Safety Recommendations

4.1 SR 25/2013:
The FAA in co-operation or in coordination with EASA to review the single, universal, CFR14 fire protection certification standard that covers all transport category aircraft as a single design category and develop a dedicated protection certification standard for the cargo compartments of aircraft designed or modified as dedicated freighter or freighter/passenger combi aircraft to include the mandatory installation of fire suppression systems of cargo aircraft with Class E cargo compartments.
4.2 SR 26/2013:

The FAA and EASA are requested to provide operators of cargo aircraft of a maximum certificated take-off mass in excess of 45,500 kg with the option to modify existing Class E cargo compartments, through a process of FAA or EASA recommended modifications, to control a class E cargo fire without requiring a crewmember to enter the compartment through the use of an active fire suppression system.
4.3 SR 27/2013:

The FAA in co-operation or in coordination with EASA to mandate the requirement for cargo aircraft certified under FAA 14CFR or the equivalent EASA certification requirements to have a method of detecting the early development of fire through the detection of thermal radiation, originating within class E cargo compartments, through the installation of Multi-Source Sensors [MSS] which utilise a process of thermal/heat detection in conjunction with smoke/fumes sampling.
4.4 SR 28/2013:

The FAA in co-operation or in coordination with EASA to review the certification requirement for crew alerting to provide a visual means of indicating the specific location of a fire to the crew.
4.5 SR 29/2013:

GCAA recommends that PHMSA standardise the battery packaging regulation to be in harmony with the ICAO Technical Instructions [TI].
The requirement is the complete harmonization of the U.S. HMR with the ICAO TI's for the Safe Transport of Dangerous Good by Air regarding lithium batteries. This includes incorporation of quality management provisions provided in Part 2; 9.3.1 e.
4.6 SR 30/2013:

The FAA in co-operation or in coordination with EASA to develop standards for containers with suppression systems, superior heat and fire resistance and resiliency to withstand a suppression-198

caused pressure pulse and still contain a suppression agent in accordance with NTSB recommendations contained in NTSB A-12-68,69,70[98].
4.7 SR 31/2013

The FAA in co-operation or in coordination with EASA to implement certification rule changes to require containers or Unit Load Devices (ULDs) which meet the standards in recommendation 4.6, develop a design standard that enables the container or ULD to be capable of internally containing or suppressing a fire agent in accordance with NTSB recommendations contained in NTSB A-12-68,69,70.
4.8 SR 32/2013:

The FAA to develop an Advisory Circular [AC] addressing the use of fire containment covers for cargo stored on pallets that could be used to cover palletized cargo or cargo containers.
4.9 SR 33/2013:

The FAA in co-operation or in coordination with EASA to provide a requirement for mandatory full-face oxygen.
4.10 SR 34/2013:

The FAA in co-operation or in coordination with EASA to recommend the adoption of a rotary single piece selector for oxygen quick donning anti-smoke oxygen masks.
4.11 SR 35/2013:

The FAA in co-operation or in coordination with EASA to require the use of Evidence Based Training Programs [EBTP] in line with the requirement of ICAO Document 9995 - Manual of Evidence Based Training. In particular, require operators to implement the development of evidence based simulator training using objective FOQA accident and serious incident data of smoke filled cockpit environments for crew emergency training.
4.12 SR 36/2013:

The FAA in co-operation or in coordination with EASA to mandate the implementation of vision assurance devices or technology for improved pilot visibility during continuous smoke, fire, fumes in the cockpit emergencies. This could include off the shelf devices or developing mask mounted thermal imaging cameras with the capability to see through smoke/fumes with sufficient clarity to view the primary cockpit instrumentation.
4.13 SR 37/2013:

The FAA in co-operation or in coordination with EASA to develop or redesign all transport aircraft checklists pertaining to Smoke Fire Fumes events to be consistent with the Integrated, Non-alerted Smoke Fire Fumes Checklist template presented in the Royal Aeronautical Society's specialist document Smoke, Fire and Fumes in Transport Aircraft: Past History, Current Risk and Recommended Mitigations, second edition 2013, prepared by the Flight Operations Group of the Royal Aeronautical Society.

4.14 SR 38/2013:

The FAA in co-operation or in coordination with EASA to review the capability of Portable Electronic Device (PED) Electronic Flight Bags (EFB) which are used for non-alerted smoke fire fumes events to be viewed in smoke filled cockpits.

4.15 SR 39/2013:

The FAA in co-operation or in coordination with EASA to provide cargo crews with a revised Fire Main Deck non-normal checklist guidance for when and how to transition from the current 22-25,000 feet fire suppression altitude to the landing phase where descending early may contribute atmospheric oxygen to a latent fire during descent. This procedure should provide a method to verify or otherwise assess the condition of the fire and to evaluate the risk to the aircraft if a descent is initiated so as not to jeopardise the safety of the crew by following the checklist instruction as directed.

4.16 SR 40/2013:

The FAA in co-operation or in coordination with EASA to mandate a certification requirement for continuous smoke testing for flight deck smoke evaluation tests where the smoke is required to be continuously generated throughout the test for cockpit smoke clearance and develop a mitigation procedure through regulation on how to effectively manage continuous smoke in the cockpit.

4.17 SR 41/2013:

The FAA in co-operation or in coordination with EASA and Boeing to evaluate the Boeing 747 Freighter/Combi/BCF modified aircraft for single points of failure where the critical systems protection of the aircraft is dependent on a single safety gate which is the cargo compartment liner at or contiguous with fire zone three: this is the area under the control cable truss assembly, the ECS ducting and the supplementary oxygen system supply line from the forward lower deck cargo hold to the crew oxygen storage boxes.

If a deficiency in the current level of critical systems protection is determined, provide regulatory oversight to mitigate the risk of control and systems damage that can result from large cargo fires.

4.18 SR 42/2013:

The FAA in co-operation or in coordination with EASA to review the certification and design of Boeing 747 Freighter/Combi/BCF aircraft distribution of oxygen from the supplementary oxygen bottles to the flight deck oxygen masks primarily provided through corrosion resistant steel (CRES) 21-6-9 tubes. In particular, to review the critical systems protection requirements for the area connecting the CRES supply line, via a PVC hose and connector, to the oxygen mask stowage box [MXP147-3] and provide regulatory oversight to mitigate the risk of control and systems damage that can result from large, catastrophic cargo fires.

4.19 SR 43/2013:

The FAA in co-operation or in coordination with EASA are requested to charter an Advisory and Rulemaking Committee (ARAC) to review the adequacy of current issue papers on the protection of critical systems from cargo fires and develop regulations and associated guidance material (e.g. Advisory Circulars) to codify the existing and proposed requirements.

4.20 SR 44/2013:

The FAA in co-operation or in coordination with EASA to require operators to implement smoke, fire, fumes training in a dedicated smoke simulator/full immersion training device allowing crews to experience actual levels of continuous smoke in a synthetic training device or other equivalent ground-based training device as an integral process in crew emergency recurrent training.

4.21 SR 45/2013:

The FAA in co-operation or in coordination with EASA to implement specific Standard Operating Procedures [SOP] for scenario based multi-crew pilot incapacitation where one or more crew members are incapacitated resulting in a single pilot crew environment.

4.22 SR 46/2013:

The FAA in co-operation or in coordination with EASA to implement a specific recommendation that failures of aircraft systems (such as the air conditioning packs) necessary for the continued safe flight and landing during an aircraft cargo fire event be considered in the aircraft level safety analysis and during the development of cargo fire emergency procedures. This should consider failures of dependant systems and the continued cascading failure of systems which are factors in large cargo fires.

4.23 SR 47/2013:

FAA and EASA regulatory certification standards to consider the development of a quantitative framework for assessing the degradation of cargo compartment liner polymer matrix or the current industry standard panel material properties and the resulting degradation in the structural integrity of these structures when subjected to extreme heat, vibration and/or thermo-mechanical energy.

4.24 SR 48/2013:

The FAA in co-operation or in coordination with EASA to develop a test method to determine flame penetration resistance of cargo compartment liners to extreme heat at the current certification requirement temperature combined with additional input loads such as vibration, multi-axial loading, intermittent pressure pulses, thermo-mechanical loadings based on differential materials coefficients, acoustic vibration and ballistic damage.

4.25 SR 49/2013:

The FAA in co-operation or in coordination with EASA and Boeing to evaluate the Boeing 747 Freighter/Combi aircraft Class E cargo compartment for a structural-acoustic coupling phenomena in the aircraft fuselage.

Structural-acoustic coupling phenomenon in an aircraft fuselage is a known characteristic. In large Class E cargo compartments, the structural and acoustic modes can be derived for vibration analysis. Structural and acoustic analysis could determine possible occurrences of vibration in the fuselage

structure during predetermined phases of flight where the vibro-acoustic signatures can be used to determine the principle sources and transmitting paths of the vibration.

Further investigation can be performed by the manufacturers of large cargo aircraft and/or the operators of these aircraft to investigate the vibration and acoustic signatures of the cargo areas for harmonic acoustic vibration resulting from the combination of engine and fuselage vibration.

Currently there is no data for the class E cargo compartments of the B744F, If such data was available through a process of acoustic mapping for structural-acoustic coupling, this data could be used to expand the UN Manual of Tests and Criteria Para. 38.3.4.3 Test T.3: Vibration test and verification data.

This could through a process of acoustic mapping the cargo compartment interior and measuring the vibro-acoustic interior vibration and vibration and resonance of the airframe structure.

Refer to GCAA SR 4.33

4.26 SR 50/2013:

The NTSB, FAA and/or EASA fire test divisions to perform a test on lithium batteries to determine the ignition properties for lithium type batteries when subjected to external sources of mechanical energy, including acoustic energy in flight range modes, acoustic harmonic modes and a separate test to determine the susceptibility of lithium batteries to vibration from a mechanical source.

The purpose of this testing is to determine the safe limits for the air carriage of lithium type batteries in dynamic aeroelastic, vibrating structures where the battery electrolyte composed of an organic solvent [and dissolved lithium salt] could become unstable when exposed to these forms of mechanical energy.

4.27 SR 51/2013:

ICAO to review the hazardous materials classification for Class 9 materials packaging where the reconsideration of lithium batteries and other energy storage devices that are currently classified as a Class 9 hazardous material be subjected to a higher level of hazardous material classification as at present time, it is not clear that the current Class 9 hazard communication or quantity limits adequately reflect the inherent risks to aviation safety.

4.28 SR 52/2013:

ICAO to develop a SARP for package level protection of batteries being shipped to include protection from thermal degradation and damage to individual cells or cell combinations in thermal runaway, and to retard the propagation of lithium battery initiated fires to other packages in the same cargo stowage location as well as to increase the amount of time it would require for the contents of the package containing lithium batteries to provide an additional source of fuel for on-board fires initiated by other sources.

4.29 SR 53/2013:

ICAO is requested to establish a task force or working group of manufacturers, operators, and regulators to develop a concept and safety case for audible emergency checklists for non-normal emergency situations and provide a feasibility working paper for industry consideration.

4.30 SR 54/2013:

ICAO is requested to establish a task force or working group of manufacturers, operators, and regulators to develop a concept and safety case for alternative vision assistance systems for the smoke, fire and fumes events non-normal emergency situations and provide a feasibility working paper for industry consideration on the implementation requirements and required standards.

4.31 SR 55/2013:

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ICAO Flight Recorder Panel to expedite the ICAO SARP on Airborne Image Recording Systems [AIRS] amendment to Annex 13 to progress of this subject due to the potential benefit to air accident investigation.

4.32 SR 56/2013:

ICAO Safety Information Protection Task Force to expedite the ICAO SARP's required for video data protection.

4.33 SR 57/2013:

ICAO Dangerous Goods Panel to amend the ICAO Technical Instructions regarding the safe carriage of lithium batteries.

Specifically, the request is to establish a dedicated task force within the DG panel, including the representation of qualified stakeholders, to study the safe carriage of lithium batteries and other potentially hazardous cargo and develop recommendations to the UN Manual of Tests and Criteria, The Manual of Tests and Criteria Revision 5, Lithium Metal and Lithium Ion Batteries, 38.3.4.3, Test T3-Vibration.

Structural-acoustic coupling phenomenon in an aircraft fuselage is a known characteristic. In large Class E cargo compartments, the structural and acoustic modes can be derived for vibration analysis. Structural and acoustic analysis can determine possible occurrences of vibration in the fuselage structure during predetermined phases of flight where the vibro-acoustic signatures can be used to determine the principle sources and transmitting paths of the vibration.

Given the active failure modes of lithium batteries, the battery risk factors concerning possible susceptibility to various extraneous forms of mechanical energy, for example vibration, possibly in a harmonic form, could be an initiating action risk.

ICAO Dangerous Goods Panel is requested to evaluate data relative to the UN Manual of Tests and Criteria, Lithium Metal and Lithium Ion Batteries, 38.3.4.3, Test T3-Vibration and advise the UNECE Committee of Experts/Working Party on the Transport of Dangerous Goods if additional criteria should be adopted for the carriage lithium metal and lithium ion batteries by air transport.

Refer to GCAA SR 4.25

4.34 SR 58/2013:

GCAA to produce an In-Flight Emergency Response Manual [IFERM] for the use of ATCO and all ANS providers. The General Civil Aviation Authority (GCAA) to issue a manual providing formal guidance for ATCO's to enhance responses to in flight emergencies. The manual should support CAR Part VIII, subparts 4 (ATS) and 8 (SAR).

4.35 SR 59/2013:

GCAA to require all ATC units be equipped with a dedicated transceiver which can be directly tuned to all frequencies in the aviation band(s) for use in emergency situations.

4.36 SR 60/2013:

GCAA to assist and/or support the provision for mutual radar data sharing between Bahrain and the UAE Flight Information Regions.