A COST-BENEFIT ANALYSIS
FOR THE INSTALLATION OF
FIRE SUPPRESSION SYSTEMS IN CARGO COMPARTMENTS OF CARGO AIRPLANES

RGW CHERRY AND ASSOCIATES
AERONAUTICAL AND SAFETY ENGINEERS

International Aircraft Systems Fire Protection Working Group

Freighter Cost Benefit Analysis

Freighter Cost Benefit Analysis

- ✓ The NTSB has recommended that fire suppression systems be installed in the cargo compartments of all cargo airplanes operating under 14 CFR Part 121.

- ✓ Currently, Class E cargo compartments, which are the primary cargo compartment type used in US cargo airplanes, do not require fire suppression systems.

Freighter Cost Benefit Analysis

In response to this recommendation, FAA has requested that a cost/benefit analysis be carried out relating to the installation of on-board fire detection and extinguishment systems in cargo airplanes.

Freighter Cost Benefit Analysis

The analysis assessed whether fire suppression systems, fitted to the upper deck cargo bays of cargo airplanes, type certificated to FAR Part 25 and operating under FAR Part 121, are likely to be cost beneficial.

Freighter Cost Benefit Analysis

Analysis carried out for aircraft types grouped into weight categories

WEIGHT CATEGORY	AIRCRAFT MAXIMUM TAKE-OFF WEIGHT
B	12,500 lb to 100,000 lb
C	100,000 lb to 250,000 lb
D	250,000 lb to 400,000 lb
E	Greater than 400,000 lb

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Freighter Cost Benefit Analysis

Potential benefits will result from a reduction in:

- Injuries (Fatal and Serious)
- Damage incurred to the aircraft and its cargo, and
- Damage that might be incurred to property on the ground.

Freighter Cost Benefit Analysis

Potential costs are those incurred from the installation and operation of fire suppression systems.

Freighter Cost Benefit Analysis

Benefit Analysis based on:

- ✓ Monte Carlo model
- ✓ Statistical distributions derived from data on in-service airplanes and accident information.

Freighter Cost Benefit Analysis

The Monte Carlo model was based on the following Benefit equation:

$$\frac{Benefit}{Year} = \frac{Accidents}{RTM} \times \frac{RTM}{Year} \times \frac{Cost}{Accident}$$

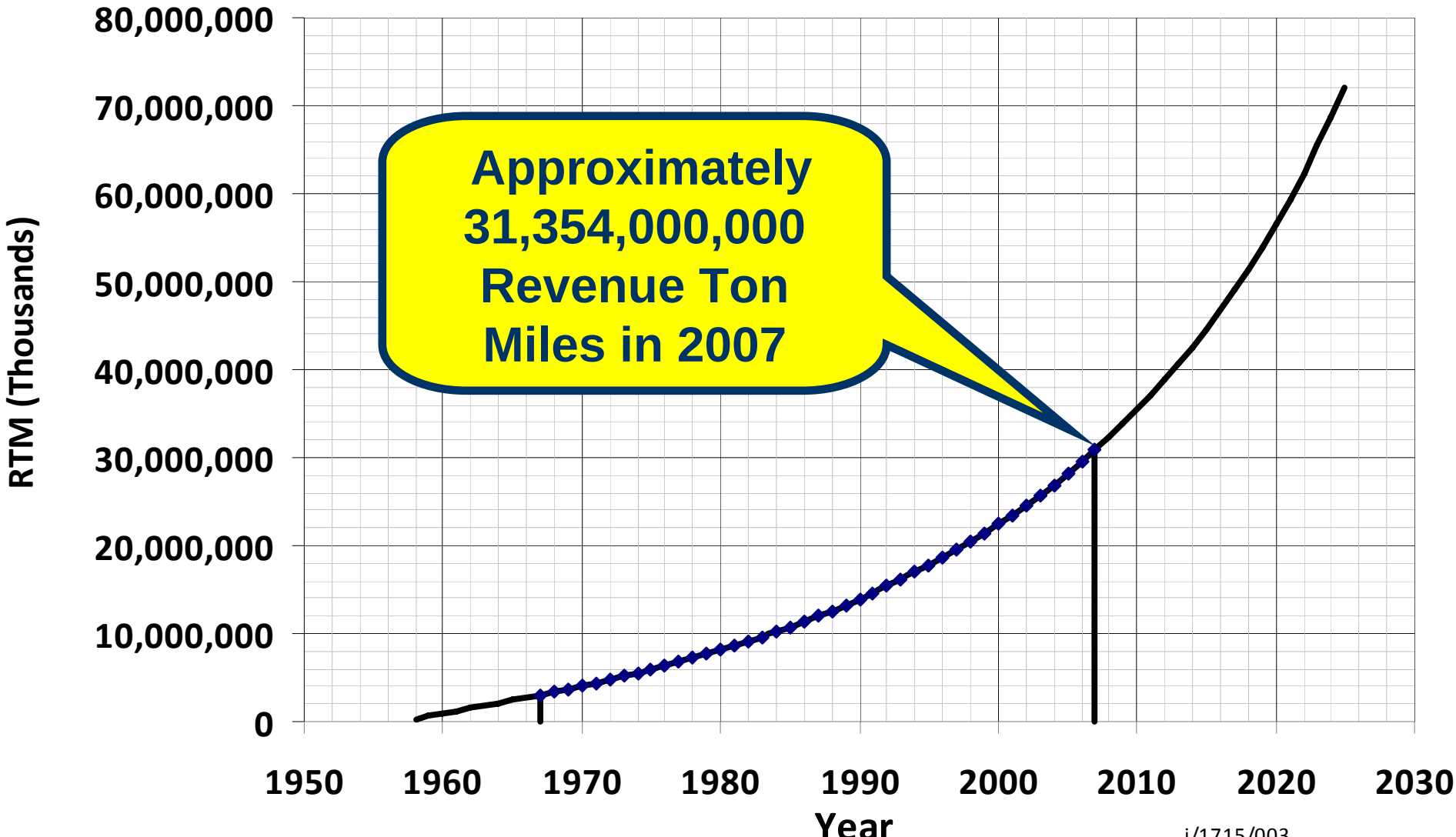
RTM = Revenue Ton Miles

Freighter Cost Benefit Analysis

Accident Rate (Accidents per RTM) based on US cargo fleet experience over the period 1967 to 2007:

- ✓ Four accidents caused by cargo compartment fires
- ✓ Approximately 545,200,000,000 Revenue Ton Miles

Freighter Cost Benefit Analysis



Freighter Cost Benefit Analysis

Assessed Number of Revenue Ton Miles for 2007 :

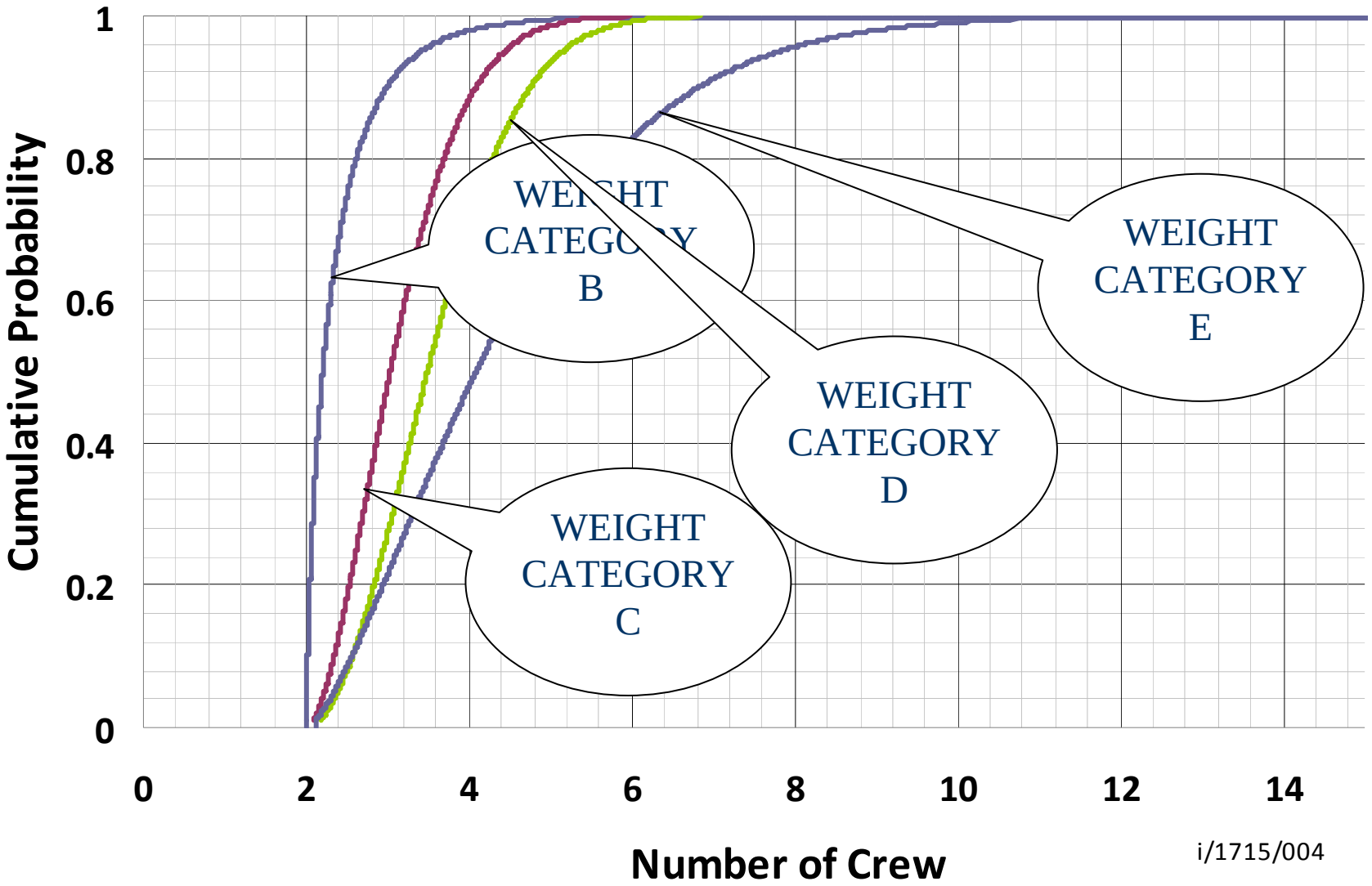
WEIGHT CATEGORY	REVENUE TON MILES (2007)
B	13,500,000
C	1,764,400,000
D	6,107,900,000
E	23,468,600,000

Freighter Cost Benefit Analysis

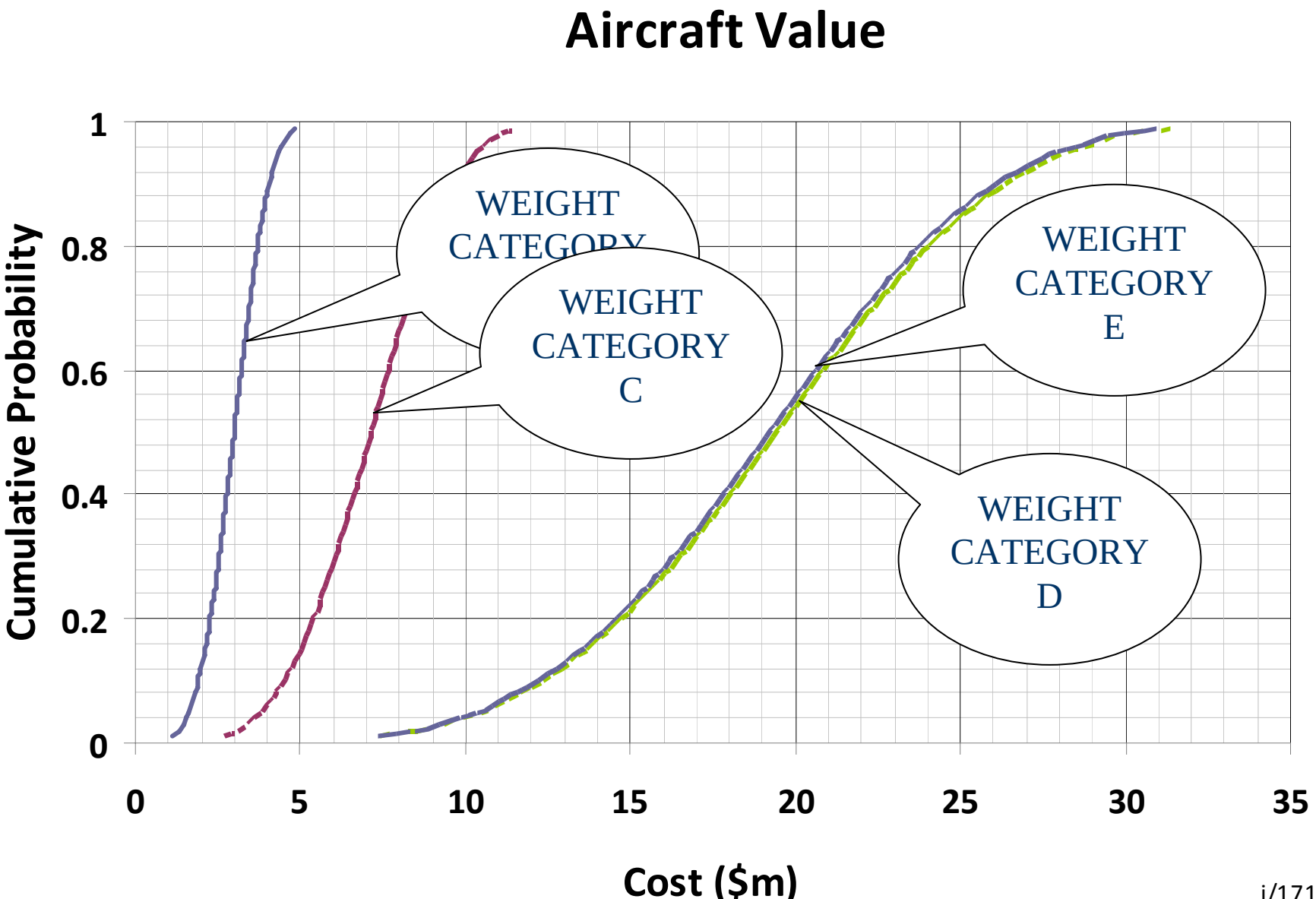
Cost per Accident based on:

- Primary Damage
  - Crew Injuries (Fatal and Serious)
  - Damage incurred to the aircraft and its cargo, and
- Ground Collateral Damage
  - Damage that might be incurred to property
  - Personnel Injuries (Fatal and Serious)

Freighter Cost Benefit Analysis



Freighter Cost Benefit Analysis



Freighter Cost Benefit Analysis

Assessed Average Cargo Value per flight for US Cargo Fleet 2007:

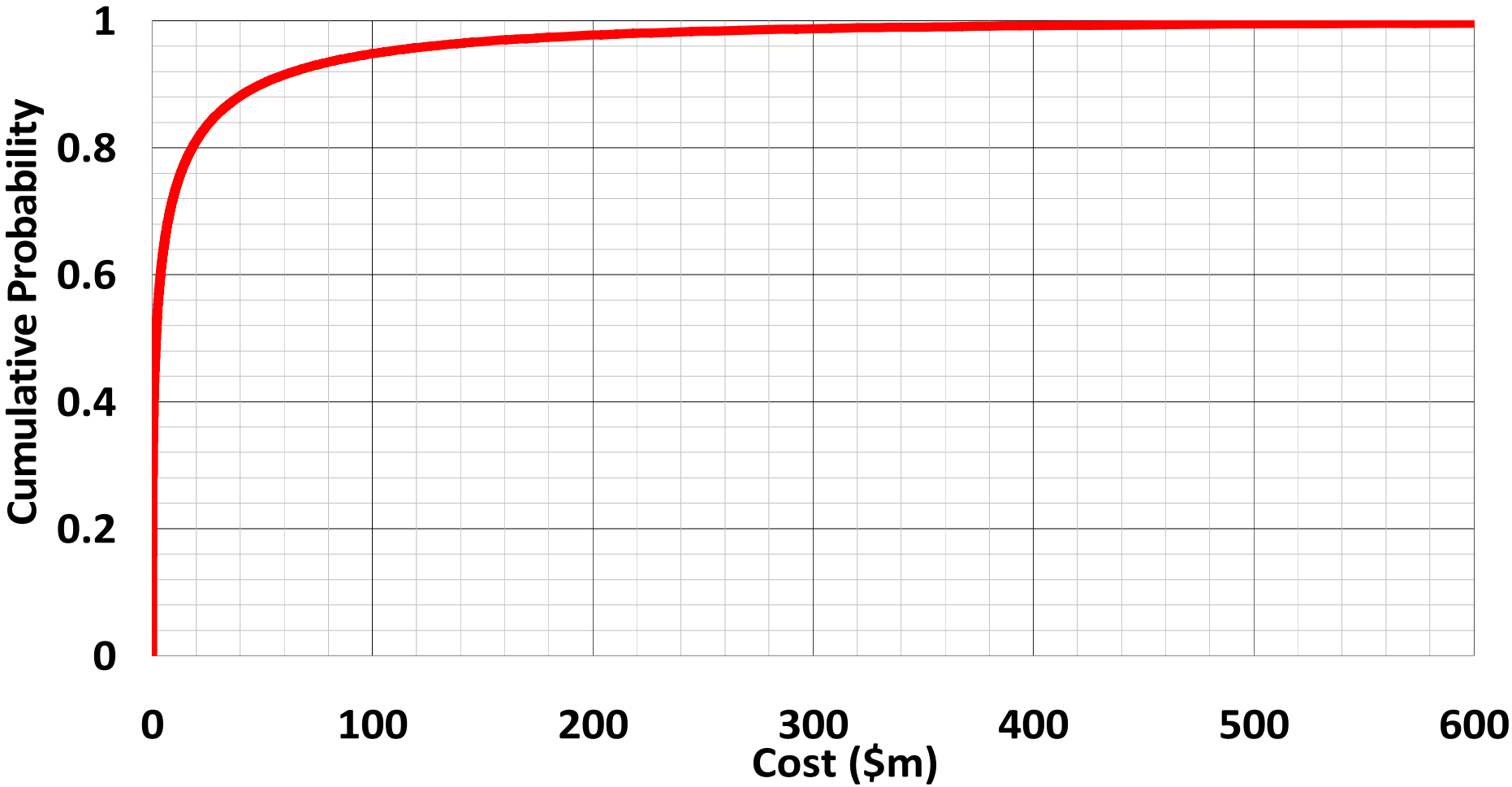
WEIGHT CATEGORY	CARGO VALUE ($ MILLIONS 2007)
B	0.14
C	1.1
D	2.6
E	4.1

Freighter Cost Benefit Analysis

Cost of Collateral Damage

Based on an analysis of accident data it was assessed that approximately one in eighteen freighter aircraft fire accidents are likely to result in some degree of Collateral Damage.

Freighter Cost Benefit Analysis



Freighter Cost Benefit Analysis

Cost Assessments based on:

- The new Type F Cargo Compartment (considered for combi aircraft) using a Halon type fire suppression system together with suitable cargo compartment liners. The data used in the cost assessment was based on that contained in the ARAC document relating to main deck class B cargo compartments.

Freighter Cost Benefit Analysis

Current Position:

- ✓ The report is with the FAA for their consideration