ALTERNATIVES TO HALON
A STATUS REPORT

PRESENTED AT THE ADPA/NSIA SYMPOSIUM

ENHANCING AIRCRAFT SURVIVABILITY -

A VULNERABILITY PERSPECTIVE

OCTOBER 21 - 23, 1997

NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

PRESENTED BY

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OVERVIEW

- SHORT HISTORY
- HALON REPLACEMENT PROGRAM FOR AVIATION
- OTHER PROGRAMS
- COSTS OF FIRE LOSSES
- CONCLUSIONS

SHORT HISTORY

- MONTREAL PROTOCOL LIMITED PRODUCTION OF OZONE DEPLETING SUBSTANCES (ODS)
- SUBSEQUENT INTERNATIONAL AGREEMENTS AND NATIONAL LEGISLATION HAVE DICTATED THE PHASE-OUT OF ODS PRODUCTION
- USAGE OF EXISTING SUPPLIES WAS STILL OK
- ODS PRODUCTION STOPPED IN THE U.S. 1/1/94
- ODS INCLUDE HALONS
- USAF DECIDED IN 1992 TO DEVELOP A NON-OZONE DEPLETING SOLUTION BY 1995

HALON REPLACEMENT PROGRAM FOR AVIATION

- JOINT DOD/FAA PROGRAM TO IDENTIFY AND EVALUATE ALTERNATIVE EXTINGUISHING AGENTS
- DRY BAY AND ENGINE NACELLE APPLICATIONS
- THREE-PHASED PROGRAM
  - OPERATIONAL PARAMETERS STUDY
    - WHAT FIRE ZONE PARAMETERS ARE IMPORTANT?
  - OPERATIONAL COMPARISON OF SELECTED AGENTS
    - HEAD-TO-HEAD COMPETITION BETWEEN AGENTS
  - ESTABLISHMENT OF DESIGN CRITERIA METHODOLOGIES
    - DEVELOP DESIGN EQUATIONS FOR THE NEW AGENT
- LAB-SCALE TESTING CONDUCTED AT NIST
- FULL-SCALE TESTING CONDUCTED AT WL

HALON REPLACEMENT PROGRAM FOR AVIATION - OUTPUT

- RECOMMENDED REPLACEMENT AGENT
  - HFC-125 FOR BOTH APPLICATIONS
- EIGHT TECHNICAL REPORTS
  - PHASE I REPORTS AVAILABLE NOW
  - PHASE II REPORTS AND DESIGN GUIDES CLOSE
  - PHASE III REPORTS ARE DRAFTED AND GOING THROUGH THE FIRST ITERATION
- DATA BASE OF FIRE ZONE PARAMETER VALUES
- INCIDENT DATA ANALYSIS REPORT
- HALON DISCHARGES AT ALTITUDE REPORT
- THE EFFECTS OF CLUTTER ON FIRE DEVELOPMENT REPORT

OTHER PROGRAMS

- WRIGHT LAB F-22 ENGINE NACELLE TEST
  - UTILIZED SOLID PROPELLANT GAS GENERATOR (SPGG) TECHNOLOGY
  - TESTING COMPLETED
  - DRAFT/FINAL REPORT BY END OF NOVEMBER 1997
  - SEE POSTER PRESENTATION HERE AT SYMPOSIUM
- NAVAL AIR WARFARE CENTER - CHINA LAKE F/A-18 E/F ENGINE NACELLE TESTING
  - UTILIZED SPGG TECHNOLOGY
  - DOCUMENTED IN NAWCWPNS TM 7859, MARCH 1995
- NEXT GENERATION FIRE SUPPRESSANT TECHNOLOGY PROGRAM (NGP)
  - HEADED BY DR. DICK GANN AT NIST
  - GOAL IS TO DEVELOP EFFECTIVE, ENVIRONMENTALLY FRIENDLY FIRE SUPPRESSION TECHNIQUES BY 2004

COSTS OF FIRE AND FIRE PROTECTION TO THE USA

- ESTIMATED HISTORICAL COSTS ($95) FOR THE PERIOD 1966 THROUGH 1995 - $15.465 B
  - COSTS OF PEACETIME LOSSES - $9.271 B
  - COSTS OF COMBAT LOSSES - $5.878 B
  - COSTS OF R&D - $0.316 B
- PROJECTED COSTS ($96) FOR THE PERIOD 1996 THROUGH 2025 - $15.990 B
  - COSTS OF PEACETIME LOSSES - $12.558 B
  - COSTS OF COMBAT LOSSES - $2.868 B
  - COSTS OF R&D - $0.564 B

BENEFITS OF FIRE PROTECTION GREATER THAN THE COSTS

- COST/BENEFIT ANALYSIS PERFORMED
- BENEFITS TO THE USAF TAKEN FROM A STUDY CONDUCTED BY THE ASC SAFETY OFFICE
  - $700 M OVER A 25-YEAR PERIOD
- COSTS DEVELOPED PREVIOUSLY
- NET PRESENT VALUE OF $119 M OVER NEXT 30 YEARS
  - PROBABLY UNDERSTATED AS MORE EXPENSIVE AIRCRAFT ENTER THE INVENTORY

CONCLUSIONS

- FIRES ARE COSTLY EVENTS
- RESTRICTIONS ON HALONS ONLY GOING TO GET WORSE
- CURRENT RECOMMENDED REPLACEMENT IS HFC-125
- PROGRAMS UNDERWAY TO DEVELOP LONG TERM SOLUTION