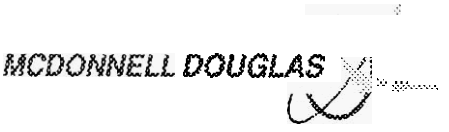
MDA HALON Replacement Efforts

HALON Options Technical Working Conference
UNM / NMERI 9 May 1996



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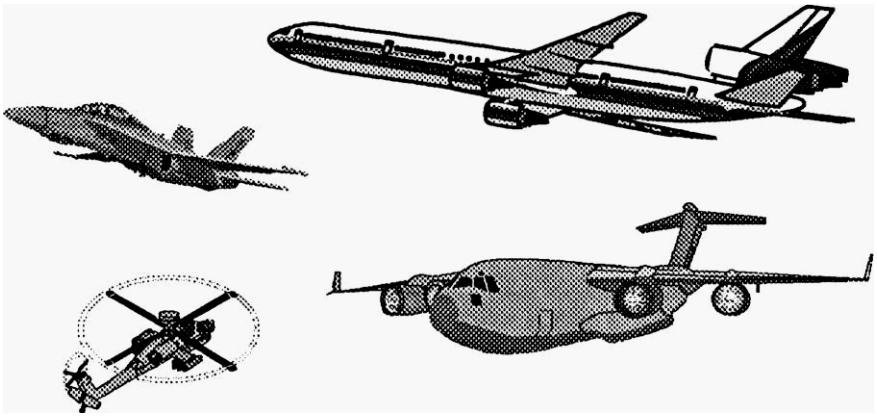
Outline

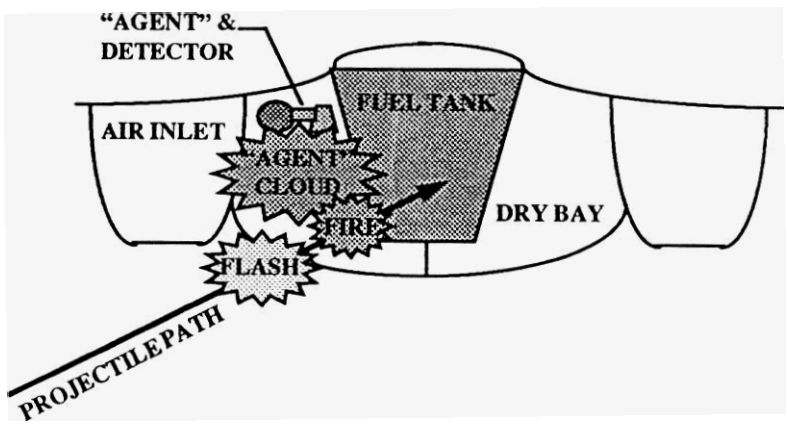
- Background
  - » Dry Bays
  - » Engine Bays
- Alternate Agent/Technology Penalties
- Corrosion Screening Test for Gas Generator Exhaust Products ("Dust")
- Planed CF3I Ground Testing
- Operating/Test Considerations
  - » Impact of Leak Location on Fire Fuel History
  - » Representative VS Simplified Operating Conditions
- Recommendations

All MDC Aircraft Types Require Fire Protection

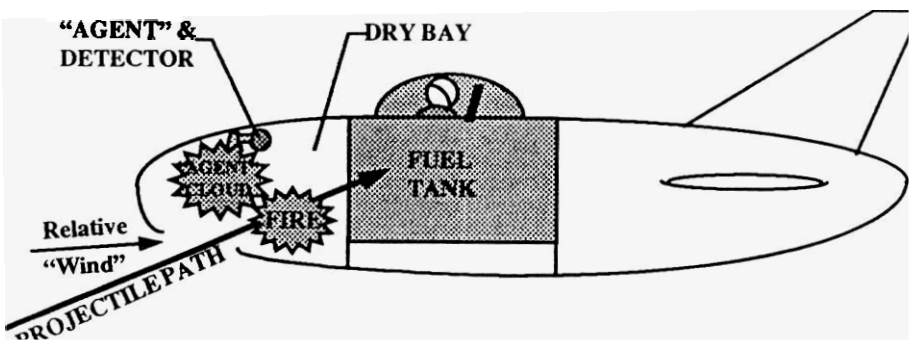


DRY Bay Protection

Dry Bay Protection Concept



Dry Bay Issues

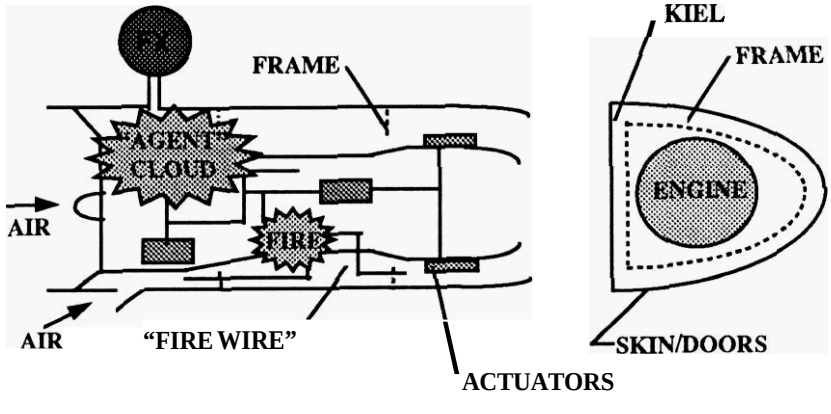


- **Effect of Equivalent Angle of Attack** ?
- **Time Delay to Discharge** ?
- **Fire or Explosion Protection** ?

Engine Bay Protection

(APU, AMAD, Gearbox, Etc. are
Usually Included)

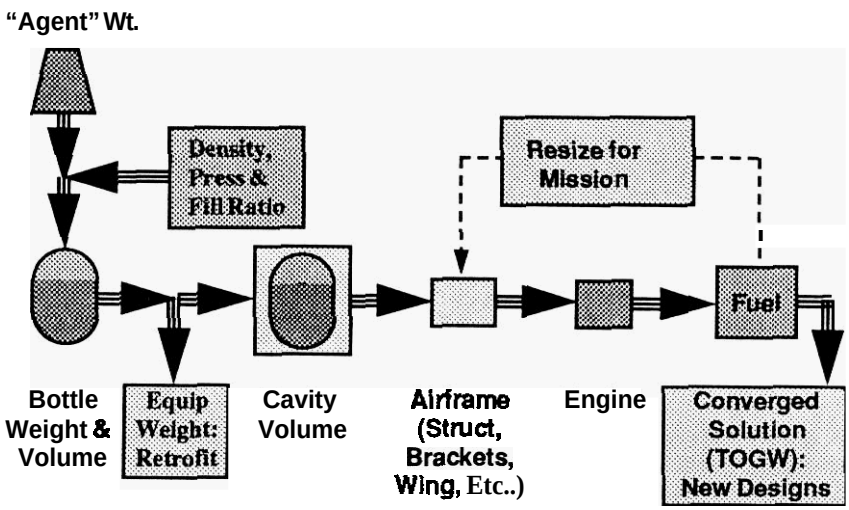
Engine Bay Installation



Alternate Agent/Technology Penalties

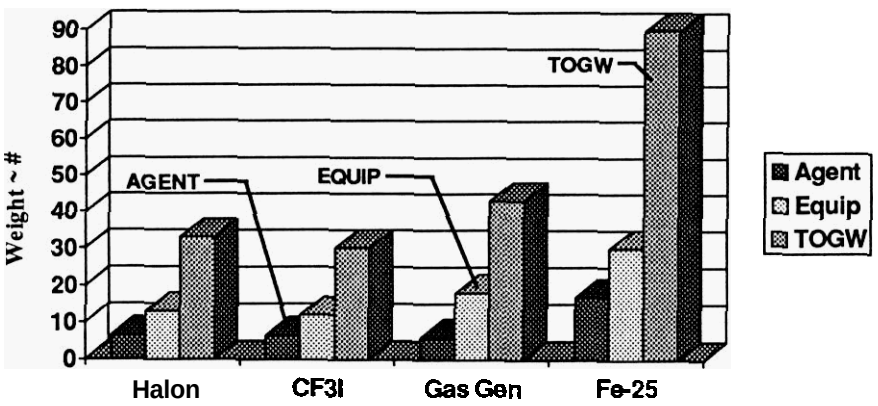
(Engine Bay Application)

Weight / Volume Multipliers



Representative F/A Engine Bays Protection Penalties

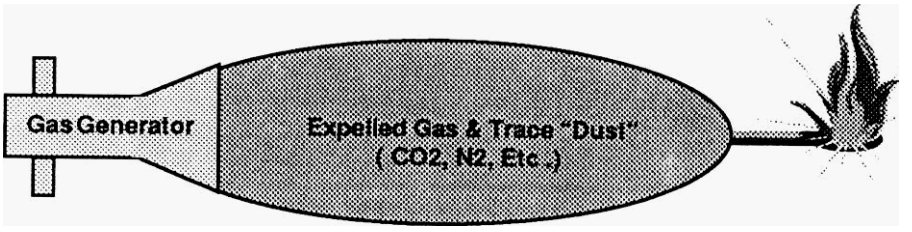
Estimate Based on 1994 Data



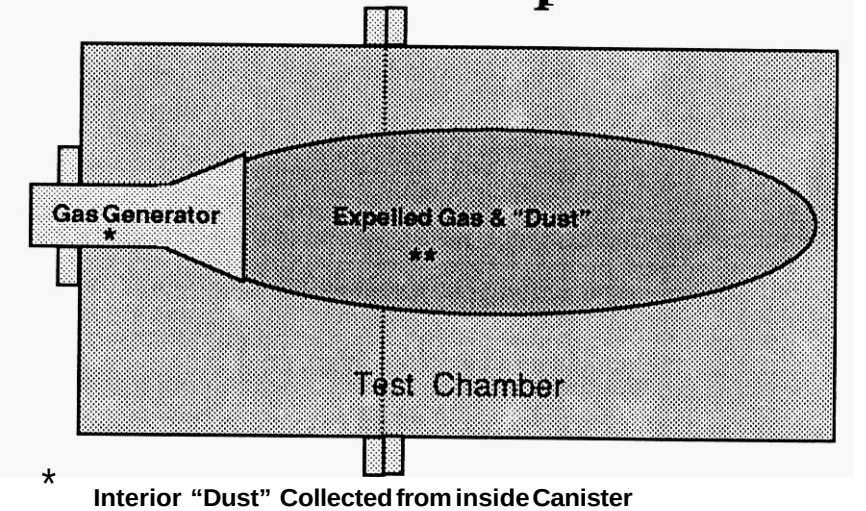
Corrosion Screening Tests

(Trace "Dust" From Solid Propellant Gas Generators)

Solid Propellant Gas Generators



"Dust" Samples

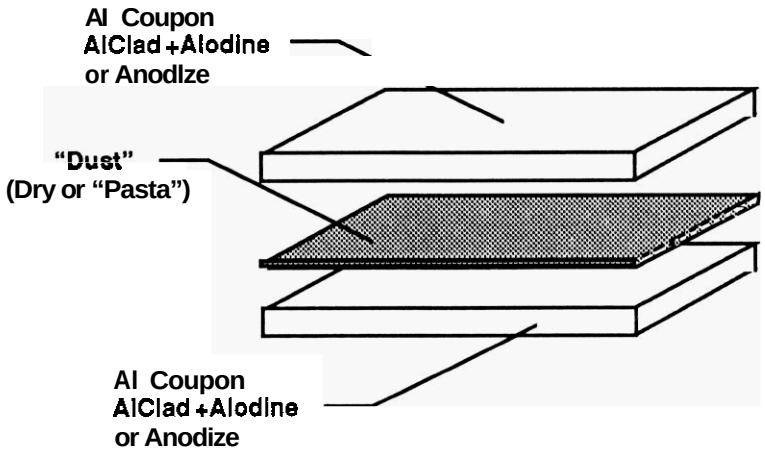


* Interior "Dust" Collected from inside Canister

** Expelled "Dust" Collected by Sweeping or Water Flush & Filtration

Corrosion Screening Test

(Per ASTM F1110-90)



Corrosion Test Results*

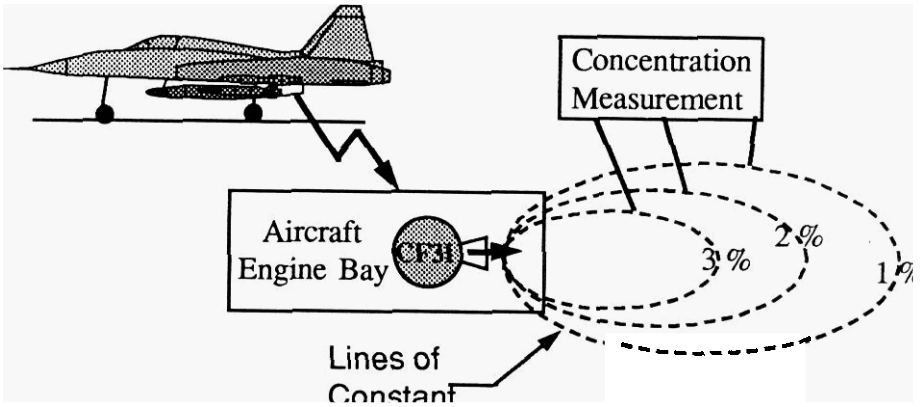
Source of "Dust"	Preparation	Results
Interior of Gas Generator	Dry Paste	0 4
Expelled 1 Collected By Water Rinse & Filtration	Dry Paste (Dust + H20)	0 0 & 1
Expelled & Collected By Dry "Sweeping"	Dry Paste (Dust + H20)	0 0 & 1

NOTES
0 = No Cormslon
1 = Mild Corrosion (Alodlne and/or Anodlze Penetrated but Base Metal Unaffected)
4 = Severe Corrosion (Base Metal Attacked)
• = Test per ASTM F1110-90

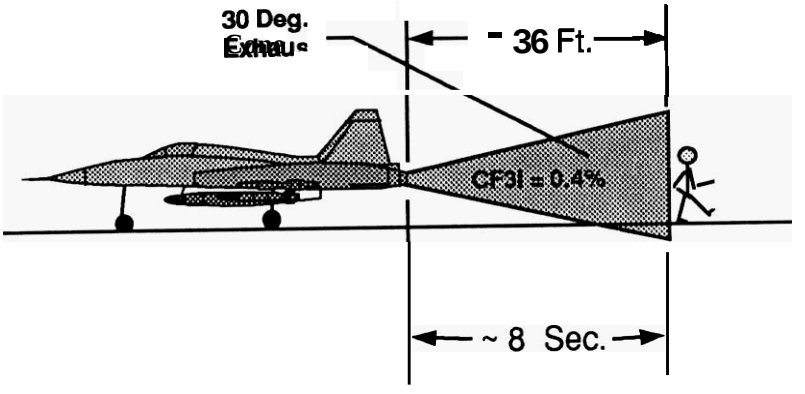
Planned CF3I Ground Testing

(Potential Toxic Impact on
Maintentance Crew)

CF3I Concentration Test



Homogeneous 0.4% CF3I "Cloud"



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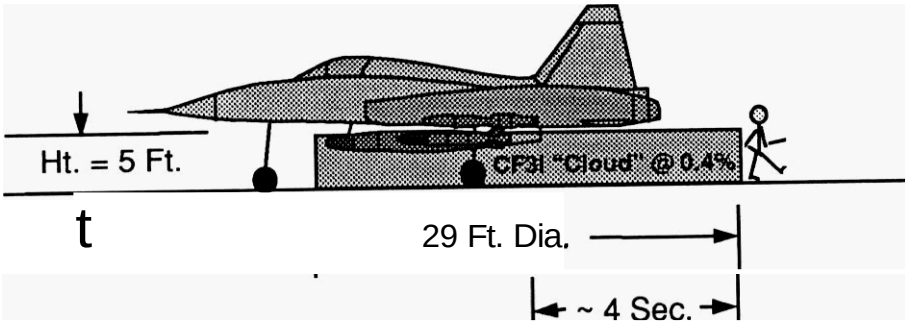
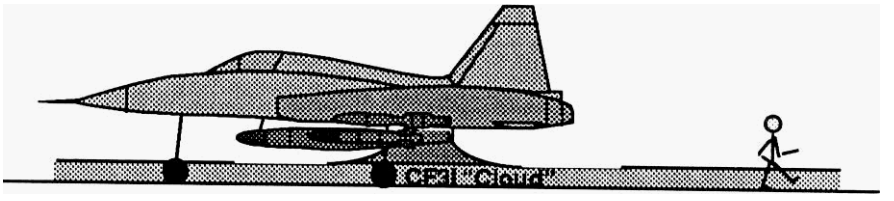
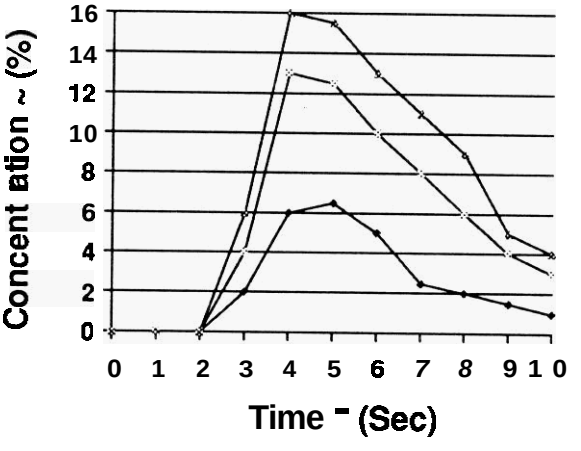


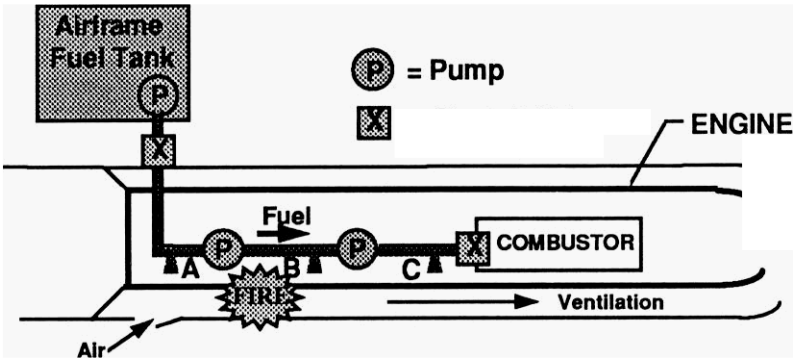
“Cloud” Shape / Height ?



Engine Bay Dispersion
(- 40 Cubic Ft.)



Fuel Leak Location Impact



Location of Leak	Norm Press	Decay Press	Decay Time
A	25 Psi	25-0 Psi	0-2 Sec
B	300 Psi	300-0 Psi	5-60 Sec
C	1500 Psi	1500-0 Psi	5-60 Sec

Recommendations

- Understand the Fire Scenarios & Extinguishing Mechanisms
  - Define Various Fire Initiation / Development / Extinguishing / Re-ignition Scenarios
  - High Speed Instrumentation to Improve Understanding
    - Concentration, Pressure, Velocity ?
  - Theoretical Modeling to Mature the Science
  - Experiments to Determine / Verify the Mechanism of Gas Generator Extinguishing, Among Others
- Reduce Weight/Volume Penalties
  - Continue R&D on CF3I and Gas Generators, Others
  - DoD / NIST / ARPA Next-Generation Program
- "NO-Fire" Certification
  - Engine Bays / Dry Bays ?