

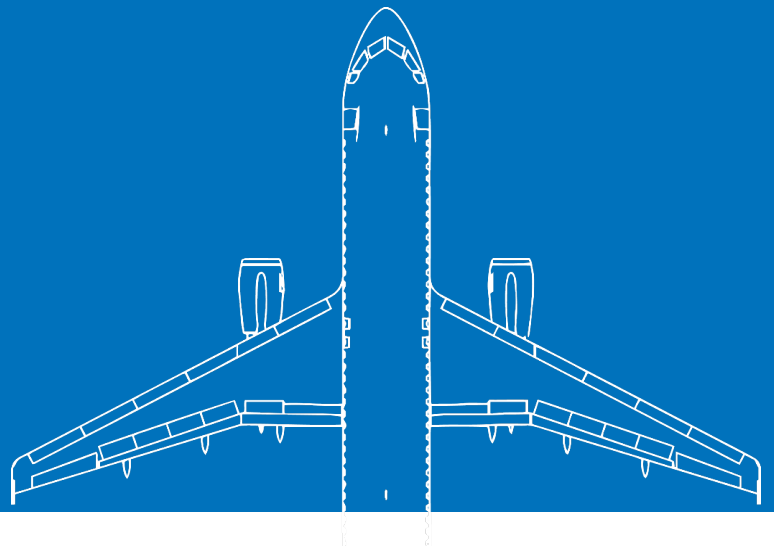


Aviation Risk Management: Making Safe Aviation Even Safer

Medium and Large Aircraft Air Transport

Sector Risk Profile

All risks, controls, and actions companion document



Introduction

The Medium and Large Aircraft Sector Risk Profile (SRP) workshops generated an initial list of 115 controls and 189 potential actions that the sector could undertake to strengthen the control environment.

To produce the refined action list, CAA formed an internal panel with subject matter experts to review and refine the risks, causes, controls, and proposed actions. This process resulted in a final list of 31 actions for the sector to initially focus on.

This document provides the full high level list of risks, controls, and possible actions. As the sector works through the first group of risks and actions identified in the main report, where appropriate, new risks will be added as they emerge, or from this list. In addition, sector participants can use this document to apply the risks and action relevant to their own operations, informing their SMS development.

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Ref	Risk	Cause	Control needs strengthening or development	Actions	Who is best to address?
1	Runway Excursions	Unstable approach	A supportive company culture	Encourage a just enforcement of the SOP's for unstable approaches and monitoring (FOA).	Airlines
				Decrease commercial pressures on crews for On Time Arrivals.	Airlines
				Develop and roll-out training for Unstable Approach plus the go around.	Airlines
			Timely ATC clearance, routing and information	Minimise short notice changes to clearances and instructions.	Airways NZ
				Provision and early advice of changes to weather, windshear/CB.	Airways NZ
				Ensuring regular review of charting standards	CAA, Chart producer, Abrodata, JEPP, Aircraft manufacturer, LIDO
		Pilot competency and experience	Civil Aviation Rules are fit for purpose	Conduct a collaborative CAA/Industry workshop	All sectors
				Unknown	Review current training matrix.
			Pilot understanding of aircraft technology	Provide evidence based training	All sectors
				Evaluate current situation	Aircraft manufacturers, Airlines
				Revise/review training of training institutions to ensure fit for purpose and currency.	Aircraft manufacturers, Airlines
				Increase Human Machine Interface training.	Aircraft manufacturers, Airlines
		Inadequate control and monitoring	Aerodrome operator compliance with recognised and approved aerodrome design and layout standards	Review of compliance monitoring process to ensure fit-for-purpose.	CAA and Aerodrome Operators
				Human control over technology	Increase regulatory oversight over introduction of new technology.
			Up-to-date crew resource management techniques (CRM)	Ensure participants are maintaining manual proficiency with or without supporting technology.	Aircraft manufacturers, Airlines, CAA, Airways NZ
				Continual update and refreshing of CRM training to all users.	Airlines

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Ref	Risk	Cause	Control needs strengthening or development	Actions	Who is best to address?	
	Runway Incursions	Unclear/non-standardized runway signage or lighting	Stop and Go lights at all hold points and hot spots.	Identify key hot spots (airports, parts of airports) and assess if stop and go lights can be used to reduce risk.	Airways NZ and Industry	
				Ensure all equipment is standardised and follows a uniform installation/implementation.	Airways NZ, Aerodrome Operators, CAA	
			Review operator training, education and communication process and ensure fit for purpose.	All sectors		
			Runway lightening configuration meets international standards.	Ensure all lighting configurations meet international standards. Where required, implement changes and communicate via education and publishing Aeronautical Information Publications (AIP).	Airways NZ, Aerodrome Operators, CAA	
			Movement area markings meet international standards.	Ensure all marking configurations meet international standards. Where required, implement changes and communicate via education and publishing Aeronautical Information Publications (AIP).	Aerodrome Operators, Airlines	
		ATS and Pilot fatigue		Crew resource management techniques (CRM) / Team Resource Management (TRM)	Review, revise, the duty time and call processes for ground and air staff.	CAA, Airways NZ, user groups
				Effective fatigue risk management system	Review international best practice	MOT/CAA, Airways NZ
					Standardise across the sector	
					Develop rules, policy and mandate use.	
				Adequate staff cover at all airports	Issues assessment (Consider risk vs movements vs cost at aerodromes might only be able to have one staff at some aerodromes, therefore look at centralisation of control (potentially not enough qualified staff / \$ in small areas))	
			Create /revise rule mandating dual staff at all airports.			
			ATS at all air transport aerodromes.	Issues assessment (Create/revise rule mandating ATS staff at all air transport aerodromes and/or consider centralisation)		
		Pilot, driver, ATS, and personnel misunderstanding		Standard comms, SOPs	Establish a minimum standard (competency and assessment).	CAA and Aerodrome Operators
					Establish currency standard	CAA and Aerodrome Operators
				Use of GPS (JEPP moving maps, ADS-B/tracking, vehicle tracking)	Identify airports that may benefit from use of GPS. Complete cost benefits analysis and complete trial period of appropriate.	CAA, Aerodrome Operators and Airlines
				Effective communications with all users (clear communications, modern equipment, culture, and standardisation).	Establish a minimum equipment standard.	
Develop and run training for minimum standards.						

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Ref	Risk	Cause	Control needs strengthening or development	Actions	Who is best to address?
	Airborne Conflict	Lack of situational awareness	Fatigue Risk Management (FRM) for pilots	Ensure FRM process is current and fit for purpose.	CAA/MOT
			Airborne objects/aircraft fitted with transponders	Regulator to mandate transponders (even if only at 121/125 operator airports).	NSS
			Non 121/125 air crew (i.e. gliders/GA/sport/helicopters) are appropriately trained for operating in shared airspace.	Raise awareness of risk of airborne conflict (and the counter measures available).	Industry
			Mandatory Broadcast Zone (MBZ)	Extend MBZ to include instrument arrival profiles.	CAA, Airways NZ
			All users have the ability to adequately broadcast intentions to other airspace users.	Implement common radio frequencies across the airspaces (but reduce interference from adjacent airports).	MOT/CAA, Airways NZ
			Foreign operations are aware of the airspace requirements	Source additional IATA Operational Safety Audits (LOSA) and work with foreign operators.	CAA/MOT
		Pilot non-compliance with ATS instructions	All pilots and crew are compliant with SOP's and other controls and rules such as MBZ	Sanction/prosecute wilful violations.	CAA/MOT
				Training to grow awareness to GA sector	Recreational Aircraft Association of NZ (RAANZ), Sport Aircraft Corp (SAC) etc.
				Introduce towers for surveillance of all areas serviced by Part 121 aircraft.	CAA, Airways NZ
				Remove voice communications and training to address issues such as RTF confusion due to ESOL phraseology.	CAA/MOT
			Common frequency in use at uncontrolled airports	Introduce common frequencies	NSS
			Workload coupled with events unfolding	Resource and technology	Airways NZ, Aerodrome Operators
		Air Traffic Service errors	Automation	Update regulations, install updated technology, and complete training of users.	CAA, Airways NZ
			Workload management systems	Review effectiveness of workload management systems monitoring to ensure fit for purpose.	Airways NZ
			Performance monitoring	Review effectiveness of performance monitoring system to ensure fit for purpose.	MOT/CAA, Airways NZ
			Appropriate training	Incorporate learning from experience into training.	
			Appropriate airspace management policies.	Review airspace management policies to ensure fit for purpose.	
			Complete flight monitoring service.	Implement government funded flight monitoring for GA.	CAA/MOT

Ref	Risk	Cause	Control needs strengthening or development	Actions	Who is best to address?	
4	Reduction in Terrain Separation	Loss of situation awareness	Human interface with Enhanced Ground Proximity Warning System (EGPWS).	Revisit training - experience based needs to move towards risk based.	Industry	
				Need to provide unexpected situations given simulator training, not prepared or rehearsed scenarios. Ideally needs to be completed in high fidelity simulators and instructors need to be competent and trained.		
				Content of training to incorporate STARTLE.		
			ATS Surveillance coverage and quality	Ensuring adequate ATC coverage in new areas which can turn from procedural surveillance.		CAA, Airways NZ
				Enhance technology in Air Traffic Management (ATM) system including predictive trajectory monitoring and effective Minimum Safety Altitude Warning (MSAW).		
				Enhance coordination and interactions between ATC and aircraft systems		
		Sharing of data, monitoring and analysis.	Review Part 12 and provide clarity to operators.	All sectors		
			Collaborative work between industry and the CAA to collect, collate, analyse, and disseminate safety information.			
			Analysis of data using Flight operations quality assurance (FOQA).		Maximise use of FOQA and control effectiveness monitoring.	
		Lack of competency, including local experience and familiarity.	In and around guide for IFR sector (121/125)	Commence a project for collation of knowledge base in a central hosted system.	Airways NZ, Aerodrome Operators, CAA	
			Ensuring GA operators are exposure to NZ conditions of shared airspace.	Make GA training more accessible and affordable (subsidy, cadetships, subsidise aircraft costs - e.g. implementation of ADSB kits).	Aircraft Owners and Pilots Association (AOPA), CAA	
			Training of routes in NZ conditions.	Review of syllabus post attaining PPL - Quality and length of type ratings.	Aircraft manufacturers, Airlines, CAA, Airways NZ	
			SMS to identify weaknesses and address.	Provide SMS implementation support for less qualified/experienced managers.	CAA and Industry	
		Navigation data integrity			N/A	

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Ref	Risk	Cause	Control needs strengthening or development	Actions	Who is best to address?
5	Unintended Flight Path Deviation	Mismanaging aircraft automation	Rules/guidelines meet requirements for single pilot operations.	Enable for appropriate aircraft type, co-pilot to log hours.	CAA/MOT
				Ensure that in high workload conditions Airlines do not operate with single pilot.	Airlines
			SOP's appropriate for operations.	Regular reviews of SOP's using SME's with the ability to amend appropriately.	Airlines
				Share benefits across operations of SOP changes.	CAA and Industry
				Training tied to risks and safety trends e.g. automation vs manual	Focus on good data collection and analysis that feeds into training.
			Ensure data collection/analysis is fed back into trainings of other areas e.g. Flight planning.		Airlines
			Encourage information sharing across sector.		Industry
		Fatigue	Appropriate FRM education and training.	Produce good guidance material.	CAA and Industry
				Run a Workshop to develop FRM training (all parts of industry; scientific and operational).	CAA/MOT
				Put training developments from workshop into practice.	Industry
			Appropriate regulatory and participant requirements.	Develop improved standards for fatigue management and clearly articulate responsibilities.	All sectors
				Integrate standards within SOPs to include strategies for managing fatigue risk (e.g. controlled rest).	Airlines
				Make FRMS accessible to all participants.	CAA and Industry
			Appropriate technology that reduces instances of crew operating while fatigued.	Implement appropriate scientific and data driven management and monitoring systems.	Industry
		Share data to identify fatigue situations and record and share lessons learned with the sector.		Industry	
		Non-compliance with standard operating procedures	Effective CRM	Ensure training includes appropriate CRM.	Airlines
				Maximise use of FOQA checks, LOSA, just culture, audit reporting to inform crews and CRM.	Airlines
			Competent personnel.	Ensure competency based training is effective.	Airlines
				Ensure ATC training is effective and fit for purpose.	Airways NZ
			Effective upset prevention and recovery training (UPRT).	Review and update training in UPRT.	CAA and Airlines

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Ref	Risk	Cause	Control needs strengthening or development	Actions	Who is best to address?
6	Degraded Air Navigation Service	Ineffective change management	Clearly defined and robust operational risk management plan.	Review current risk management plans. Track changes and monitor risk profile, and agree what will trigger re-evaluation of risks.	CAA and Airlines
			Programme plan clearly communicated to all levels or an organisation.	Implement an engagement interaction and feedback process.	Airlines
			Economic argument	Effective cost benefit analysis project planning.	CAA and Airlines
			Clear requirements and standards.	Use focus groups, industry groups to develop and agree definitions.	CAA and Airlines
	Ineffective maintenance and upgrade of core systems	Effective and appropriate regulations	Fit for purpose regulatory changes to support new navigation changes are implemented (NSS Actions)	Standards for aircrafts equipment to be reviewed to ensure fit for purpose, revised and promulgated.	CAA and Industry
			Up to date equipment and technology installed correctly and in a timely manner.	Existing systems need to be appropriately maintained, planned outages need to be coordinated with stakeholders.	Airways NZ
		Training and competency meet requirements to maintain and upgrade core systems.	Ensure new systems are fit for purpose - have a safety focus, efficiency, and an appropriate level of automation.	Airways NZ	
			Maintain expertise of legacy systems.	Ensure training for ATC, maintainers and pilots in new equipment and procedures is effective and fit for purpose.	Airways NZ and Industry
		Appropriate contingencies are in place to manage failures.	Ensure back-up systems in case of failures - GBNA APNT, IRS etc. portable aids, are in place and functioning properly.	NSS	
			Ensure pilots and ATC are effectively trained to manage contingency procedures / disruptions.	Airways NZ and Industry	
		Outdated systems	Programme of modernisation across the industry.	Enhanced system/ industry wide approach to resource allocation and investment to be developed.	Airways NZ and Industry
			Enhanced maintenance and future proofing plans.	Move to a risk based approach, particularly at small or remote ports, ensure funding is available to meet development needs.	Navaid owners
	Efficient and proactive Notice to Airmen (NOTAM) system.		Enhance processes and infrastructures used by aerodrome/ airport operators. Information dissemination i.e... Business cont. plans developed, particularly at remote small ports.	Airways NZ, Aerodrome Operators	
	Redundancy/ backup SME available to low frequency ports.		Identify at risk ports, provide additional resources - including training to at-risk ports, and provide access to backup SMEs.		

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Ref	Risk	Cause	Control needs strengthening or development	Actions	Who is best to address?
	Aircraft Upset	Over reliance on automation	Effective fit for purpose training of HMI.	Provide 6A level enhanced basic training (manual vs automated) - potentially mandate currency in manual flying.	CAA, Abinitio providers
				Type rating training extends to include basic flying skills.	Airlines
			Appropriate rostering.	Roster experienced crew with inexperienced.	CAA and Airlines
			Appropriate design of automation and Human machine interface (HMI).	Ensure operation is logical to experience level. Appropriate warnings and assistance for inappropriate use.	Original Equipment Manufacturer (OEM)
		Pilot lack of knowledge of aircraft systems and procedures	Appropriate and effective training.	Review back to basics syllabus, policy, and quality of training organisations. Effective recurrency training and ongoing evaluation.	CAA and Industry
			Experience	Review experience requirements, and recurrency training requirements. Increase hour's requirements.	CAA and Airlines
			Aircraft documentation is updated and comprehensive.	Ensure flight manuals are up to date and comprehensive.	CAA/MOT
				Educate the industry on holistic effects of design change.	
				Review type acceptance process to include all relevant stakeholders.	
			Standardisation of equipment and tight controls on use of non-aviation approved equipment.	Standardise fleets.	Airlines
				Review available aviation equipment, check it is fit for purpose, and/or assess appropriateness of new types.	
				Airlines to work together to try to make new equipment more affordable through combined purchasing power.	
		Develop relevant training.		CAA/MOT	
		Pilot loss of situational awareness	Appropriate training	Implement effective threat and error management training.	CAA and Airlines
				Mandate CRM/HF training.	Airlines
				Include upset recovery including STARTLE factor in training programme.	
			Effective and appropriate monitoring.	Develop an assurance program: LOSA/ FOQA.	
				Review and utilised occurrence reporting.	
				Support development of Just cultures.	
		Appropriate, properly functioning equipment (aircraft/ATC).	Review and evaluate existing equipment/ technology e.g. TCAS 7.1.		

Ref	Risk	Cause	Control needs strengthening or development	Actions	Who is best to address?
8	Damage to Aircraft on the Ground	Inadequate training of ground handlers	Robust individual licensing.	Define competency components, train and assess. Review to track effectiveness.	Airlines
			Certification of G.H.A organisations.	Issues assessment on certification of G.H.As. Audit and approval of G.H.A organisations to ensure compliance with standards/rules.	CAA and Industry
			Effective airport company oversight of safe practices.	Clearly define and promulgate standards for specific airports. Appropriately monitor and enforce standards. Investigate the degree to which organisation SMS' captures ground staff activity.	Aerodrome Operators
		Non-compliance with standard operating procedures.	Effective performance and management framework.	Build an incentive for conformance rather than OTP into individual/ team performance. Look at learnings from construction industry.	Industry
			Appropriate and effective supervision.	Make sure there are appropriate service level agreements with providers and implement monitoring of effectiveness. Ensure there is fundamental supervision of ground activity.	Airlines
		Aerodrome infrastructure operations and developments.	Design procedures at aerodromes comply with standards (including parameter fences for wildlife control).	Ensure implementation is monitored and provide feedback to aerodrome operators.	CAA/MOT
				Address non-compliance.	
				Ensure aerodrome SMS appropriately considers aviation activity during developments and general activity of aerodrome infrastructure.	Aerodrome Operators
			National co-ordination and collaboration through government for future aerodrome design planning and Infrastructure e.g. gates to cope with traffic growth.	Instigate national planning activity (Master planning).	All sectors
			Coordination of works in progress.	All stakeholders involved from planning to implementation (e.g. recent AA/CH/WN all WIP at the same time). Regular updates on progress coordinated by stakeholders to all - ensuring the same message.	Aerodrome Operators
		Training and monitoring to avoid complacency and normalisation of deviations (of ground staff).		Ensure effective competency based training and curriculum.	CAA, Aerodrome Operators and Airlines
				Ensure a learning culture safety promotional activity.	N/A
		Shielding around ground vehicles - crushable structure	Look at vehicle design research overseas examples and other industries and assess applicability to NZ aerodromes.	CAA, Aerodrome Operators and Airlines	

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Ref	Risk	Cause	Control needs strengthening or development	Actions	Who is best to address?
	Degraded Safety Margin (Peculiar to NZ environment)	Unexpected and compounded adverse changes in weather	Effective and appropriate pilot training.	Enhance existing training - New hire training is adequate - complacency needs to be negated for existing pilots in training.	Airlines
			Accurate and well promulgated weather forecasting.	Improve accuracy of WX forecast tailored to aircraft operating regime.	Metservice
				Increased use of well-defined and consistent PIREPS (Pilot report on actual weather conditions).	CAA, Metservice, Airlines
			Provision of sufficient alternative airports.	Install CAT3 Instrument landing System (ILS) where technically possible and useful.	Airways NZ, Aerodrome Operators
				Improve Ohakea to allow for FAL for international A/C (customers, MPI).	
				Implement Satellite Based Augmentation System (SBAS).	CAA/MOT
		Effective foreign operator training.	Develop an "Introduction to NZ weather" package for foreign operators.	CAA, Metservice, Airlines	
		Single runway operations	Appropriate and timely promulgated runway condition/status.	Conduct appropriate regular inspections.	Aerodrome Operators
				Ensure scheduled maintenance occurs.	CAA/MOT
				Ensure wildlife management programmes in place.	
			Adequate ATC/FIS cover.	Implement controls for runway use and protection if no ATC.	Airways NZ, Aerodrome Operators
			Alternative runway availability.	Ensure back up lights are in place and functioning appropriately.	
				Schedule maintained outage with other airports so an alternative is available.	
		Unique topography for key aerodromes	Accurate instrument flight procedures.	Increase adoption (more locations and Aircraft types).	Airways NZ and Industry
				Standardise approach chart design	CAA, Airways NZ, user groups
			Location training and familiarity for aircrew to standards.	Conduct location specific training for air crew to standards using new technology.	Airlines
			Provision of live wind data across wide area.	Conduct feasibility study of live wind system at critical locations.	

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Ref	Risk	Cause	Control needs strengthening or development	Actions	Who is best to address?
10	Compromise of safety to people on aircraft in flight	Passenger behaviour (including unruly passengers, cabin baggage, smoking etc.)	National caution list (identify and manage before boarding).	Customers cautioned and details returned. Advised of consequences. Training of airport and check in staff to flag the risky passengers.	All sectors
			Education on aeroplane "social etiquette" - the unwritten rules.	Produce material, education campaign including entertaining videos in boarding lounges/ on plane, magazines etc.	Industry
			Cabin crew training.	Further develop learning from incidents and near incidents. Incorporate into training.	Airlines and Avsec
			Cross industry information sharing.	Facilitate data and analysis sharing across the industry.	Industry
		Adverse weather	Turbulence procedures for crew.	Ensure adequate training of crew, and awareness of pilots. Education of pilots and passengers on ways to reduce risk.	Airlines
				Add to safety briefing the reasons why passengers need to fasten seat-belts	
				Avoidance of bad weather.	
			Weather reports passed on by pilots/ATS.	Reporting of moderate turbulence in Sig-Net.	CAA, Metservice, Airlines
			Delta in interpretation of "severe" turbulence for aircraft and cabin.	Ensure appropriate education and training.	Airlines
		Dangerous goods	Awareness and understanding of Personal Electronic Device (PED) battery risk.	Identify emergency responses.	CAA, Aerodrome Operators and Airlines
				Provide comprehensive information in pax safety announcements.	CAA and Airlines
				Review cabin crew training and resources to ensure effectiveness and fit for purpose.	
			Awareness and understanding of Dangerous Goods risk.	Increase checks during check in including online check in.	Airlines
				Provide holding facility for unsafe goods (e.g. at AVSEC screening).	Aerodrome Operators, AVSEC (e.g. at AVSEC screening)
		Sufficient electronic screening of carry on and hold bags.	Investigate cost benefit analysis of increased screening of hold and carry-on bags and extending to smaller aircraft.	CAA/MOT	

Ref	Risk	Cause	Control needs strengthening or development	Actions	Who is best to address?
11	Aircraft Fire/Fumes	Undeclared dangerous goods	Education about risks of undeclared dangerous goods.	Conduct review of size and scope of issue. Identify and target key risk areas.	Airlines and Avsec
					CAA/MOT
			Multi medium approach (airports, airlines, AVSEC, on aircraft. Evidence based.)	Aerodrome Operators, Airlines, Avsec	
		Adequate screening.	Implement screening for regulation in tandem with industry across all aircraft categories.	Airlines and Avsec	
	Lithium batteries	Effective education	Update website and Dangerous Goods poster, kiosks.	CAA and Airlines	
		Effective crew assessment.	Conduct further staff training including self-redesign logic.	Airlines	
		Effective security scanning.	Define intent and training.	CAA and Airlines	
			Explore new technology and training options.	AVSEC	
	Improperly prepared or damaged dangerous goods	Auditing of freight forwarders.	Appropriately enforce Part 92 and combine with operators SMS activity.	CAA and operators	
		Effective training.	Practical on going scenario based training relevant for new technologies	Airlines	
		Adequate equipment to prevent fire/fumes or equipment to restrain Dangerous Goods in hold	Mandate carriage of sufficient and relevant PPE.	CAA and Airlines	
		Adequate education	Conduct public awareness campaign backed up by scientific evidence.	Industry	
		Occurrence reporting	Increase reporting to see emerging operator trends and promulgate with sector.	CAA/MOT	
		Maintenance of areas to hold cargo	Ensure suppression testing of cargo hold is adequate and effective.	Airlines	
			Ensure there is no over-filling and ensure adequate and effective inspections occur.		