WE NEED TO KNOW WHAT WE DON'T KNOW

In-Flight Smoke/Fire/Fume Events: The need for improved aircraft systems.

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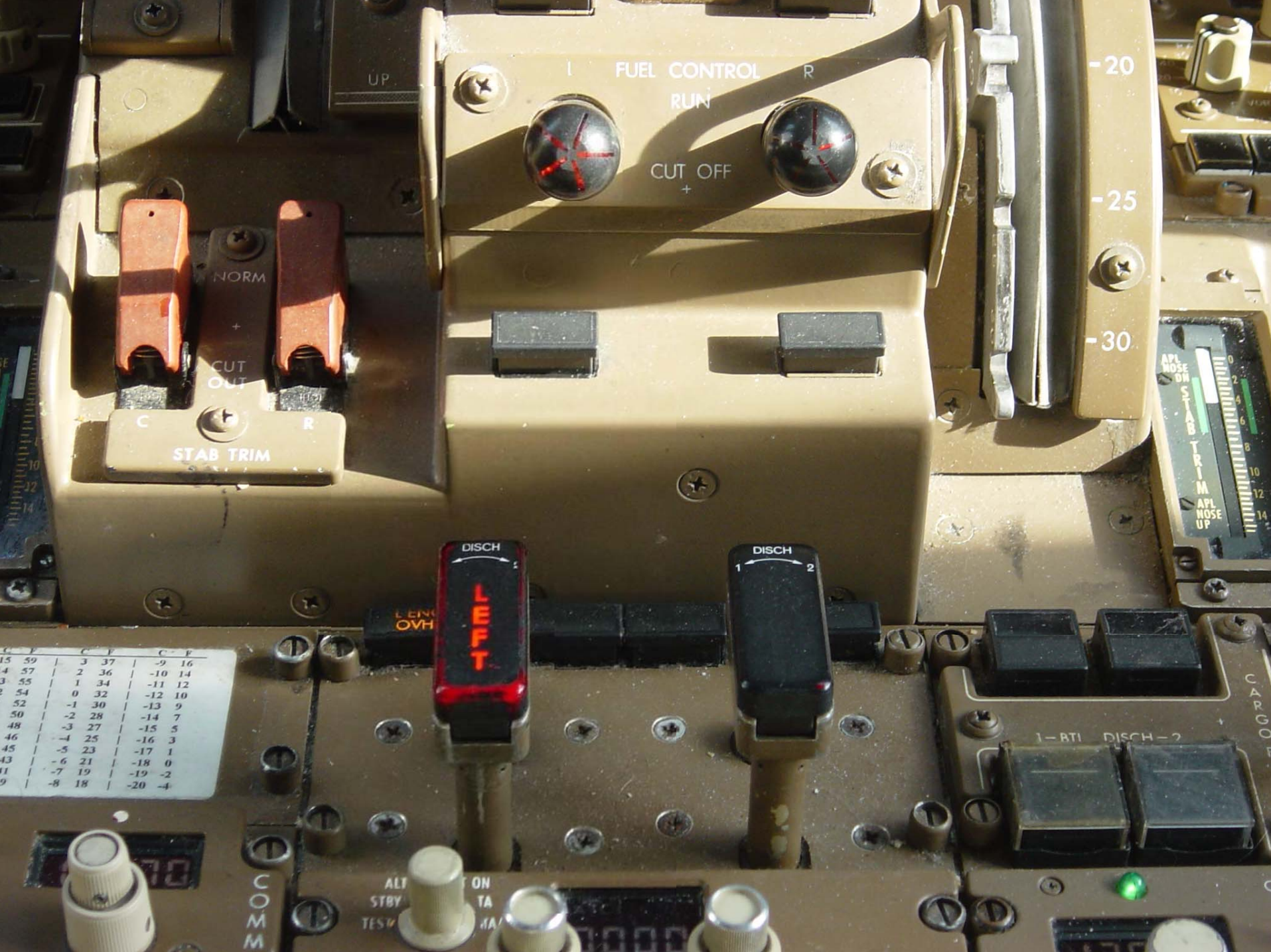
2007 International Aircraft Fire and Cabin Safety Research Conference
October 29 – November 1, 2007
Atlantic City, NJ

AIR LINE PILOTS ASSOCIATION, INTERNATIONAL

AIRCRAFT FIRE SCENARIOS

- **Engine fire event:**
  - Alerted event (annunciated in the cockpit)
  - Ability to suppress/extinguish fire
  - Feedback regarding event status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APL NOSE DN
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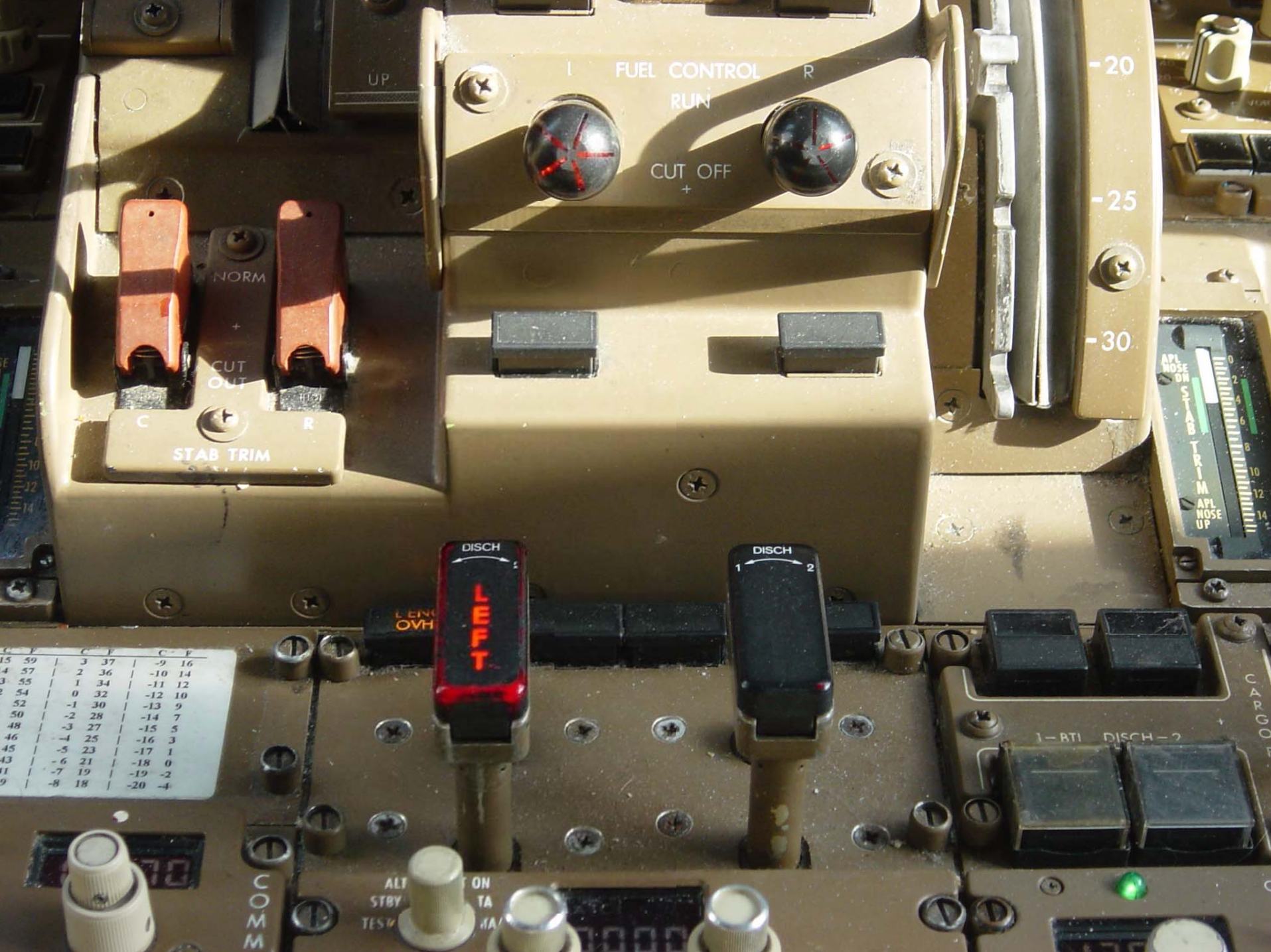
APL NOSE UP
DISCH
LEFT
DISCH
1 2
OVH
CARGO
1-BTI DISCH-2
COMM

OPERATIONAL DECISION

- **Continue to destination?**
- **Land at the *nearest suitable* airport?**
- **Land at *any* airport?**
- **Land *immediately* on *any landing surface*?**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AIRCRAFT FIRE SCENARIOS

- **Engine fire events**
- **Smoke/Fire/Fumes (SFF) events**
  - Non-alerted event (reliant on crew observation)
  - Information typically non-specific/unknown
    - Nature
    - Location
    - Intensity
  - No feedback regarding status

SMOKE OR FUMES OR FIRE ELECTRICAL

Condition: [illegible]trical smoke or fumes or fir[illegible]ntified.

Note: If smoke/fumes are severe, first accomplish the SMOKE OR FUMES REMOVAL checklist.

OXYGEN MASKS AND SMOKE GOGGLES . . . . . ON, 100%

CREW COMMUNICATIONS . . . . . .ESTABLISH

Plan to land at the nearest suitable airport.
Consider a passenger evacuation.

RECIRCULATION FANS SWITCHES (Both) . . . . . OFF

[Removes fans as a possible source of smoke or fumes. Stops recirculation of smoke or fumes and increases fresh air flow.]

If smoke or fumes or fire source is known:

ELECTRICAL POWER (Affected equipment) . . . . REMOVE

If practical, remove power from affected equipment by switch or circuit breaker in flight deck or cabin.

If smoke or fumes or fire persists or source is unknown:

UTILITY BUS SWITCHES (Both) . . . . . OFF

[Removes electrical power from possible sources of smoke or fumes.]

ALTERNATE EQUIPMENT COOLING SWITCH . . . . . ALTN

[Removes supply fan as a possible source of smoke or fumes.]

Do not accomplish the following checklists:
RECIRCULATION FAN
UTILITY BUS OFF

SMOKE OR FUMES AIR CONDITIONING

Condition: [illegible]oncentration of air conditioning smoke or f[illegible]s is identi[illegible]

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APU BLEED AIR SWITCH . . . . . OFF

[Removes APU, if running, as a possible source of smoke or fumes.]

If smoke or fumes continue:

ISOLATION SWITCH . . . . . OFF

[Isolates left and right sides of the bleed air system.]

RIGHT PACK CONTROL SELECTOR . . . . . OFF

[Removes right side of the air conditioning system as a possible source of smoke or fumes.]

If smoke or fumes continue:

RIGHT PACK CONTROL SELECTOR . . . . . .AUTO

[Restores right side of the air conditioning system.]

LEFT PACK CONTROL SELECTOR . . . . . OFF

[Removes left side of the air conditioning system as a possible source of smoke or fumes.]

Do not accomplish the following checklists:
PACK OFF
RECIRCULATION FAN

OPERATIONAL DECISION

- **Can I continue to the destination?**
- **Land at the *nearest suitable* airport?**
- **Land at *any* airport?**
- **Land i*mmediately* on *any landing surface*?**

SITUATIONAL DISCUSSION

- **A flight attendant calls and says that there is smoke near the aft lavatory.**
- **Flight crew discuss appropriate action…**

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RIGHT PACK CONTROL SELECTOR . . . . . OFF

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Do not accomplish the following checklists:
PACK OFF
RECIRCULATION FAN

SITUATIONAL DISCUSSION

- **Flight attendant calls and says smoke appears to be dissipating.**
- **Finish checklist and continue on…**

SITUATIONAL DISCUSSION

- **Flight attendant calls to say smoke has returned.**
- **Auto-pilot disengages.**
- **Flight attendant calls to say smoke has intensified.**
- **Additional crew discussion.**

“Center, we have smoke in the cabin. We’re declaring an emergency and need to land.”

SITUATIONAL DISCUSSION

- Numerous unassociated systems fail.
- Flight crew smells smoke.
- Don oxygen masks.

“Center, we need to expedite our descent.”

SITUATIONAL DISCUSSION

- **Flight attendant calls and says, "Captain, there's FIRE in the CABIN!"**
- **Aircraft is in steep bank, nose low.**
- **Flight attendant calls and says, "Captain, the FIRE IS SPREADING!"**
- **First officer having trouble controlling aircraft.**

The Current Situation

- **This SFF scenario has happened in the past.**
- **Current regulations and aircraft systems would not prevent the scenario from occurring today.**
- **On average, 2 SFF events *EVERY* day in the United States.**

The Current Situation

- **Assumption that the pilots can accurately identify the source of the SFF event.**
- **There is a wide range of possible smoke, fire, fumes sources and situations:**

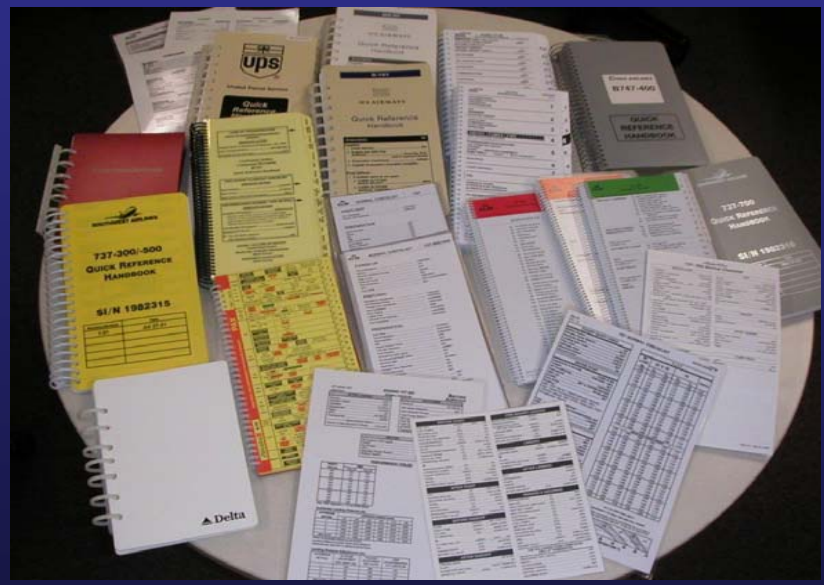
Everything in between

“Wing fire”

“Oven smoke”

The Current Situation

- **Manufacturer and airline checklists vary widely in format and content.**



- **Current aircraft systems do not provide adequate protection, detection or feedback.**

The Current Situation

- What has been done?
- What needs to be accomplished?

What has been done?

SFF Steering Committee

Initial Workshop
Oct. 2004

Airlines (IATA)
Pilots (IFALPA)
Manufacturers (Boeing, Airbus, Bombardier, Embraer)

28 people

Checklist Meetings
Nov. & Dec. 2004

Airlines (IATA)
Pilots (IFALPA)
Manufacturers (Boeing, Airbus, Bombardier, Embraer)

15 people

Symposium
March 2005

Regulators (FAA/JAA)
Other agencies (NTSB, TSB)

55 people

What has been done?

SFF Steering Committee

To scope our task, our focus was not on:

- **Airplane design changes**
- **Crew training**
- **Ground coordination**
- **ATC coordination ...etc.**

What has been done?

SFF Steering Committee

- **The Focus was on the following:**
  - Standard SFF definitions, philosophy and template.
  - Common approach for manufacturers and operators.
  - Common pilot actions to be performed (“non-alerted” events).
  - Checklist template that addresses:
    - Source identification
    - Timing for diversion
    - Smoke/fumes removal versus source identification
    - Additional actions to identify source

What has been done?

SFF Steering Committee

- **Accomplished to date:**
  - Standardized SFF checklist, definitions and philosophy
    - Emphasis on consideration of landing
    - Boeing / Airbus implementation - but yet to be industry-wide
  - FAA research on material flammability detection systems

What needs to be accomplished?

- **A non-alerted SFF event of unknown nature and intensity is the worst scenario a pilot can face.**
- **Standardized SFF checklist still requires knowledge of the nature and intensity of the SFF event.**
- **Current aircraft systems do not provide adequate protection, detection or feedback.**

We need to know what we don't know!

Tombstone Mentality

Tombstone Threshold


PSA 182

Delta 191

AIR LINE PILOTS ASSOCIATION, INTERNATIONAL

Air Canada 797

Valujet 592

Swissair 111

UPS DC-8 Philadelphia, Feb. 2006

What needs to be accomplished?

- Legacy of Swissair 111? Or UPS Philadelphia?
- No FAA aircraft system mandates.
- Pilots still do not have system feedback regarding status of aircraft during SFF event.

What needs to be accomplished?

Industry needs to bring about improvements before the next accident or loss of life:

- **Checklist implementation?**
  - **Other manufacturers?**
  - **Mandatory requirements – the FAA?**
    - **AC 120-80? Meeting in April 2007?**
- **Aircraft system design changes?**
  - **Retrofit current fleet? New aircraft design?**
  - **Trend-monitoring, detection, suppression, protection**

What needs to be accomplished?

- **ALPA position on SFF events:**
  - **Require all passenger and cargo transport-category aircraft to be equipped with:**
    - **Detection system throughout the entire aircraft.**
    - **Extinguishing devices.**
    - **System feedback/trend-monitoring to the flight crew.**
  - **Industry-wide adoption of standardized SFF checklist.**

Headline:

“FIRE IN THE SKY: Airplane lands safely due to early crew alerting and new fire protection system.”

Headline:

“FIRE IN THE SKY: No Survivors.”


We need to know what we don't know