Engine Nacelle, Halon Replacement

Reconsidering Carbon Dioxide as a Fire Extinguishant ~ Status

Presented to: FAA International Aircraft Systems Fire Protection Working Group

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Presentation Overview

• Show CO2 distribution test results to date.

• Identify future plans.
CO2 Distribution in the FAATC NFS

1. Measured CO2 distribution with a locally-modified, Statham-derivative gas analyzer
   A. 12 sample points
   B. associated with “high”-ventilation/spray-fire testing

2. Completed testing Nov 2017
   A. 3 repeated tests, inferior CO2
   B. 3 repeated tests, superior CO2
General Orientation, FAATC NFS

2 FUEL SPRAY NOZZLES
CONCENTRATION ANALYZER
SAMPLE POINT (typical), 12 points
AUTOIGNITION SOURCE
EXTERNAL SHELL
APPROXIMATE VISUAL CAMERA VIEWFIELDS

“PROTECTED” VOLUME
(18.8 ft³, 0.53 m³)

DISTANCE TO CANDIDATE INJECTION CROSS-SECTION
APPROXIMATELY 1.83 m (6 ft)

0.61 m (2 ft)

DISTANCE BETWEEN CORE/SHELL RIBS (typical),
5 cm tall

NOTES: Station (sta) numbers are incremented as inches.
Some details omitted for clarity.
This is a schematic view. Not drawn to scale.
Representative CO2 Distribution...

"HIGH" VENTILATION SPRAY FIRE, JP-8/Jet-A
"hivent" INJECTION PLUMBING
CO2 STORAGE VOLUME: 211 in³
INJECTED CO2 WEIGHT: 7.3 lbf

CO2 Superior
Representative CO2 Distribution...
CO2 Minimum Concentrations...

Minimum Volume Fraction CO2 [%v/v]

Time [sec]

CO2 Inferior

CO2 Superior

6.5 lbf CO2, 20171024_03
6.5 lbf CO2, 20171106_02
6.5 lbf CO2, 20171108_02
7.3 lbf CO2, 20171020_03
7.3 lbf CO2, 20171030_02
7.3 lbf CO2, 20171107_02
Near-term plans

1. Complete data review [these results are preliminary]

2. Work with CO2 vs “high”-vent/pool fire
   A. Establish acceptable fire suppression conditions
   B. Capture associated CO2 distribution

3. Review collected information & determine if further testing will occur