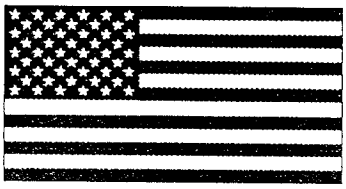
CABIN WATER SPRAY

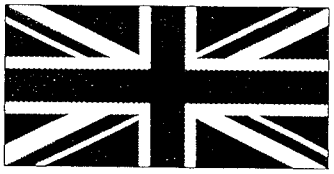
AN INTERNATIONAL PROGRAM

JOINTLY SPONSORED BY:

FAA

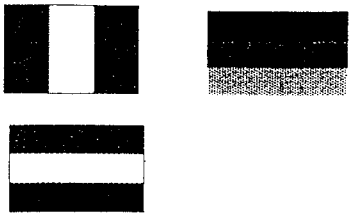


CAA



TRANSPORT CANADA

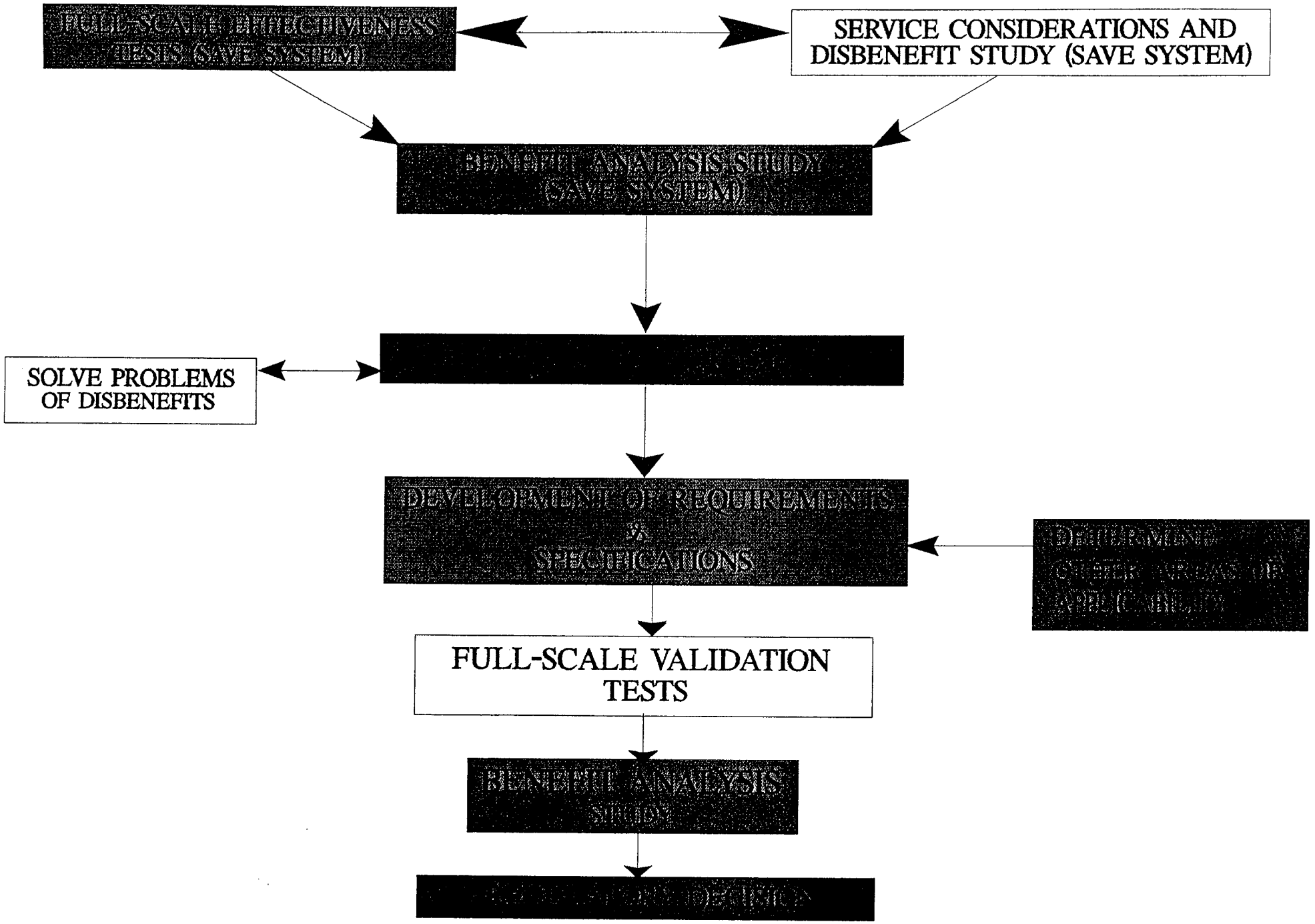
OTHER JAA COUNTRIES



PROGRAM OBJECTIVES

- Determine Feasibility and Benefits
- Optimize Concept
- Develop Requirements and Specifications
- Provide Information for Regulatory Decision

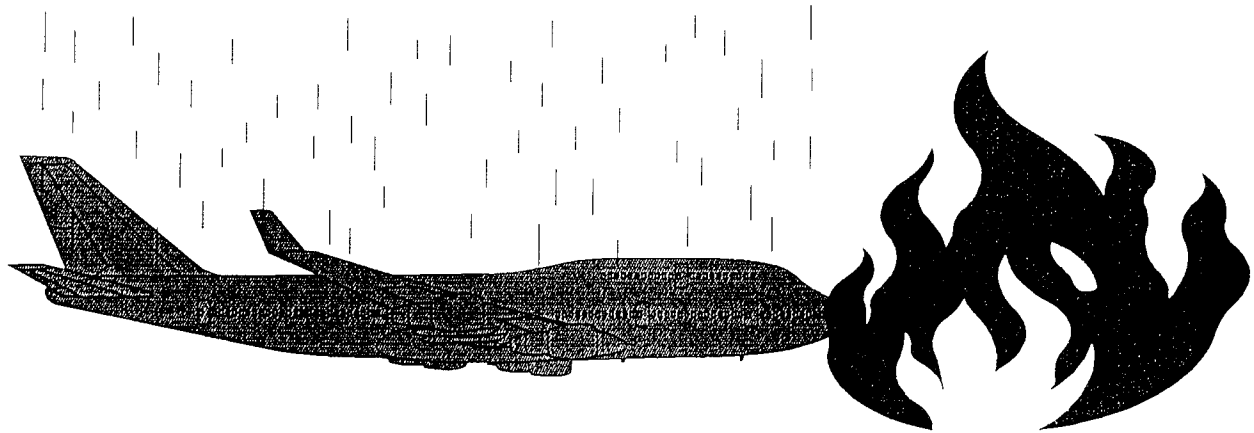
ONBOARD WATER SPRAY PROGRAM



FULL SCALE EFFECTIVENESS TESTS

PURPOSE:

Determine additional escape time, using the "SAVE" system under controlled full-scale conditions, for several postcrash fire scenarios.



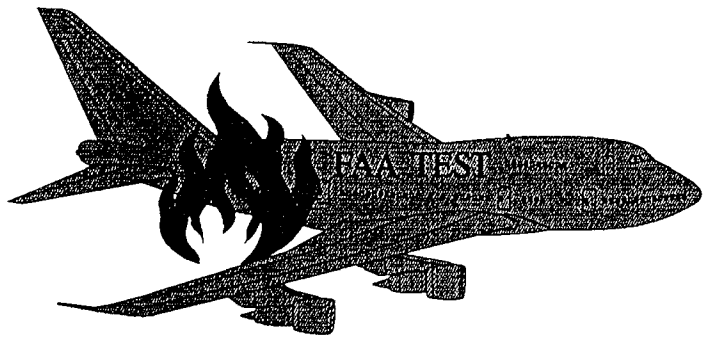
FULL SCALE EFFECTIVENESS TESTS

NARROW BODY AIRCRAFT

Scenario	Result — Survivable Time Without Water / With Water
ZERO WIND	300 Sec. / >500Sec.
MODERATE WIND	195 Sec. / 410 Sec.
HIGH WIND	/ 60 Sec.
BURNTHROUGH	140 Sec. / 272 Sec.

FULL SCALE EFFECTIVENESS TESTS
WIDE BODY AIRCRAFT

Scenario	Result (Survivable Time Without Water / With Water)
MODERATE WIND	210 Sec. / ›330 Sec.
OXYGEN ENRICHED	155 Sec. / 330 Sec.
FIRE BALL	Large Improvement



SERVICE CONSIDERATIONS AND DISBENEFITS STUDY (SAVE SYSTEM)

Determine Problems Associated With:

- An Inadvertent Discharge Inflight.
- An Inadvertent Discharge On The Ground.
- A Discharge During An Evacuation.

DISBENEFIT STUDY
(Authorities)

Weight 

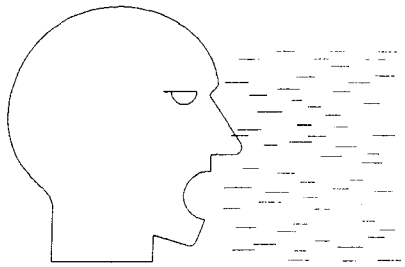
Cost 

Possible Evacuation Delays

Hypothermia 

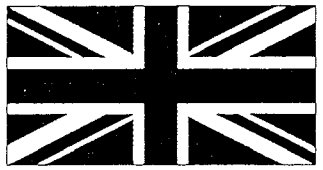
Inhalation of Small Water Particles

Inhalation of Hot, Moist Air



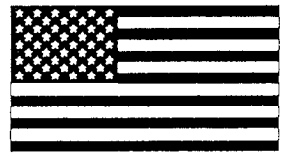
DISBENEFIT STUDY (AIRBUS)

Sponsored By CAA

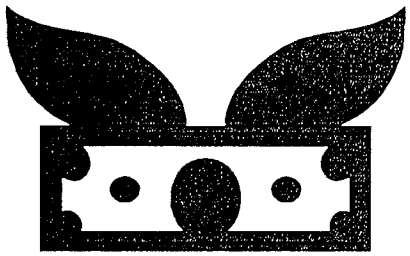


- No Airbus Aircraft Could Tolerate an In-flight Activation
- Costly 
- Heavy 

DISBENEFIT STUDY (Boeing)

Sponsored by FAA 

- Carpet and Seats would Absorb Most Water
- Common Cause Fault
- Human Factors Problems
- COST
- Weight



BENEFIT ANALYSIS STUDY

CAA (lead) - FAA - TRANSPORT CANADA

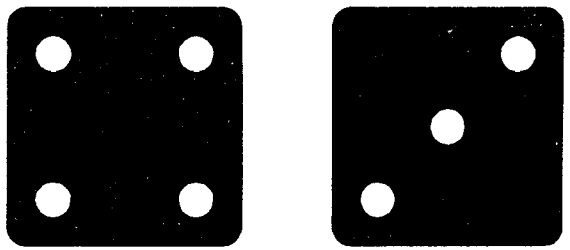
- Accident Base: 95 Fire Accidents
  Past 26 Years
  Accidents Updated to Present Fire Standards

- 14 Lives Per Year World Wide
- 6 Lives Per Year JAA, FAA , TC
- 5 Lives Per Year FAA

RISK ANALYSIS

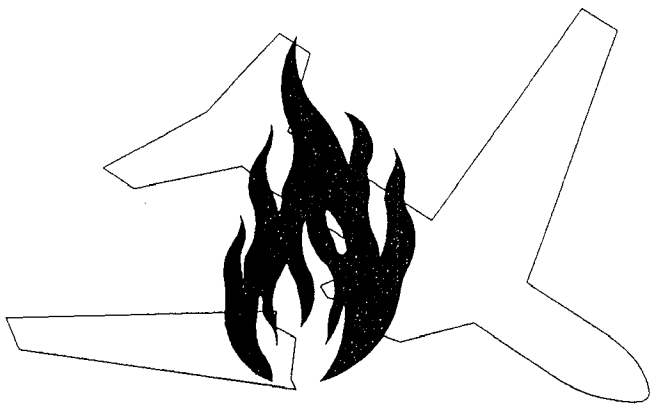
Sponsored By FAA

- Development Ongoing at NIST
- Look to the Future
- Develop Probabilities
- Broad Capibilities



OPTIMIZATION OF SYSTEM

- Determine How The System Works
- Reduce Weight
- Minimize Disbenefits
- Maintain Effectiveness



OPTIMIZATION OF SYSTEM

- Zoned System Developed
- Water Reduced

Narrow Body	72 to 8 Gallons
Wide Body	210 to 21 Gallons

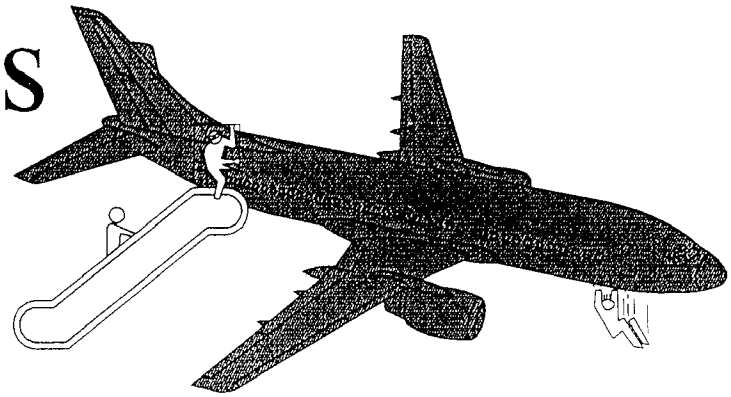
- Effectiveness Maintained

IN-FLIGHT DISCHARGE

- Zoned System Minimizes Quantity of Water
- Manual Arming / Automatic Activation Minimizes Chance
- Manual Shut Off

EVACUATION IN WATER SPRAY

CAA Sponsored Tests



CONCLUSIONS:

- Water Spray Had No Effect Upon Evacuation Rate.
- Visibility Not Affected
- No Problems From Wet Surfaces

HYPOTHERMIA

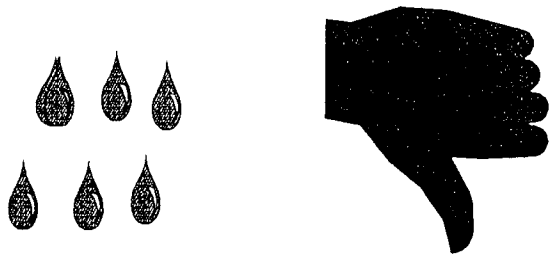
- Zoned System Minimizes Threat
- Evacuation Tests Show Limited Wetting of Passengers
- CAMI Presently Studying

INHALATION OF SMALL DROPLETS

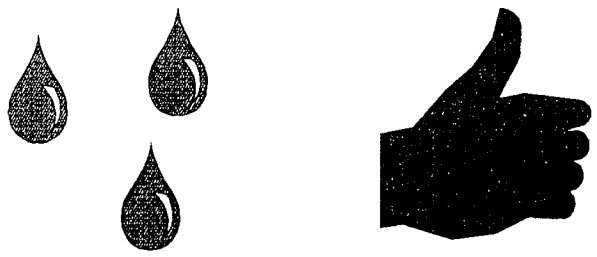
Studies by FAA & CAA

Droplets Larger Than 30 Microns, OK

Water Spray Tested is Larger.



LESS THAN 30 MICRONS



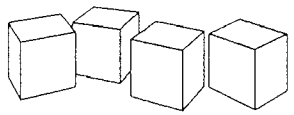
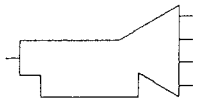
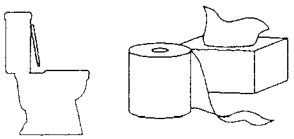
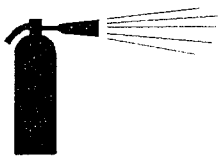
GREATER THAN 30 MICRONS

INHALATION OF MOIST, HOT AIR

- Measured in Full-Scale Zoned Test
- Analyzed by FAA & CAA
- Found Not To Be A Problem

DETERMINE OTHER USES

Halon Replacement For:

- Cargo Compartments 
- Engine Nacelle 
- Lavatory Trash 
- Hand Held Extinguisher 

DEVELOPMENT OF REQUIREMENTS & SPECIFICATIONS

- Developed to Cost System
- Have Not Developed Performance Test Requirements

COST STUDY

Sponsored By CAA

- AIM Aviation
- Costing For:
  - Regional - Narrow Body - Wide Body
  - Retrofit - New Manufacture - New Design
  - Various System Configurations

COST STUDY

For New Design:

	Per Aircraft	
• Narrow Body	83K Initial	13K per year
• Wide Body	214K Initial	22K per year

WORK IN PROGRESS

- Risk Analysis
- Hypothermia Study
- Full Scale Tests of Regional Aircraft
- Boeing Cost Study?

PLANNED WORK

- Alternate Uses
- Part of Halon Replacement Program

PROGRAM FUTURE OPTIONS

1. 

2. Continue Optimization
   - Reduce Costs?
   - Other Uses.

3. Regulate
   - Type of Regulation
   - Develop Requirements
   - Performance Test
     Flight Test