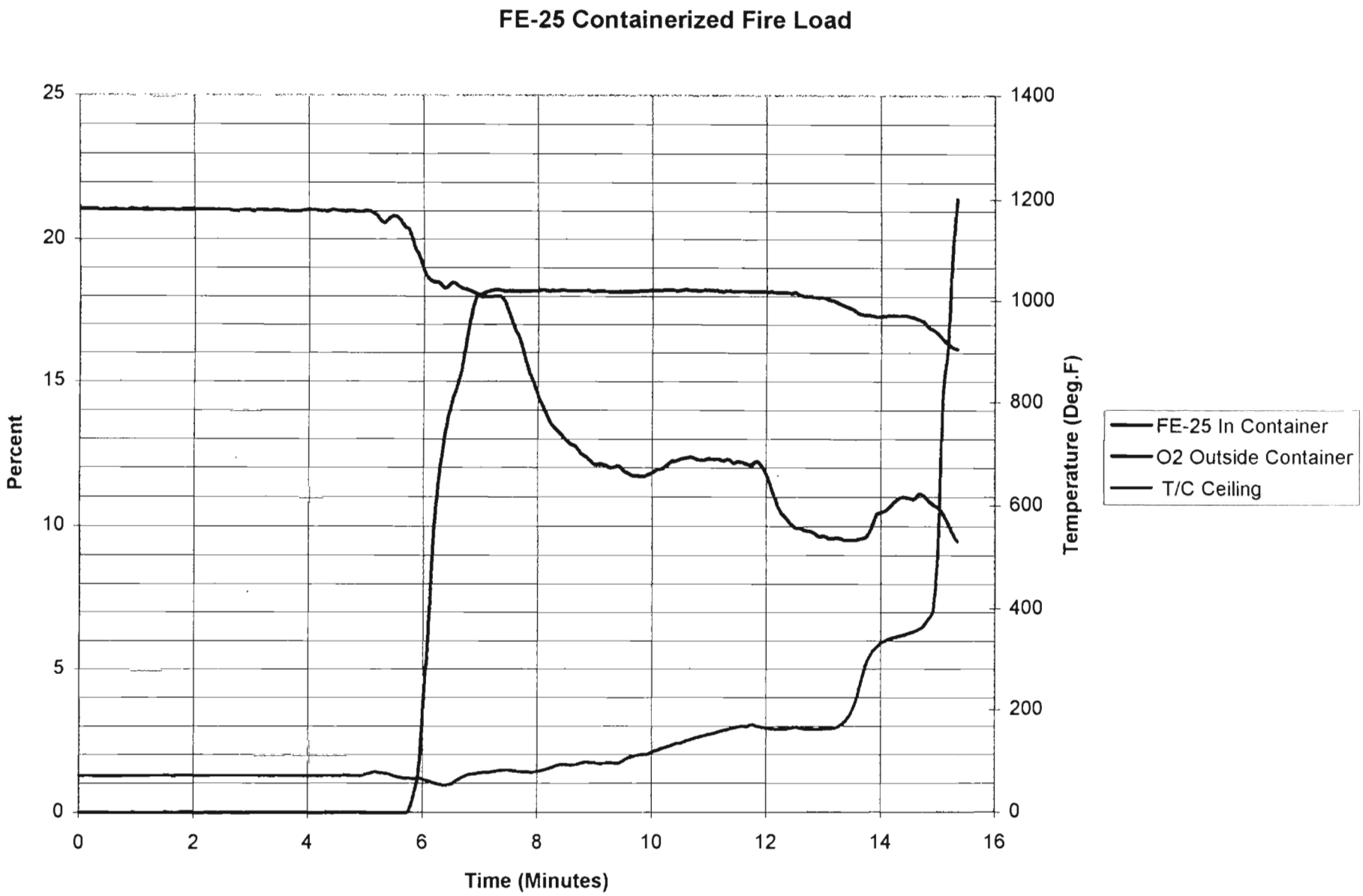
Triodide: (.0516)(2357 ft3)(28.3l/ft3)(1 mole/24.13l)(196 g/mole)(1 lb/454 g)= 61.6 lbs

Halon 1301 Containerized Fire Load



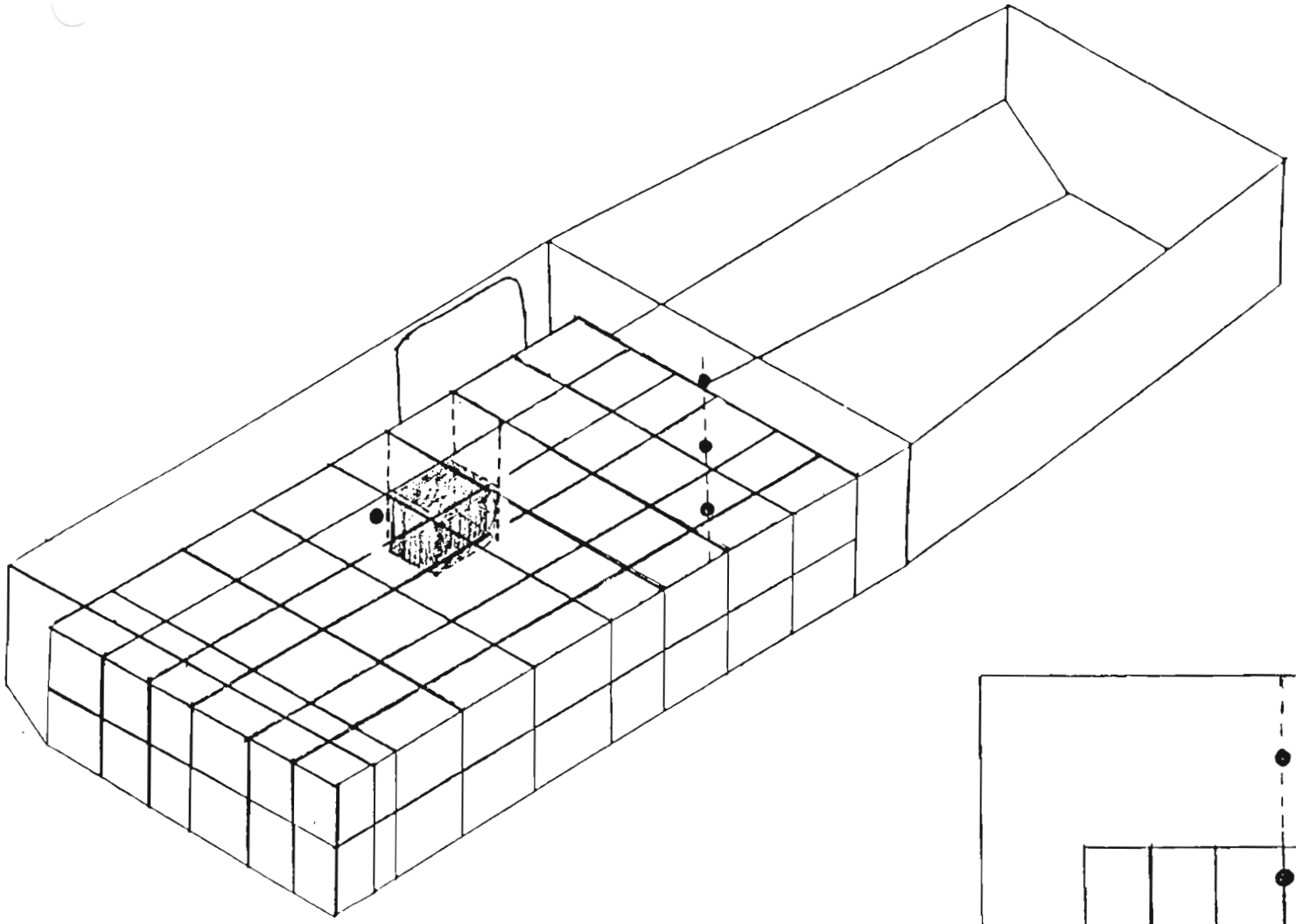

Halon 1301 Containerized Fire Load
Halon Bottom Tree
Halon Top Tree
O2 Outside Container
T/C Ceiling 4
Percent
Temperature (Deg. F)
Time (Minutes)
0
5
10
15
20
25
0
100
200
300
400
500
600
700
800
0
3
6
9
12
15
18
21
24
27
30


FM-200 Containerized Fire Load
Percent
Temperature (Deg. F)
Time (Minutes)
0
5
10
15
20
25
0
100
200
300
400
500
600
700
800
0
2
4
6
8
10
12
14
16
FM-200 Inside Container
O2 Outside Container
T/C Ceiling 4


FE-25 Containerized Fire Load
Percent
25
20
15
10
5
0
0
2
4
6
8
10
12
14
16
Time (Minutes)
1400
1200
1000
800
600
400
200
0
Temperature (Deg.F)
FE-25 In Container
O2 Outside Container
T/C Ceiling

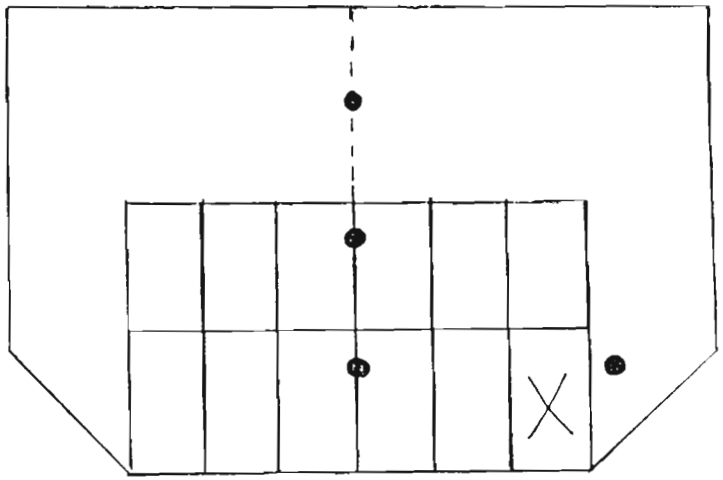
AGENT SUPPRESSION AND EXTINGUISHING CONCENTRATIONS

AGENT	CUP BURNER	CLASS A BULK FIRE	RATIO	CLASS A CONTAINERIZED	RATIO	CLASS B FIRE	RATIO
1301	3.1	4.1	1.3	4.2	1.4	3.0	1.0
FM 200	6.6	9.3	1.4	8.9	1.3	5.2	0.8
FE 25	8.8	11.3	1.3	10.7	1.2	8.9	1.0

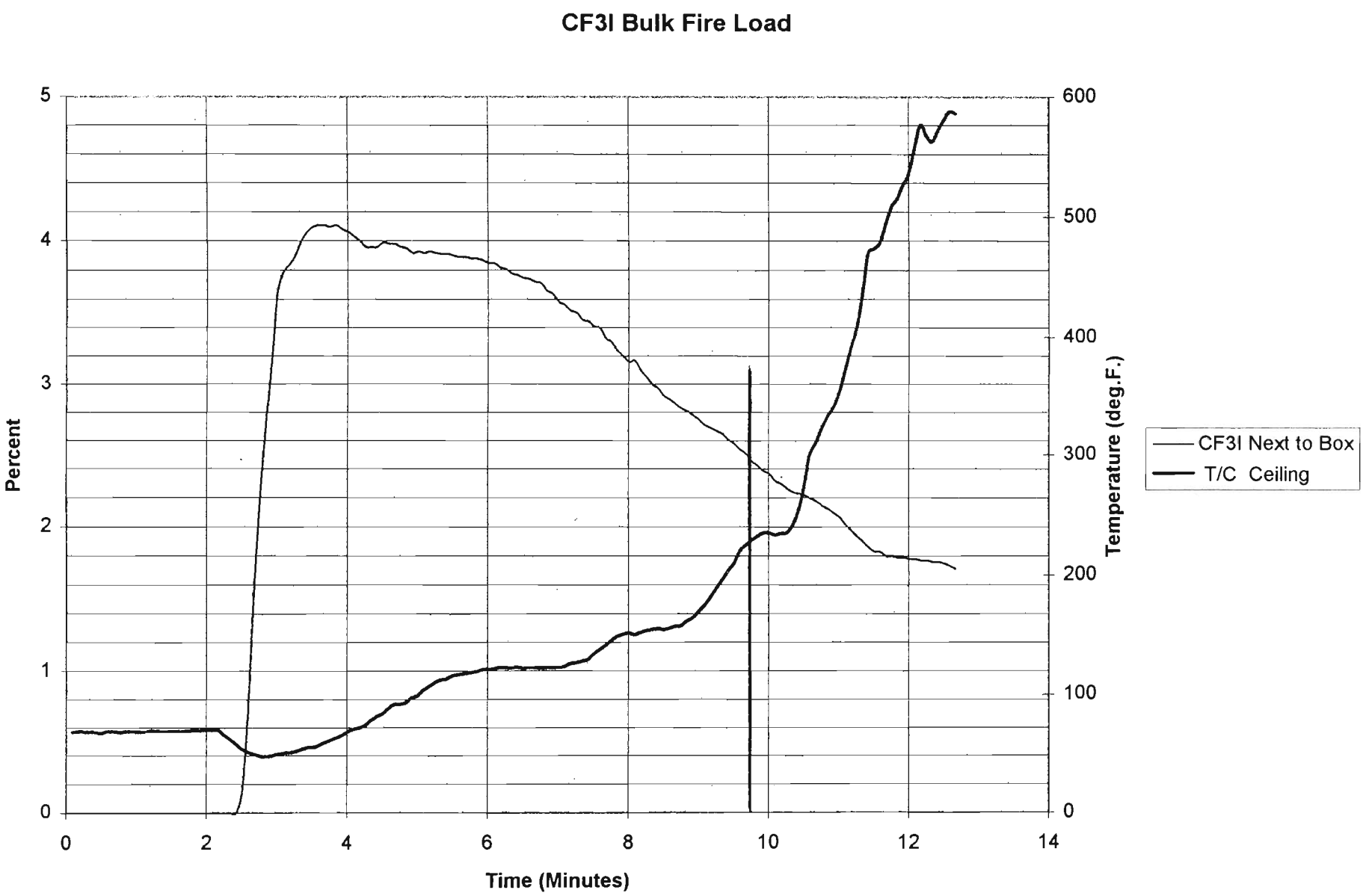


Gas Probes

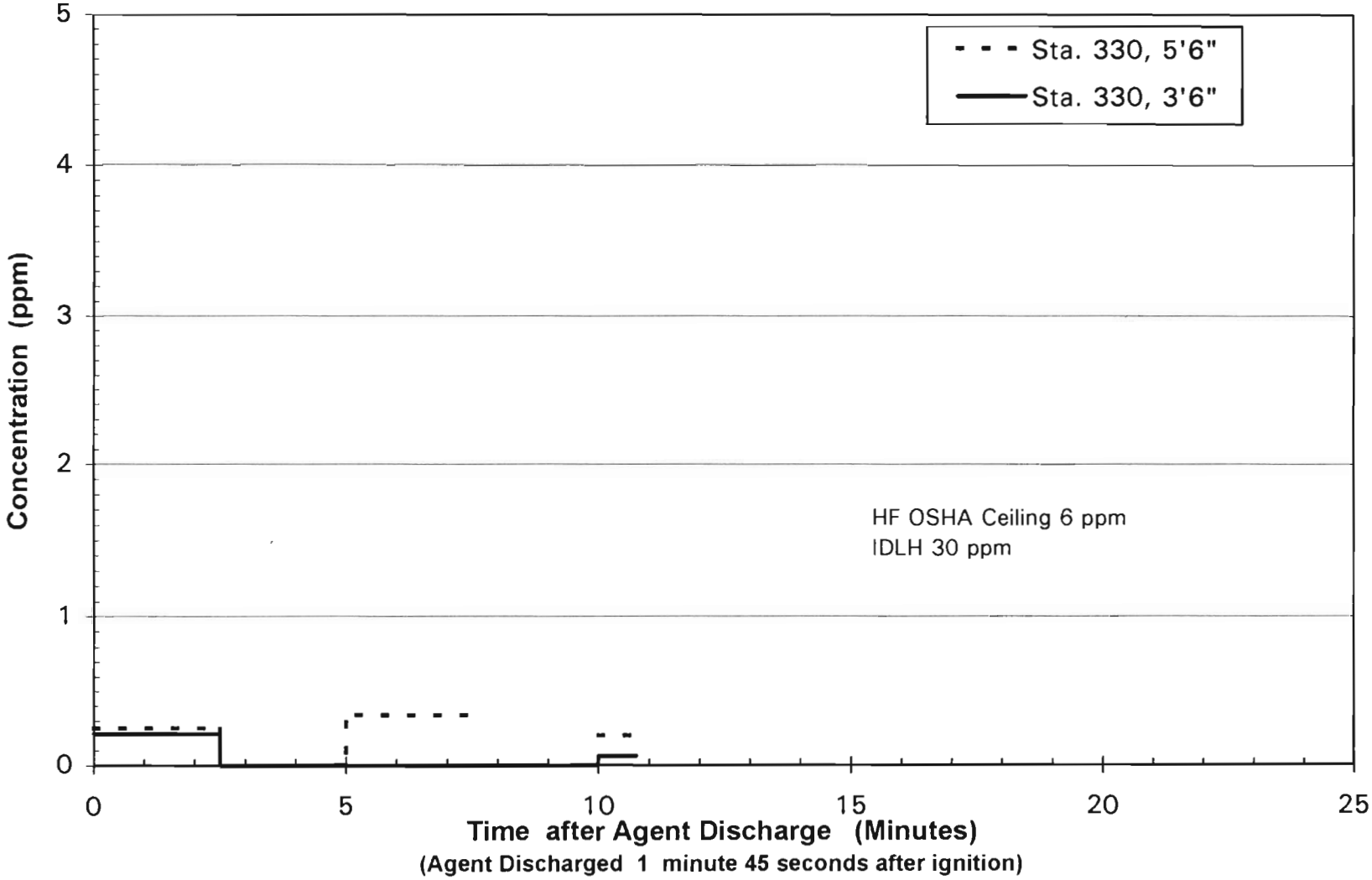
Ignited Box



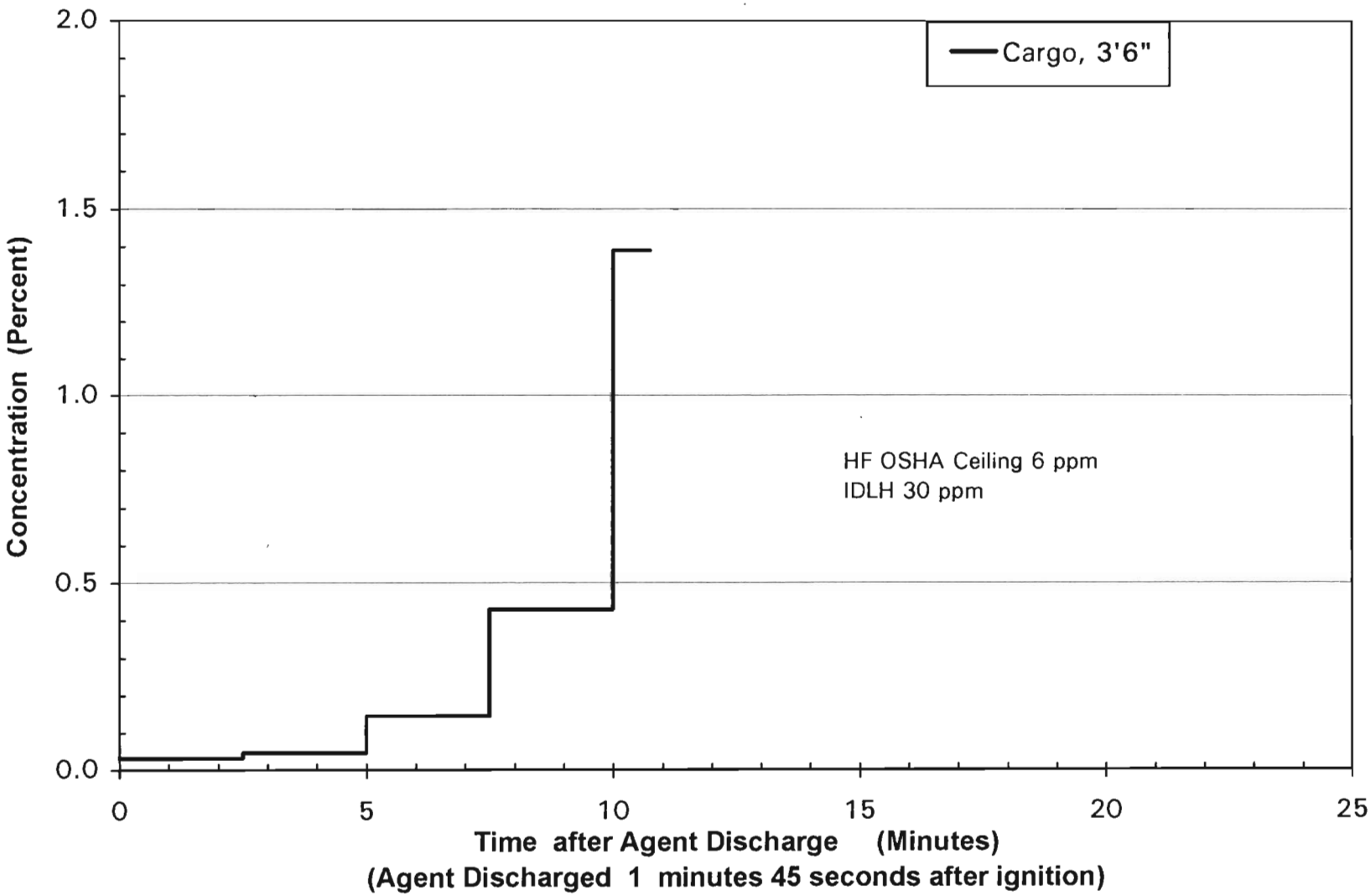
End View


CF3I Bulk Fire Load
Percent
Temperature (deg.F.)
Time (Minutes)
0
1
2
3
4
5
0
100
200
300
400
500
600
0
2
4
6
8
10
12
14
CF3I Next to Box
T/C Ceiling

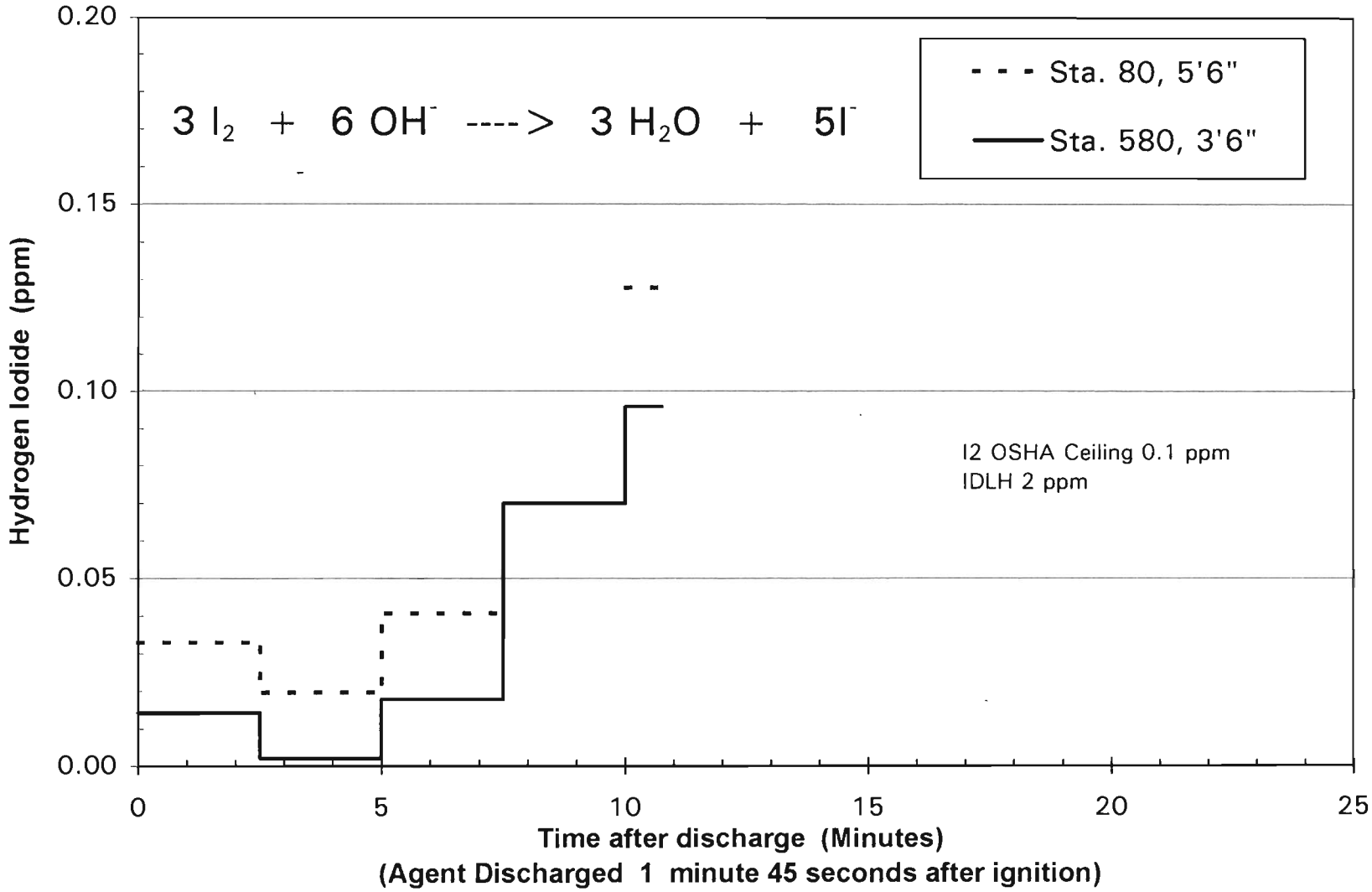
Hydrogen Fluoride TC10 Cargo Test 9704 05-Apr-97
Agent: CF3I

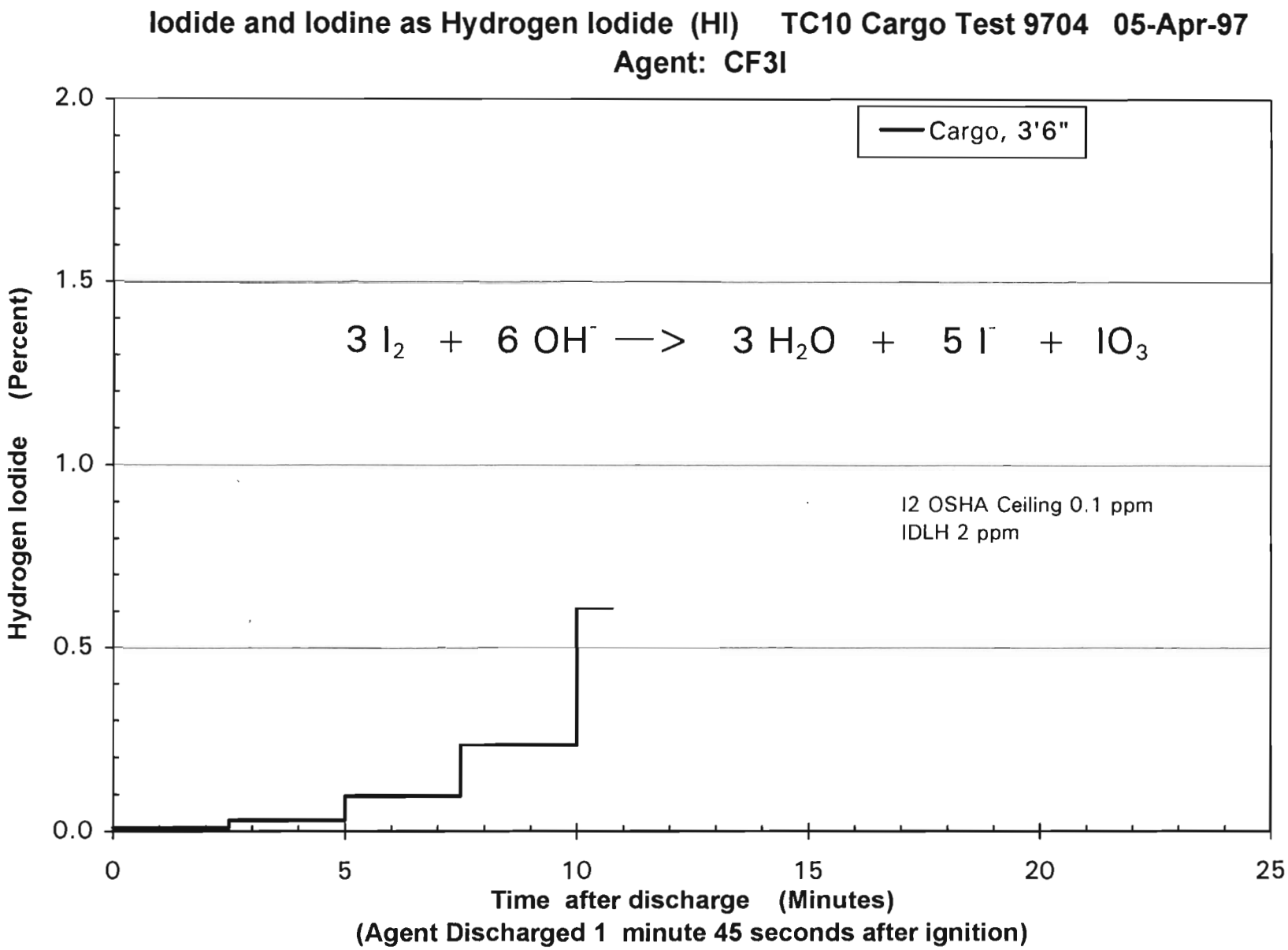


Hydrogen Fluoride TC10 Cargo Test 9704 05-Apr-97
Agent: CF3I



Iodide and Iodine as Hydrogen Iodide (HI) TC10 Cargo Test 9704 5-Apr-97
Agent: CF3I




Iodide and Iodine as Hydrogen Iodide (HI) TC10 Cargo Test 9704 05-Apr-97
Agent: CF3I
Cargo, 3'6"
3 I2 + 6 OH- —> 3 H2O + 5 I- + IO3
I2 OSHA Ceiling 0.1 ppm
IDLH 2 ppm
Hydrogen Iodide (Percent)
2.0
1.5
1.0
0.5
0.0
0
5
10
15
20
25
Time after discharge (Minutes)
(Agent Discharged 1 minute 45 seconds after ignition)

Concentrations for Combined HI and I2 in Air Measured with a Mass Spectrometer

Readings were taken 48 hours after the completion of the cargo fire test

Inside cargo compartment at mid height: 0.7 ppm
Five feet outside of cargo compartment door at five foot height: 0.07 ppm
Five feet outside of cargo compartment door at floor level: 0.2 ppm

NIOSH/OSHA Ceiling Limit for I2: 0.1 ppm
NIOSH/OSHA IDLH for I2: 2 ppm

International Halon Replacement Working Group (IHRWG) Task Group on Halon Options

The following provides an update on the IHRWG Task Group on Halon Options. For additional information see the Internet site **http://nmeri.unm.edu/cget/ihrwg.htm**.

1. The IHRWG Task Group on Halon Options reviews and assesses halon substitution technologies for each major area of on-board aircraft use: (1) engine nacelles, (2) handheld extinguishers, (3) cargo compartments, and (4) lavatory protection. The Task Group maintains a review of new technologies as they appear and periodically submits updated reports. Past reports of the Task Group on Halon Options were published in February 1995 and September 1996:

> Brown, J. A., Jacobson, E., Dvorak, L. E., Gibson, J., Gupta, A., Metchis, K., Mossel, J. W., Simpson, T., Speitel, L. C., Tapscott, R. E., and Tetla, R. A., *Chemical Options to Halons for Aircraft Use*, DOT/FAA/CT-95/9, Final Report, Task Group 6, International Halon Replacement Working Group, U. S. Department of Transportation, Federal Aviation Administration, February 1995
>
> Tapscott, R. E., Dvorak, L. E., Jacobson, E., Leach, W., Sanders, M., Simpson, T. A., Speitel, L. C., and Tetla, R. A., *Halon Replacement Options for Use in Aircraft Fire Suppression Systems*, DOT/FAA/AR-96/90, U. S. Department of Transportation, Federal Aviation Administration, September 1996.

2. The Task Group is now working on a third report for which comments are requested. The report is available on the internet site at **http://nmeri.unm.edu/cget/ihrwg.htm** in Portable Document Format (pdf). (You can obtain a free viewer for this file format at **http//www.adobe.com**.) The draft report does not contain the final recommendations and should not be quoted or cited. The opinions expressed are those of the Task Group and do not necessarily reflect the views of any sponsoring or supporting organization. If you have comments, suggestions, or recommended corrections or if you have trouble reading the report, please contact Robert Tapscott, Chair, Task Group on Halon Options.

3. All manufacturers of fire suppression technologies applicable to replacement of halons on aircraft should ensure that we are informed of their products. If we have already included your product in the report (see the Internet site), please review the discussion thoroughly. Final decisions on information and assessments presented are solely the responsibility of the Task Group; however, we welcome the submission of recommended changes and additions.

4. Appendix A of the Task Group report now being prepared will contain a list of manufacturers whose products are specifically discussed in the report with addresses and telephone/fax numbers. Manufacturers are requested to check to ensure that they are included in this list and that the information provided is correct.

5. The Task Group on Halon Options met on Wednesday, 16 April during the IHRWG meeting in Long Beach, California. One item discussed was the Task Group mandates. The Task Group has had two mandates in the past: (1) to review technologies for replacement of halons in aircraft use and (2) to recommend agent/systems for establishment of test protocols. The second mandate may be changed to assess the applicability of various technologies for each major on-board aircraft application. (engine, lavatory, handhelds, cargo).

6. The Task Group on Halon Options will meet during the NMERI Halon Options Technical Working Conference (HOTWC) (**http://nmeri.unm.edu/cget/confinfo.htm**), 6-8 May 1997. The Task Group meeting is scheduled for 5 to 6 pm, Wednesday, 6 May in the Weavers Room at the Sheraton Old Town, 800 Rio Grande Blvd. NW, Albuquerque, New Mexico 87104, USA (telephone: +1-505-843-6300, fax: +1-505-842-9863), the location of the HOTWC.

7. The Task Group would like one additional member in each of the areas of WATER MISTING SYSTEMS and INERT GASES. If you are interested, please contact the Task Group Chair. Although attendance at Task Group meetings is not required, members must be willing to spend time helping to review and write the report. It is essential that members have an email address and Internet access.

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FIRE PROTECTION TECHNOLOGY BENEFIT METHODOLOGY DEVELOPMENT PROJECT

PRESENTED AT THE INTERNATIONAL HALON REPLACEMENT WORKING GROUP MEETING

~~LONDON, ENGLAND~~

~~9-10 OCTOBER 1996~~

LONG BEACH, CALIFORNIA

15-16 APRIL 1997

BACKGROUND

- INTERNATIONAL LAWS HAVE RESULTED IN A BAN ON THE PRODUCTION OF HALONS
- RESULT HAS BEEN A RAPID EVOLUTION OF VARIOUS AIRCRAFT FIRE PROTECTION TECHNOLOGIES
- LITTLE EFFORT DEVOTED TO METHODOLOGY DEVELOPMENT TO EVALUATE VARIOUS REPLACEMENT TECHNOLOGIES

PROJECT OBJECTIVE

- DEVELOP AND DOCUMENT A METHODOLOGY TO QUICKLY AND COST-EFFECTIVELY ASSESS THE POTENTIAL OF PROPOSED FIRE PROTECTION TECHNOLOGIES

PROJECT TEAM

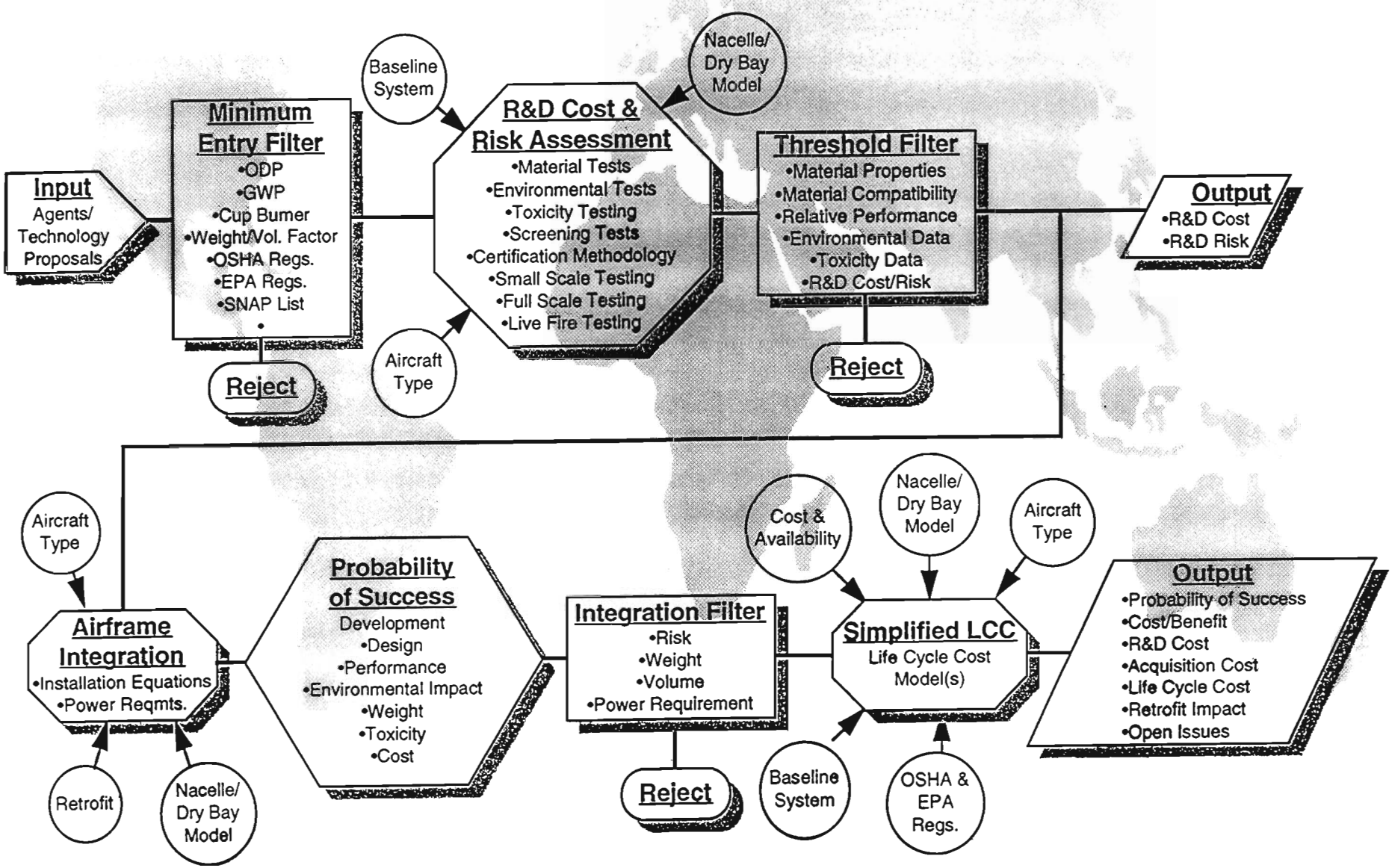
- BOOZ•ALLEN & HAMILTON, INC.
- MCDONNELL DOUGLAS AEROSPACE
- WALTER KIDDE AEROSPACE

APPROACH

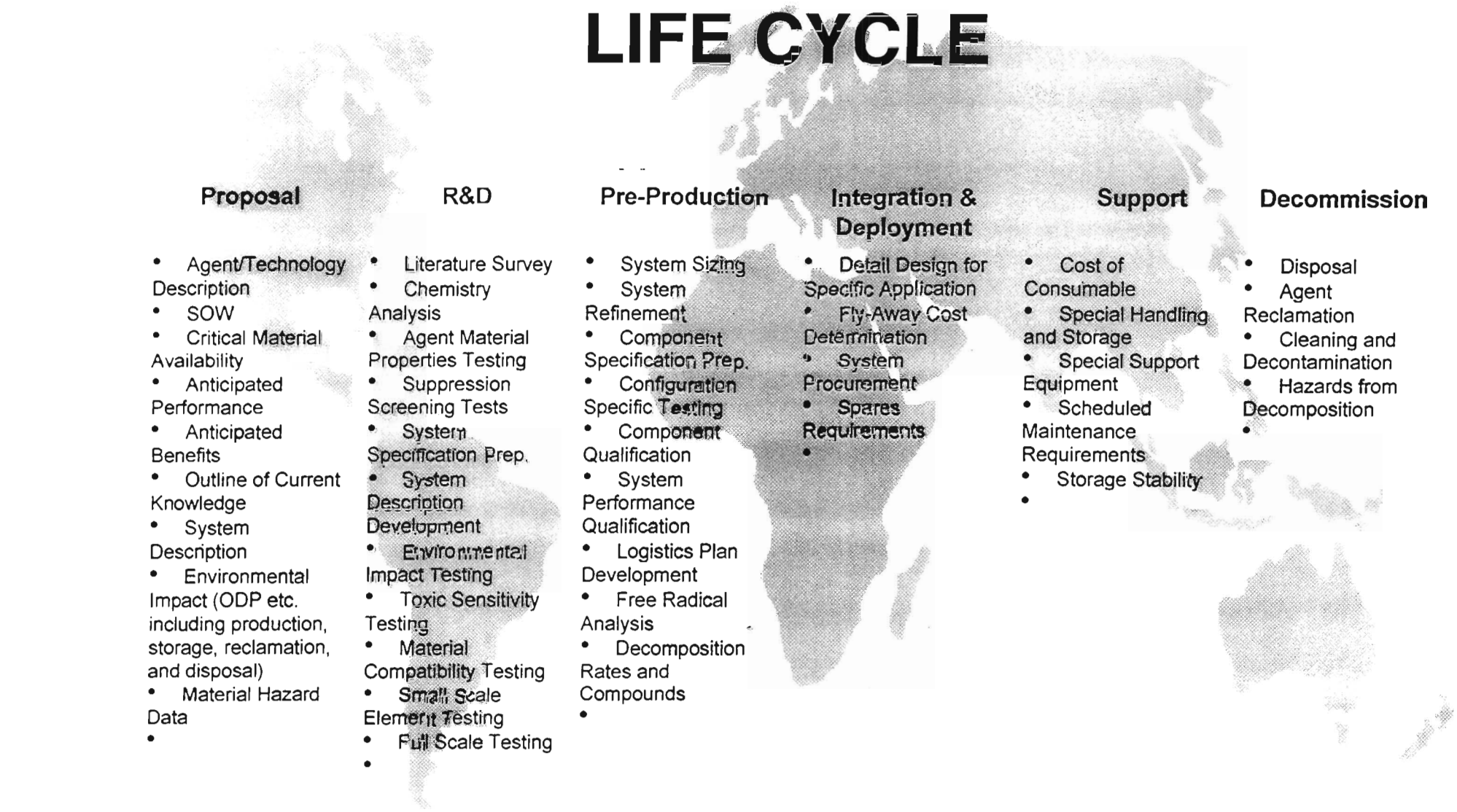
Plan and Document a Preliminary Methodology to Assess the Potential of Proposed Fire Suppression Technologies

- Features
  - Quick and Cost-Effective Assessment
  - Minimum Entry Screen
  - Estimate of R&D Costs and Risks
  - Performance Screen
  - Airframe Integration Model and Screen
  - Probability of Success Derivation
  - Life Cycle Cost Estimates from Simplified Model

PRELIMINARY METHODOLOGY



FIRE SUPPRESSION SYSTEM LIFE CYCLE



Proposal

- Agent/Technology Description
- SOW
- Critical Material Availability
- Anticipated Performance
- Anticipated Benefits
- Outline of Current Knowledge
- System Description
- Environmental Impact (ODP etc. including production, storage, reclamation, and disposal)
- Material Hazard Data
-

R&D

- Literature Survey
- Chemistry Analysis
- Agent Material Properties Testing
- Suppression Screening Tests
- System Specification Prep.
- System Description Development
- Environmental Impact Testing
- Toxic Sensitivity Testing
- Material Compatibility Testing
- Small Scale Element Testing
- Full Scale Testing
-

Pre-Production

- System Sizing
- System Refinement
- Component Specification Prep.
- Configuration Specific Testing
- Component Qualification
- System Performance Qualification
- Logistics Plan Development
- Free Radical Analysis
- Decomposition Rates and Compounds
-

Integration & Deployment

- Detail Design for Specific Application
- Fly-Away Cost Determination
- System Procurement
- Spares Requirements
-

Support

- Cost of Consumable
- Special Handling and Storage
- Special Support Equipment
- Scheduled Maintenance Requirements
- Storage Stability
-

Decommission

- Disposal
- Agent Reclamation
- Cleaning and Decontamination
- Hazards from Decomposition
-

MONTREAL PROTOCOL MEETING

- MELBOURNE

HALONS TECHNICAL OPTIONS COMMITTEE

FEBRUARY 1997

1. Meeting discussed a number of Key Issues relating to Aviation.

2. These included:
   - Provide clear guidance for users who are critical
   - Costa Rica Decision VIII/14
   - Current production in Developing countries China/India/Korea
   - Development of 25 year plan for controlled phase out in none essential areas
   - Change of style of HTOC report to make it easier for the parties to understand
   - Australia position on banking and destruction
   - Commercial Aircraft installed base needs and support
   - Commercial Aircraft change of Class D cargoholds to Class C
   - U.S. EPA position on aviation
   - New task group assignments

Provide Guidance for Users that are Critical

- Identify critical use areas
- Define those that are short-medium or long term
- Aviation needs to segregate between its ground based facilities and aircraft needs
- They must immediately put this programme in place if they have not already done so
- Put in place a banking and recycling programme aircraft need

Costa Rica Decision VIII/14

- Further studies on availability of halons to meet the needs of those deemed critical
- Parties to estimate surplus on deficit relative to their assessment of critical need
- If there is a shortfall, prepare an action plan to overcome shortfall
- If there is a surplus provide guidance on disposal or redeployment
- Report to be prepared for the 10th Meeting of parties in 1998

Production in Developing Countries

- Review of current production
- Look at a reduction on the production date of 2010
- Example of help:
  U.S. may help Russia with some H2402

Develop 25 Year Plan

- Retirement
- Redeployment
- Recycling
- Banking
- Review 5 years critical use
- Destruction

HTOC Report - Change of Style

- More user friendly
- Executive summary
- Fact sheets on Technical Data
- WEB Site - ftp://www.taylorwagner.com

Australia Position

- Have a bank
- Large amount of H1211
- Recyling and destruction facility
- Has no intention of destroying H1301 for the forseeable future

Civil Commercial Aviation H1301

- Estimated number of aircraft 30,989
- Installed base (fixed systems) for fleet 700 tons
- Annual service support and new build on current design 50 tons
- Aircraft 30 year life 1,500 tons

Cargo Holds Conversion D to C H1301

• Number of aircraft (approx)	3,000
• Average requirement 50 lbs of halon	67 tons
• Annual service support	6 tons
• Aircraft 30 year life	180 tons
30 year critical need	1,500 tons
for all fixed systems	180
Total	1,680 tons

Civil Commercial Aircraft - Hand Portables H1211

- Estimated number of aircraft 30,989
- Average amount in each aircraft 15 lbs
- Installed base 207 tons
- Annual service and new requirement 3 tons
- Average life of aircraft 30 years 90 tons
- Training of crew annually 3 tons
- 30 year programme 90 tons

World Installed Base

- None Article 5 Countries

99,000 tons

New Task Groups

DOD	- Bob Darwin
Aircraft	- John O'Sullivan
Retrofit Costs	- John O'Sullivan
Oil/Gas	- David Catchpole
National Programme	- Eric Pederssen
Article 5 (1)	- China/India reps

Future of Aviation

- Need to act now
- Each company develops its own programme
- Work with other interested bodies
- The need to maintain level of safety
- Provide information to John O'Sullivan on your current future needs for halons for aircraft use only

AGENDA

INTERNATIONAL HALON REPLACEMENT WORKING GROUP MEETING

APRIL 14-16, 1997

Hosted by Douglas Aircraft Company, Long Beach, California

MONDAY, APRIL 14, 1997

1:00 Task Group on Final Minimum Performance Standard for Cargo Compartments

TUESDAY, APRIL 15, 1997

9:00-9:15	Introduction/Background/General Information
9:15-9:30	Schedule for Halon Replacement Program
9:30-10:30	Update on Class 'D' Cargo Compartment to Class 'C' Cargo Compartment Meeting held February 6, 1997 in Seattle
10:30-10:45	Break
10:45-12:00	Task Group Leader Presentations
12:00-1:30	Lunch
1:30-4:30	Subgroup Leader Reviews/Presentations
	1:30-2:00 Lavatory
	2:00-2:30 Handheld
	2:30-3:00 Engine
3:00-3:15	Break
	3:15-4:30 Cargo

WEDNESDAY, APRIL 16, 1997

8:30-9:30	Task Group Meetings as needed
9:30-10:30	Discussion on Minimum Performance Standards
10:30-10:45	Break
10:45-11:30	Additional Discussion
11:30-1:00	Lunch
1:00-2:30	Working Group Member Presentations - 10 to 15 Minutes Each
	Jerry Flood - Cease Fire "Cease Fire's Synergistic, SuppressionTechnology for Fire Extinguishment"
	Lawrence Hardge - New Millenium Enviornmental Research
	Richard Dirks - KDI Precision Products "Watchtower"
2:30	Final Discussion/Next Meeting/Closing
2:30	Refreshments will be provided

THURSDAY, APRIL 17, 1997

9:00-12:00 Douglas Tour