

Class E Cargo Compartment Smoke Detection and Active ULD Testing



Federal Aviation
Administration



Presented to: International Aircraft Systems Fire Protection Working Group. Atlantic City, NJ

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Date: November 17-18, 2009



*UPS DC-8
Feb. 7, 2006
Philadelphia, PA*



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Cockpit Voice Recorder Transcript¹

2333:44 Aircraft cleared to descend from FL 330 to FL 240

2334:39 “Smell like wood burning”

2335:40 “It’s pretty strong now”

2335:54 Cockpit door opened “It’s more in the back”

2338:39 One pack turned off

2343:18 “Fume evacuation”

2343:27 Packs on max flow, recirc fan off

2347:59 Cockpit door opened again “It’s definitely stronger in the back. No haze or smoke when I shined my light back there” At FL 40

2354:42 “Cargo smoke detectors on” At FL 20

2355:48 Landing gear down

2355:57 “Lower cargo compartment aft smoke detectors on”

2359:00 Touch down

2359:02 “Smoke in cockpit”

2359:45 End of transcript. Crew evacuated through L1 door

¹ Source: NTSB Accident Report



NTSB Recommendation A-07-98 to the FAA.

“Ensure that the performance requirements for smoke and fire detection systems account for the effects of cargo and cargo containers on airflow around the detection sensors and on the containment of smoke from a fire inside a container and should establish standardized methods of demonstrating compliance with those requirements. (A-07-98) “





727 Freighter

Main Deck Airflow approximately one air change every 5.1 minutes (11.8 air changes/hour). Air from one pack supplied with APU bleed air.





4 Aspirated Photoelectric Smoke Detectors (94-96% light transmission/ft alarm point)



Certified to one minute detection time (FAR 25.858)





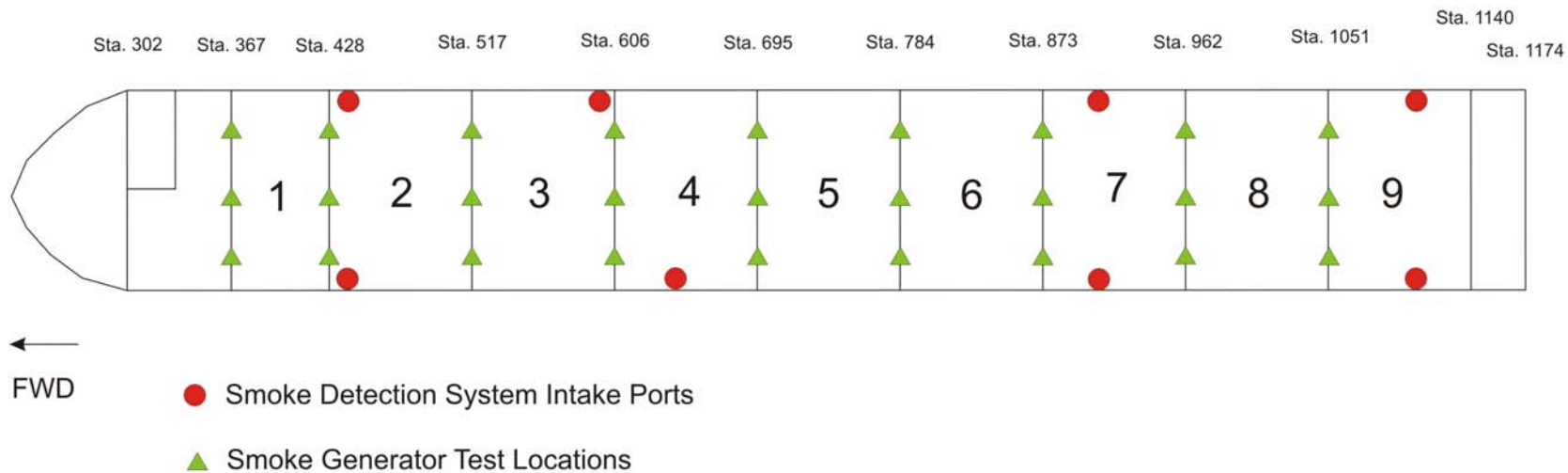
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727 Freighter 88" cargo container positions



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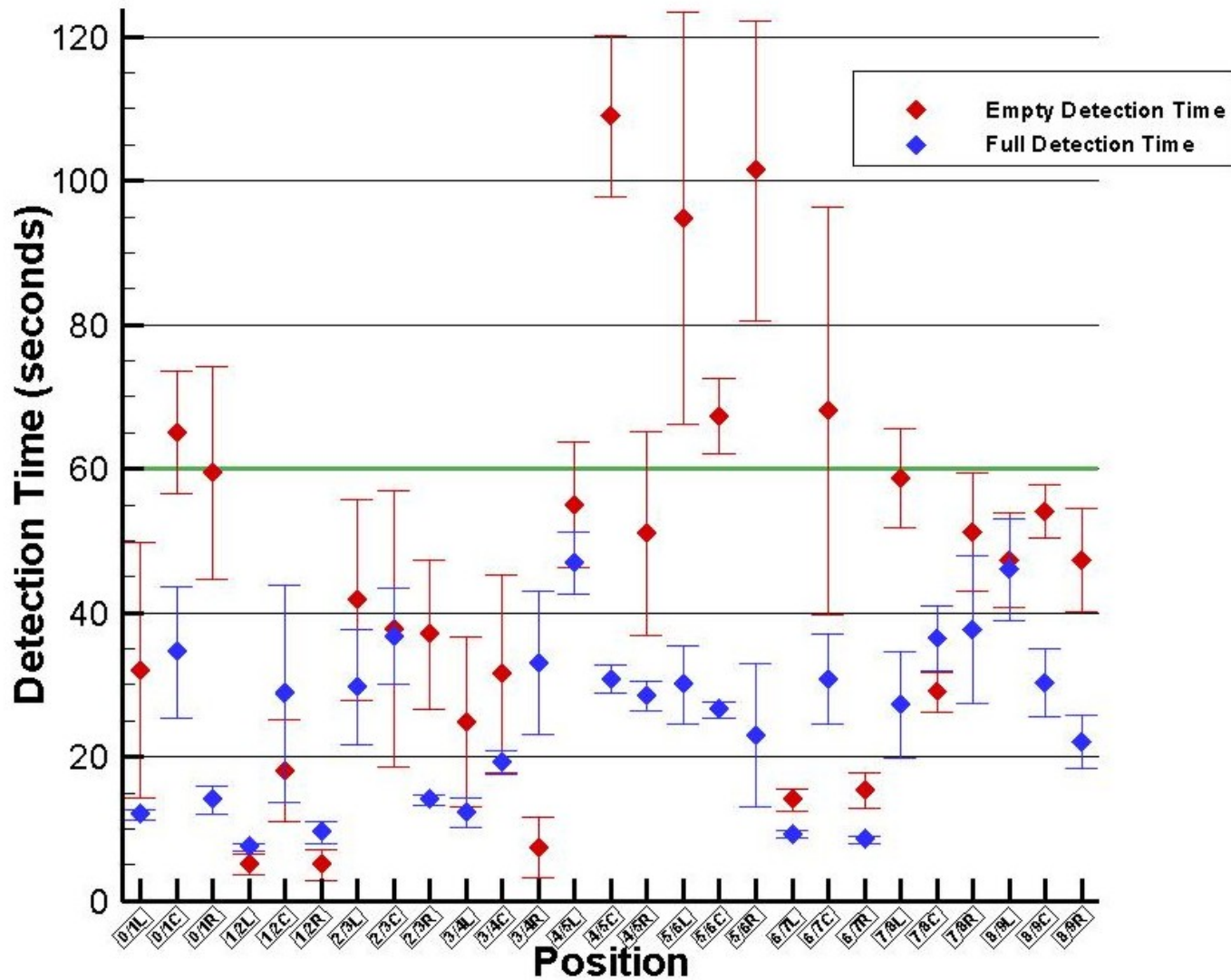
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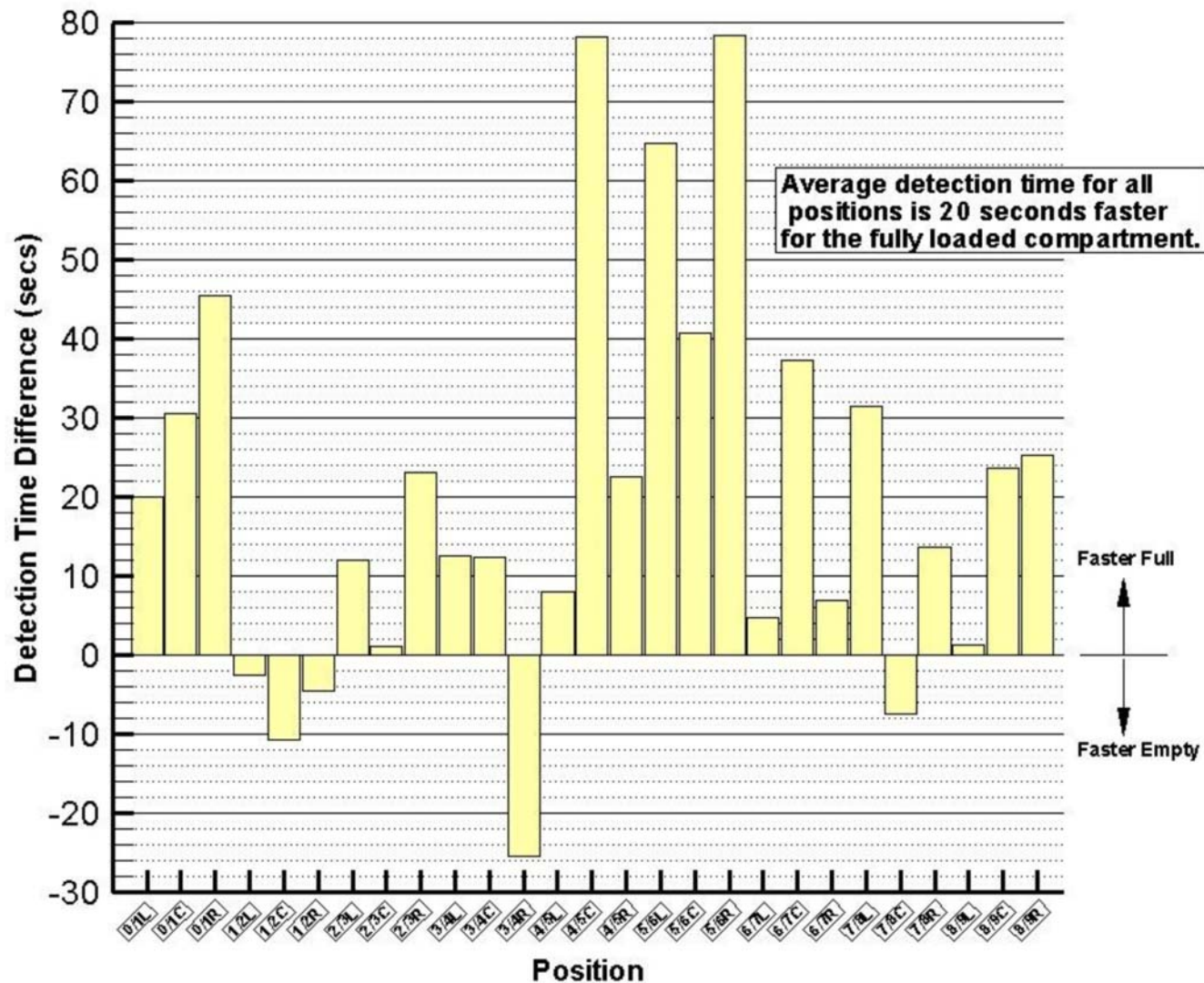


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727 Main Deck



727 Main Deck Detection Time Difference (Empty minus Full)

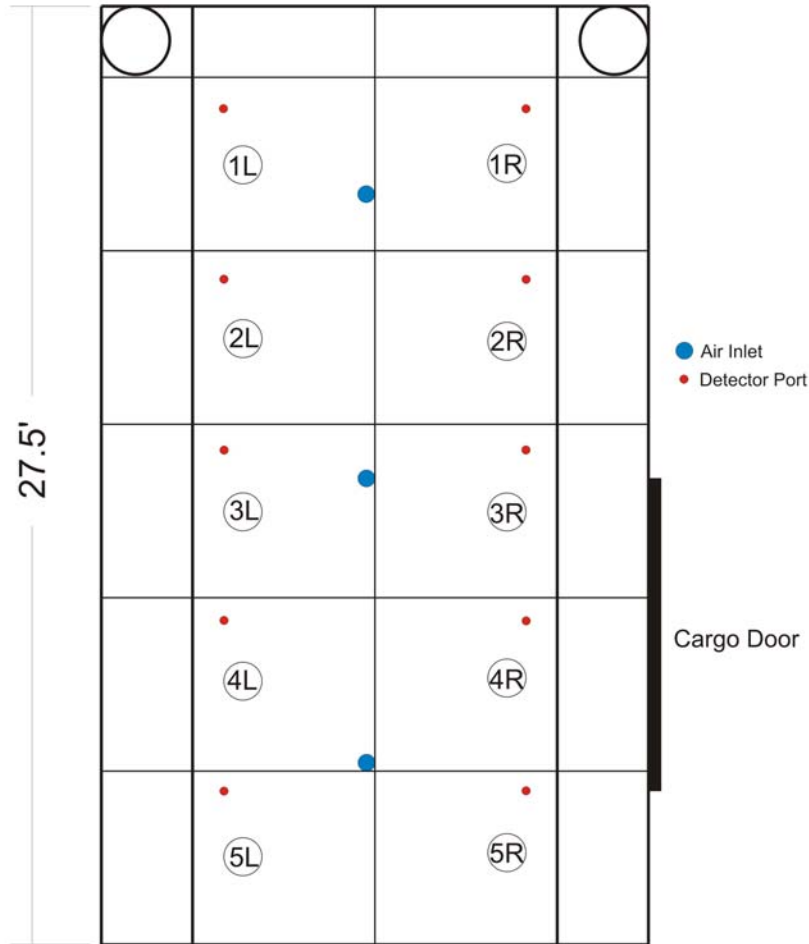


747SP Below Floor Compartment

Ventilation airflow provided one air change approximately every 6 minutes (10 air changes per hour). Air source was 2 air conditioning packs supplied with bleed air from the APU



747SP Aft Cargo Compartment



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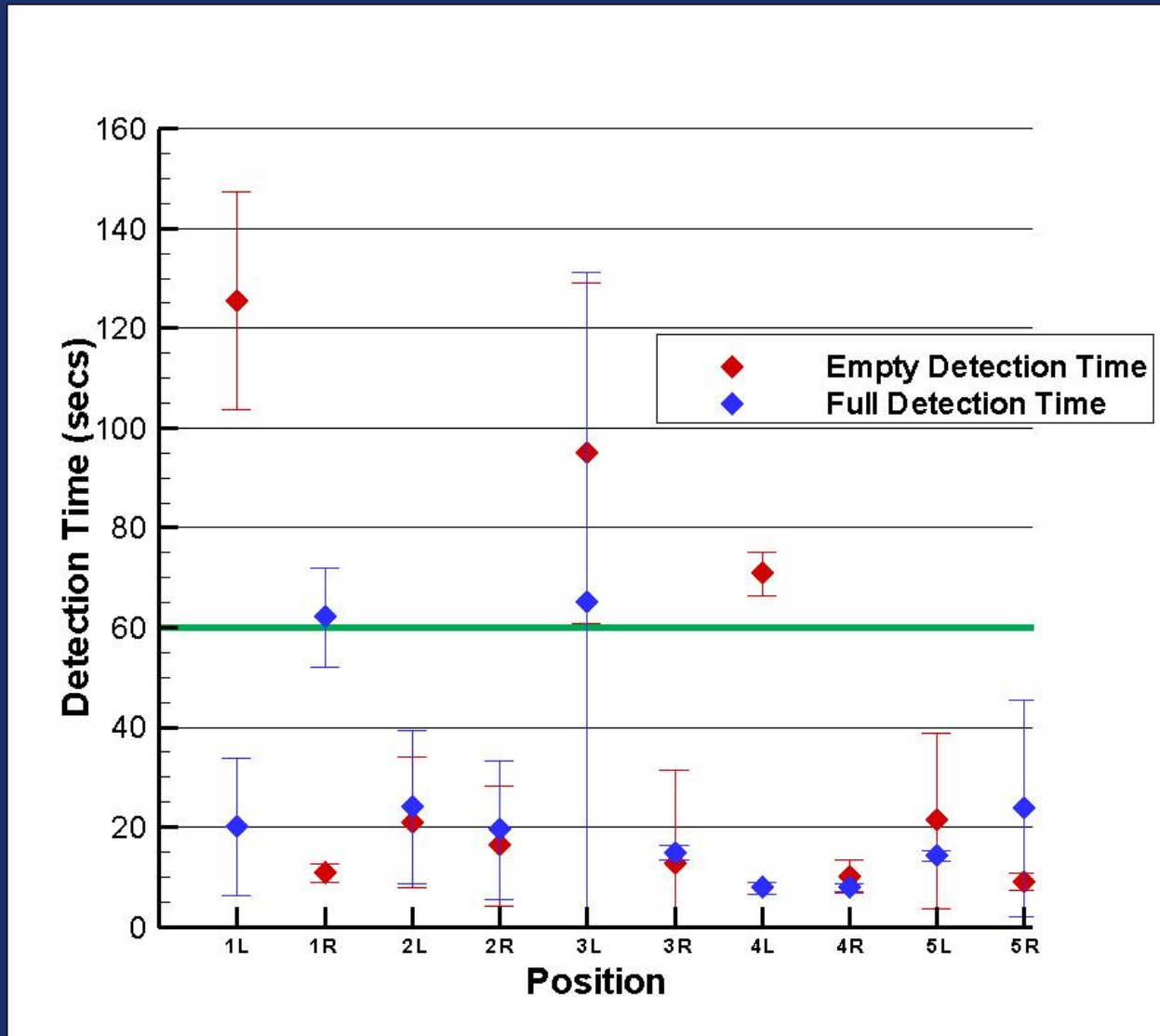
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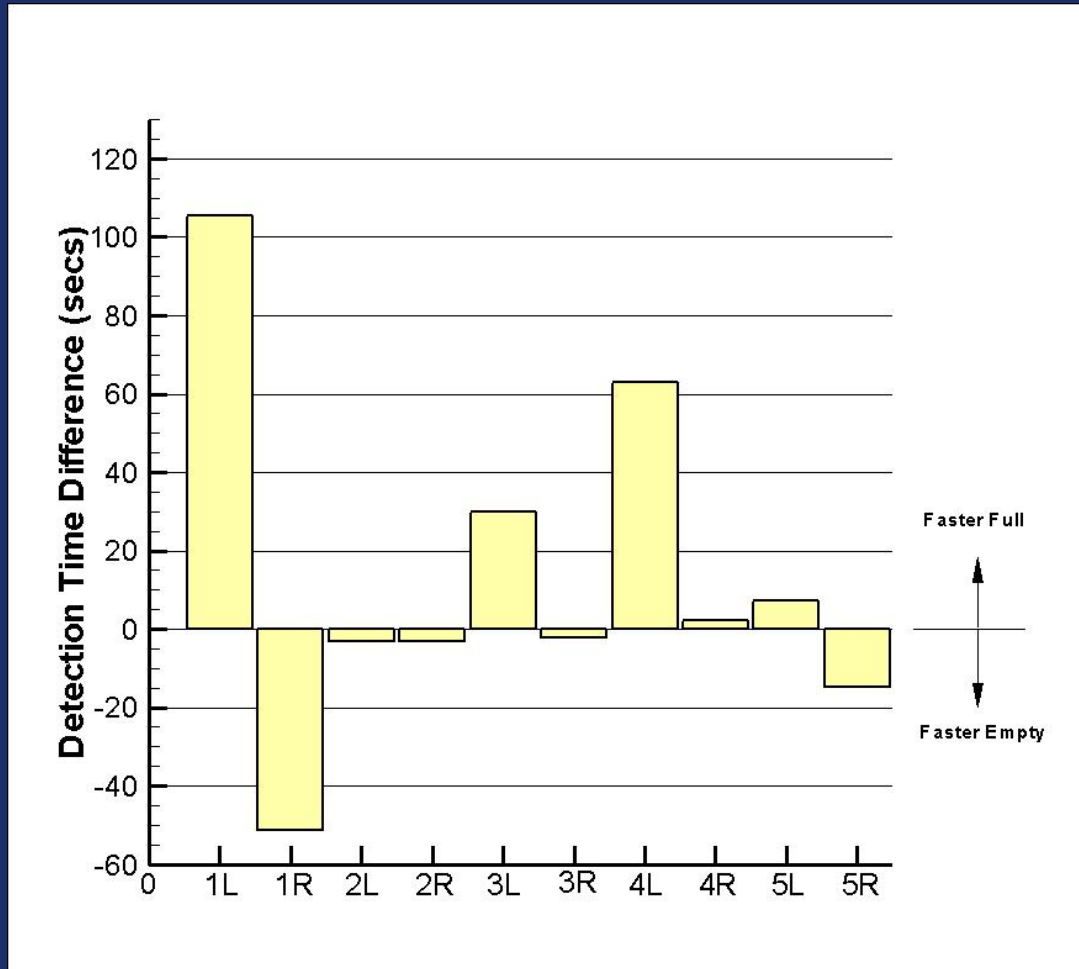
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747 Time of Initial Alarm Regardless of Duration

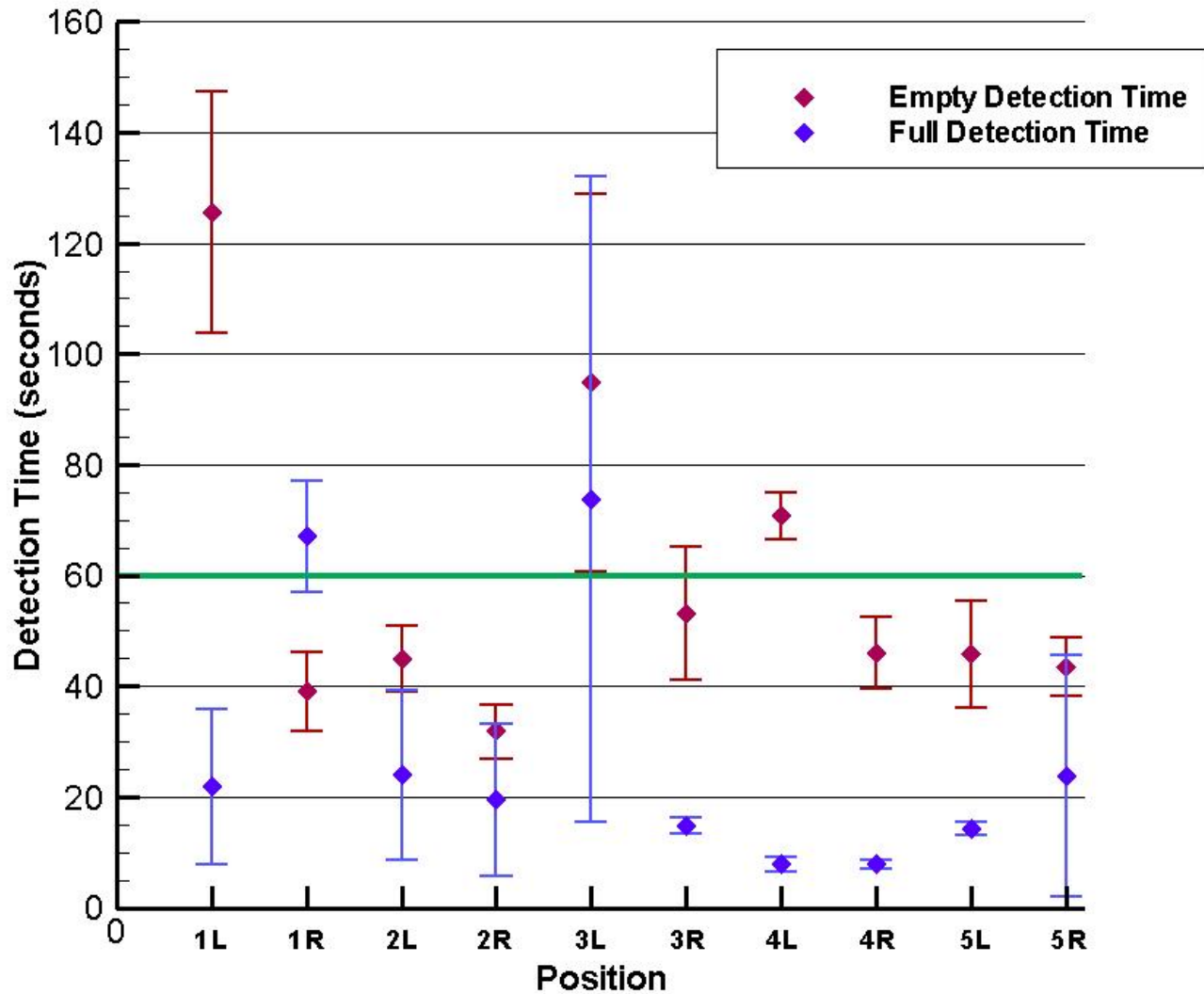


747 Time of Initial Alarm Regardless of Duration

Average detection time for all positions tested is 13 seconds faster for the fully loaded compartment.



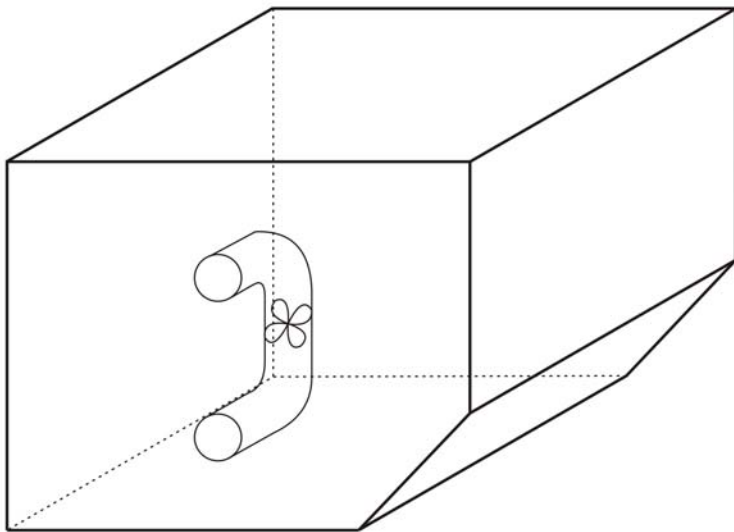
747 Lower Aft Compartment Sustained Detection



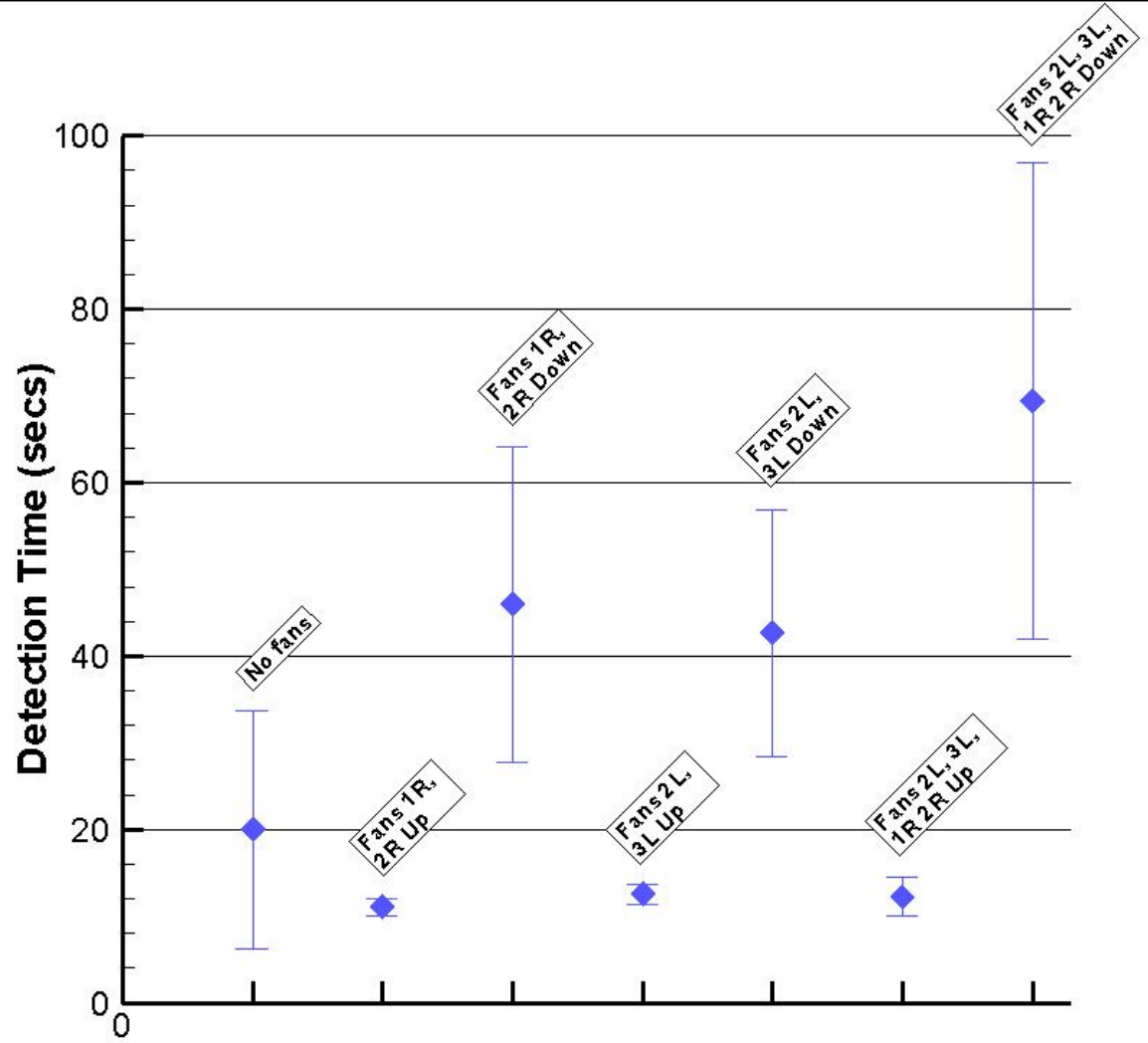
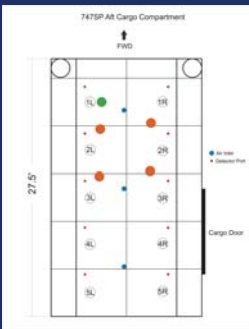
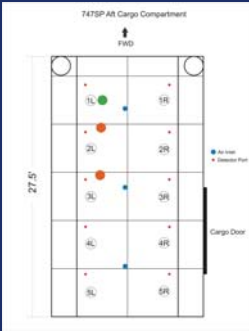
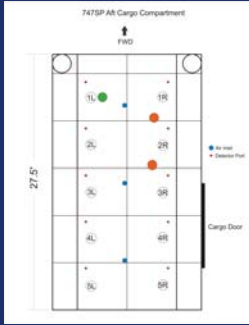
Simulated Refrigerated ULD

"Active" LD-3 Container.

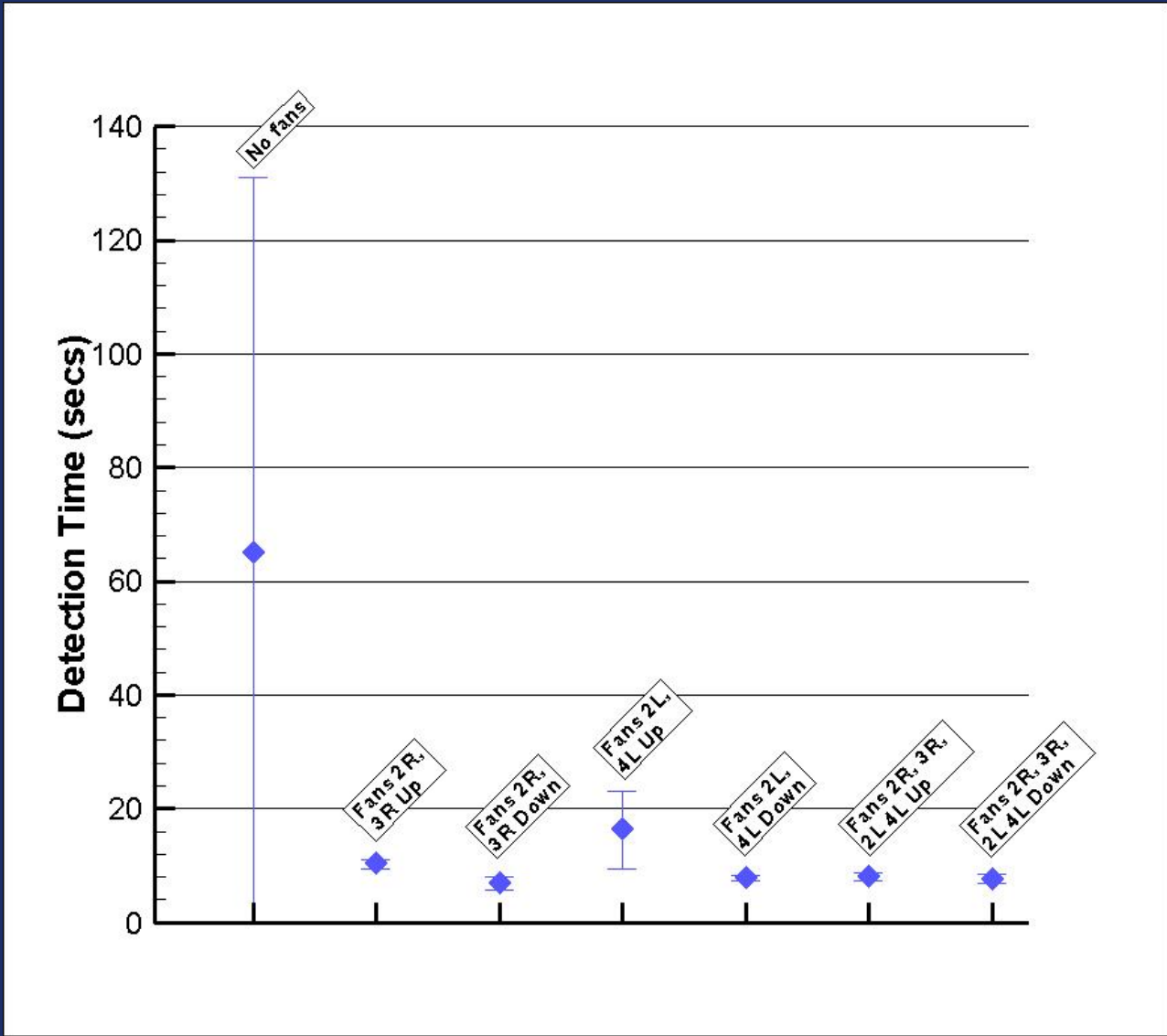
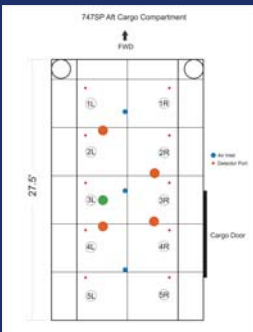
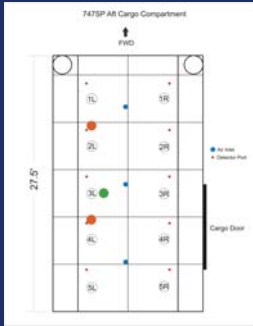
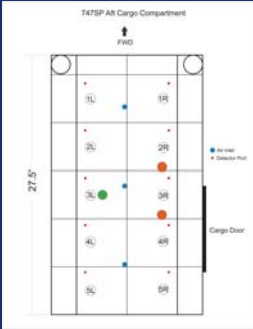
Cargo compartment air is drawn in one end of the duct and exhausted out the other end at a rate of 180 ft³/min.



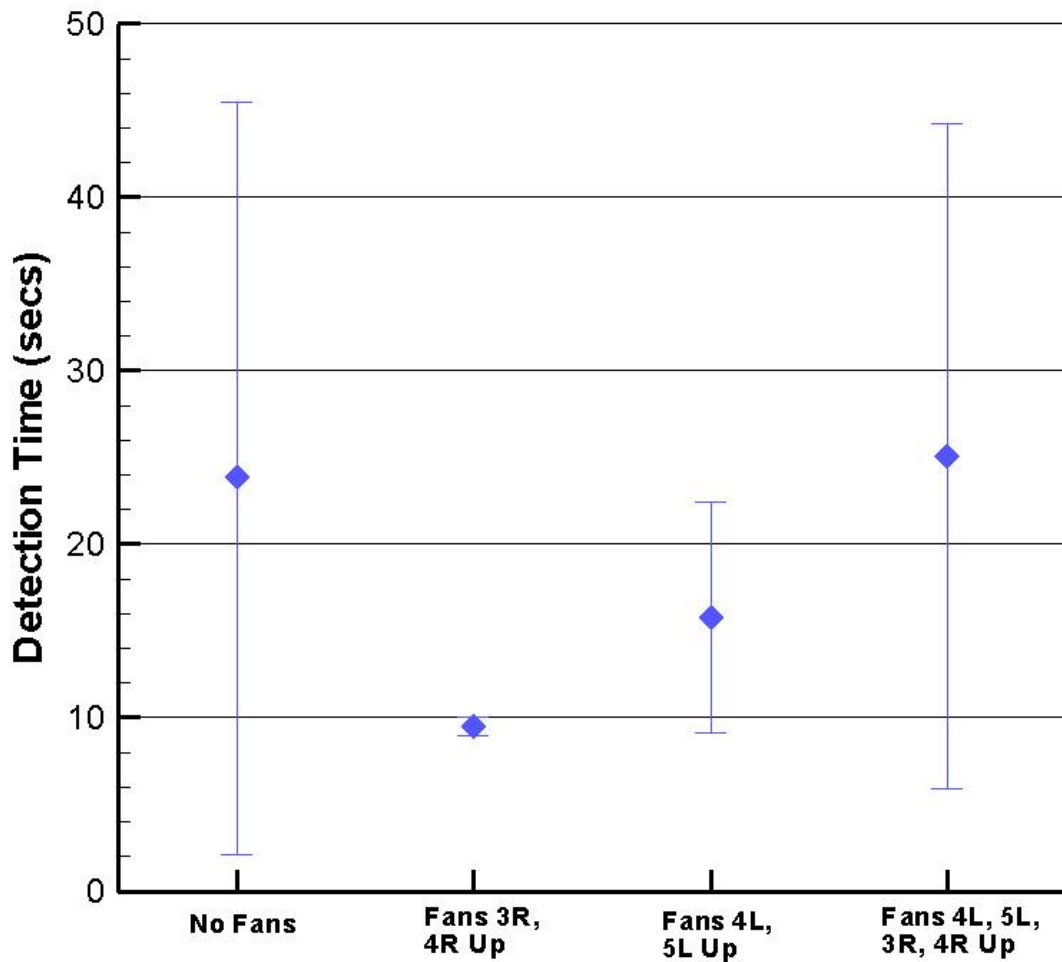
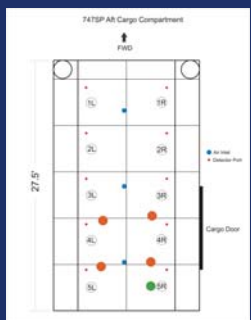
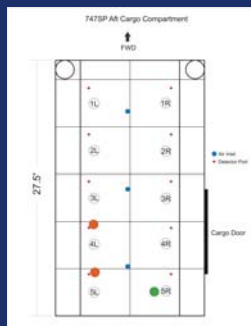
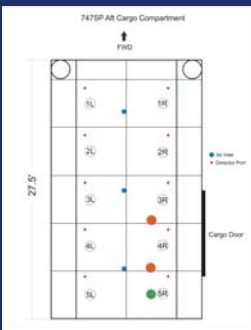
Position 1L



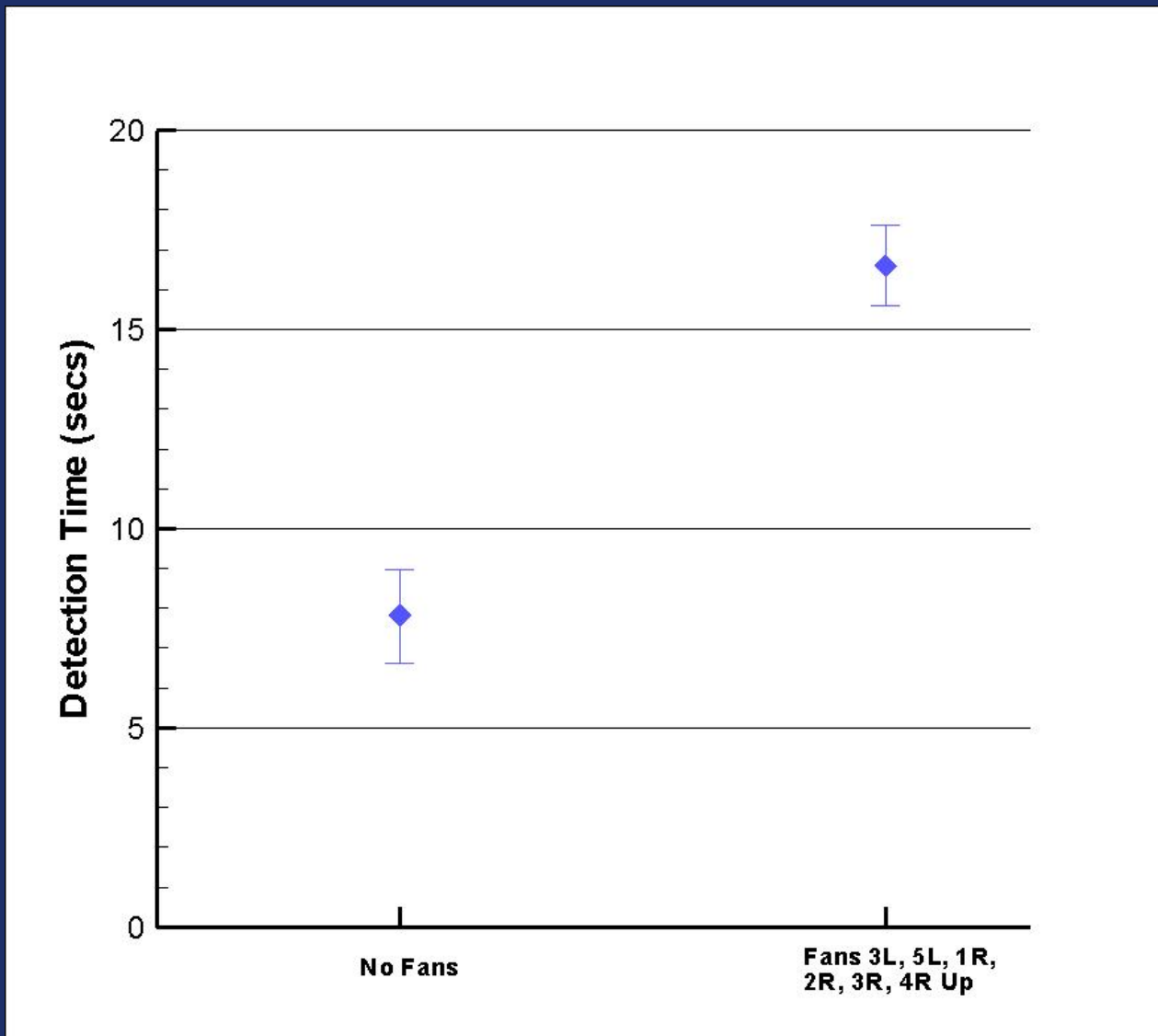
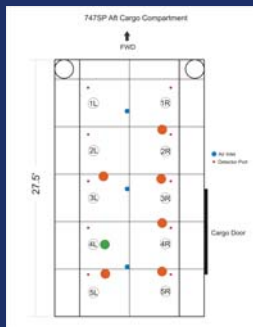
Position 3L



Position 5R



Position 4R



Draft report has been submitted for publishing and will be available on the Fire Safety website shortly.

