NMERI Halon Alternatives Technical Working Conference

U.S. NAVAL AIRCRAFT INERT GAS GENERATOR TEST PROGRAM

Prepared by: Marco Teoschi and Bill Leach
Naval Air Warfare Center Aircraft Division

Sponsored by: Mr. James Homan, AIR-4.3.5
Naval Air Systems Command
8 May 1996
INERT GAS GENERATOR APPLICATIONS

- F/A-18 E/F
  - ENGINE BAY
  - DRY BAY
- V-22
  - DRY BAY
  - MID-WING
• WORKHORSE GAS GENERATORS
  – 200MS, 1 LB GAS GENERATORS (F-18)
  – 1 LB MONOLITHIC GAS GENERATORS (F-18)
• PELLETIZED PROPELLANT GENERATORS (F-18, V-22)
• SOLID GRAIN GAS GENERATOR (F-18)
F-18 E/F ENGINE BAY SIMULATOR
F/A-18 E/F ENGINE
NAC TESTING

- ENGINE NACELLE TEST ARTICLE
- VARIABLE DISTRIBUTION SYSTEMS, PROPELLANT TYPES
- ESTABLISHED SOLID GRAIN PROPELLANT EQUIVALENT TO HALON TESTS CONDUCTED IN 11/94
- RESULTS:
  - 5.5 POUND SOLID GRAIN GAS GENERATOR
F/A-18 E/F ENGINE NACELLE TESTING (CONT’D)

• PRESSURE / CONCENTRATION TESTS MEASUREMENTS TAKEN
  – CONCENTRATION TESTS TAKEN WITH AND WITHOUT FIRE PRESENT
    • RESULTS DEMONSTRATED SAME LEVEL OF OXYGEN DEPLETION DURING AGENT DISCHARGE FOR BOTH TEST EVENTS
  – VARIED DISTRIBUTION SYSTEM DIRECTLY AFFECTS INERTION LEVELS
F-18 E/F DRY BAY AREA

Tank 1

Tank 2

Tank 3

Tank 4

Foam

Active Dry Bay Fire Suppression Using Gas Generators/IR Detectors
F/A-18 E/F DRY BAY TESTING

- LIVE FIRE TEST (LFT) CONDUCTED - 10/95 - 11/95
- FULL SCALE DRY BAY SIMULATOR & SURROGATE LFT TESTING - 8/96 - 10/96
- TEST CONDITIONS & PROCEDURES
  - VARIABLE THREAT, NUMBER & LOCATION OF GAS GENERATORS
V-22 D<Y BAY INERT GAS GENERATOR SYSTEM
V-22 MIDWING LIVE FIRE TEST

- V-22 EMD #6 AIRCRAFT TESTBED
- FULLY TESTED MID-WING FIRE PROTECTION SYSTEM - 1/96-2/96
- SYSTEM SIZED FOR SEVEN 420g PELLETIZED GAS GENERATORS
- PRESSURE / CONCENTRATION MEASUREMENT TESTS TAKEN
HIGHLIGHTS

• **F-18:**
  - AGENT CONCENTRATION TESTS WITH FIRE
  - MONOLITHIC GAS GENERATOR

• **V-22:**
  - 1ST AGENT EMISSION TEST FOR GAS GENERATOR BASED SYSTEM
  - ACTUAL AIRCRAFT USED
  - PHYSICALLY ACTING AGENT (BOTH V-22, F-18)