

Civil Aviation Authority of New Zealand

Richard White Manager Safety Investigation



System Safety Process





CIVIL AVIATION AUTHORITY POLYGON OF CERTAINTY



CIVIL AVIATION AUTHORITY POLYGON OF CERTAINTY



CIVIL AVIATION AUTHORITY POLYGON OF UNCERTAINTY





Just Culture

- **Purposeful Behaviour :-** Behaviour carried out with the <u>intent of causing an</u> incident or injury, or to mislead the investigation.
- Behaviour with knowledge of outcome :- Behaviour where something has occurred (eg. an error) that the person is <u>aware of</u>, and which the person knows will (likely) lead to an incident, or mislead the investigation.
- **Behaviour under influence of drugs or alcohol :-** Any behaviour that leads to an incident where the behaviour follows the <u>intentional consumption</u> of alcohol or other drugs.
- **Reckless Behaviour :-** Behaviour carried out with <u>conscious disregard</u> that the behaviour will <u>significantly and unjustifiably increase the probability</u> of an incident occurring.
- **Negligent Behaviour :-** Situation where the person <u>should have known</u> that his/her behaviour would <u>significantly and unjustifiably increase the</u> <u>probability</u> of an incident occurring.
- Multiple acts of Negligent Behaviour :- Do the multiple acts indicate a general lack of care and professionalism?



AVIATION SAFETY

MANAGEMENT SYSTEM

A S M S





CIRCULAR 253.AN/151



HUMAN FACTORS DIGEST No. 12 HUMAN FACTORS, AIRCRAFT MAINTENANCE AND INSPECTION

Approved by the Secretary General and published under his authority

INTERNATIONAL CIVIL AVIATION O RGANIS ATION MONTREAL - CANADA

CIRCULAR 253.AN/151



HUMAN FACTORS DIGEST No. 10 HUMAN FACTORS, MANAGEMENT AND ORGANIZATION

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INTERNATIONAL CIVIL AVIATION O RGANIS ATION MONTREAL - CANADA

Safety Outcome Targets Set For Each Industry Sector





In Terms of the Polygon of Certainty



Improvement over time reflects

- better compliance by industry with rules
- rules improved by CAA
- better safety knowledge of industry + CAA



CONTROL STEPS

- 1. Decide what is to be controlled
- 2. Select units to measure it with
- 3. Choose the desired target standard
- 4. Devise a way to carry out this measurement
- 5. Carry out the measurement
- 6. Compare the measured results to target standard, and
- 7. Take steps to adjust actual measured performance to target standard



SAFETY CONTROL LOOP

FAULT FOUND

CAUSES REMOVED

CAUSAL FACTORS ESTABLISHED

CORRECTIVE ACTION PLANNING





SAFETY CONTROL PROCESS: COLLECTIVE OCCURRENCES





Proactive Surveillance

Auditing Spot Checks Enforcement



Audit Requirements

A series of modularised audit requirements can be loaded against each department, identifying what is required to audit that department. This includes the check lists required. Scheduling details such as the auditor skills, the estimated hours and the frequency of audit must also be specified. These details can then be used as the basis for scheduling and conducting the audit.

Drg/Department Flight Operations Include Requirements with Status of Comparison Collapse All Branches Collapse All Branches Freight Handling Active Outsidy/Assurance Active Outsidy/Assurance Active Domestic line station - WN Active Domestic line station - AA Active Network Logistics Active Domestic line station - CH Active Route checks Active Inflight Services Active Administration Active Fleet Management Active Movements Control Active Active Active LAB The Research & Development Lab Active Active Record: Image Active Record: Image Active Active Image Active Active Image Active Active Image Active Active Image Active	📰 Maintain Audit Requirements							
Expand All Branches Collapse All Branches Freight Handling Active Outality Assurance Active Densitic line station - WN Active Domestic line station - AA Active Domestic line station - CH Active Boute checks Active Administration Active Administration Active Administration Active Administration Active Administration Active Training Active Movements Control Active Training Active LAB The Research & Development Lab Active Active Kecord: 1 Movements Development Lab	Org/Department Flight Operations	T	Include Requirements with Status of C Active Only C Active and Inactive					
Network Logistics Active Line Stations Active Domestic line station · VM Active Domestic line station · AA Active Domestic line station · CH Active Route checks Active Inflight Services Active Administration Active Fleet Management Active Movements Control Active Training Active LAB The Research % Development Lab Attive Active Record: 1 Image: 1 Meterol 1	Expand All Branches Freight Handling Quality Assurance	Collapse All Branches Active	Title Quality Assurance Comments					
Training Active Acti	Network Logistics Line Stations Domestic line station - WN Domestic line station - AA Domestic line station - CH Route checks Inflight Services Administration Fleet Management Movements Control	Active Active Active Active Active Active Active Active Active Active	Est Hrs 16 Frequency 6 (months) Status Active Audit Type Audit Image: Comparison of the state o					
		Active k List Title Status evelopment Lab Active						



Audit Scheduling

Calendar based audit scheduling is used to review all audit modules (requirements) due to be audited in a specified period, based on the audit frequency and when that module was last carried out. From this list of requirements, an audit is created, specifying target start and end dates and a brief description.

Schedule Audits Based on Requirement	s Due										_	
Select Audit Requirements based on:		Nov		-	1998	; 🖵]		Audit	Scheduling	g Details:	
Type Audit	Sur	n Mon	Tue	Wed	Thu	Fri	Sat		Dept			ਹ
Dept All Departments	1	20	3	28 4	23 5	30 6	31 7		Targe	t Dates	End [_
Due Dates	8	9	10 17	11 18	12 19	13 20	14 21		Audit	 Title (Des	cription)	
From 01-Nov-38 10 30-Nov-38	22 29	23 30	24 1	25 2	26 3	27 4	28 5					
Audit Requirements Due												
Department Title Maintenance Division Quality Assuran Maintenance Division Planning	ce		Du 11- 01-	e Date Nov-9 Nov-9	B 12 B 12	8 8 8		Comm Aust (ients conform l	o ISO 9000	Currently Scheduled	
		OK			Canc	el						



- The typical auditor is a man past middle age, spare, wrinkled,
- intelligent, cold, passive, non-committal, with eyes like codfish,
- polite in contact, but at the same time unresponsive, calm and
- as damnable composed as a concrete post or a plaster-of paris
- cast; a human petrifaction with a heart of feldspar and without
- charm, minus bowels, passion or a sense of humour. Happily
- they never reproduce; and all of them finally go to Hell.



Sul	oject for Review	Comments	Confidence Level
1.	Financial/Labour/Manage- ment Difficulty	ANZ Auckland are up-to-date with payments to the CAA.	Confident
2.	Change in Company Capability	Since Part 145 issue B737-300 added.	Very Confident
3.	Change in Key Personnel	The Engineering Business Unit has recently been restructured.	Confident
4.	Internal Audit Reports	The Internal Audit Reports have been sampled. These are to a high standard.	Very Confident
5	Occurrence Reports	Occurrence reports for 1993 are 57, most of which are minor in nature,	Very Confident
6	Honesty Weighting	Air New Zealand continue to deal with the CAA in an honest and professional manor.	Very Confident
7.	Previous CAA Audit History	Part 145 compliance audit shows that Tech Services had most problems followed by component maintenance. The audit program for 1994 focussed on sampling plans	Very Confident



AUDIT HRS GRAPH





Audit Cause (Totals)



CAA

Count

Investigation Cause (Totals)



Cause

CAA

Risk Profile		3 / RAT /	117
03-Dec-2002	41508 Air Adv	entures New Zeal	and Limited
<u>Reason for profile</u>	Request from within t	he CAA - 3/roug/5	6
Criteria		Assessment	Comments
Operator Profile		4	Has non-145 maintenance provider (10786), unsched pax, est > 12 mths.
Operator Management		9	Two ppl each hold 2 or more positions: J Williams is OI, QA & Maint., M Bannerman is Ops & Trg.
Management Stability		0	No recent changes.
Operational Stability		2	Added NCA - PA31, type previously operated.
Occurrence Evaluation		0	Nothing remarkable. Stats 3q01-2q02: 555 hrs, 2 occ's, 1-2 expected gives 82.1%. 0 occ since 1/7/2002.
Financial Status		4	Bad debtor once in last year - 4/02 for \$2792.
Conditions Imposed			Not used as from 1/4/00
Last Audit Quality Evaluati	on		None in the 1st year.
Non-compliance Evaluation		4	Moderate NCI of 60 from 1 major, 1 minor non-compliances and 5 hrs audit in last year.
	Actual Profile Score:	23	
1	Possible Profile Score:	70.00	
	Profile Percent Score:	32.86 %	<u>Profile Level</u> : Moderate

Profile History for the 12 months prior to this profile

06-May-2002 Change in Credit Status with the CAA

Reactive Surveillance

Mandatory Occurrence Reporting (MOR) and Safety Investigation



Legislative Requirements

Civil Aviation Act - Section 26

Establishes general requirement to report accidents and incidents

Civil Aviation Act - Section 72B

- Functions of the Authority
- To investigate and review civil aviation accidents and incidents in its capacity as the responsible safety and security authority, subject to the limitations set out in section14(3) of The Transport Accident Investigation Commission Act 1990

• Rule Part 12

Identifies what must be reported, by who, and when

Advisory Circular to Rule Part 12

Defines an acceptable means of compliance



Initial Notification of Accidents

Rule Part 12 requires that a notification to the Authority is required of an accident and lists the information required.



Investigative Process

Notification

- Accidents and serious incidents
 - : as soon as practicable

Provision of details

- Accidents, serious incidents and all other incidents
 - : within 10 days of the occurrence

Investigation

- by CAA and / or by operator of own occurrences

Reporting

- by operator of own occurrences
 - : within 90 days

Recording of information

- on the CAA database



CAA requirements (our needs)

- Outer Covering the reporting requirements of Rule Part 12 in a form that we can use at minimum cost, both to us, and to you the industry. To minimise our data entry costs we need to have it:-
 - If on paper either
 - on our own form, or
 - one with substantially the same layout, or
 - as computer reports set out along the lines of our form
 - ✤ If electronically
 - In a format that matches our computer system's data requirements.
 - Reports That give us confidence that the operator not only recognises the occurrence of a reportable safety event but responds to that event by conducting an appropriate investigation which identifies the cause/s and corrective actions necessary to prevent recurrence... and implements those corrective actions.



Investigation Requirements

Holders of certain aviation documents (the requirement is identified in the appropriate operating Rule) are required to investigate incidents which they have reported and submit their findings to the Authority. This provision will ensure that organisations will take timely corrective action when such a need is identified in the course of their investigations. The Authority, on receiving investigation reports, will assess if any further preventative and corrective action is required.

The investigation requirement placed on these holders of aviation documents does not derogate or replace the statutory responsibilities of TAIC or the Authority with respect to the investigation of incidents.



Notification Channels

- CAA 005 Form.
- AFTN Message.
- Fax.
- Phone.
- Letters and Email in some circumstances.
- Electronic Data Interchange (EDI) AQD. systems at client sites (About 10 Aviation Quality Database (AQD) sites currently in New Zealand).



ICAO Reports

Annex 13 Report Annex 8 Report



Aviation Quality Database - (AQD)

- Written by Superstructure Development Ltd.
- The system is based on the same design concepts as the CAA Systems and has been written to be compatible with these systems.
- The system is seen as a valued tool to assist in safety in that it is selling internationally as well as nationally.



Notification Capture:- Pre Add Check

E Check for Existing Occurrence

00	currence	Date	10/07/98	From	9/07/98	To 11/07/98	3					TAIC FAX
	Occ No	Туре	Occ Da	te (UTC)		Location	Call Sign	Reg	Fac ID	AS ID	_	Notification Letter
▶	98/2046	DEF	09/07/98 00):00	AKL		NZ52	NZŴ				New Occurrence
	98/2009	BRD	09/07/98 00):13	OHAKEA		NZ6471					
	98/2047	INC	09/07/98 02	2:50	CHC		NZ192	NBC				Display Log
	98/1864	ASP	09/07/98.08	S:00	Between	Between HK & NS		EWD		/КЛ		Log Entry
	98/1929	ASP	09/07/98 07	7:05	LISMORE	E reporting	VAL62					
	98/2048	INC	09/07/98 07	7:55	SYD		NZ14	SUL				Mail
	98/2010	BRD	09/07/98 08	3:14	WHENU	APAI	N244SW					Change State
	98/2049	DEF	09/07/98 11	1:00	Christchu	rch Interna		NZM				
	98/1990	ARC	09/07/98 12	2:00	AUCKLAI	ND						Un Hold Toggle
	98/2014	BRD	09/07/98 15	5:22	GISBORI	NE		NSX				Client Role
	98/2011	BRD	09/07/98/20):33	PALMER	STON NORTH		JSA				12861 Operator
	98/2012	BRD	09/07/98 22	2:45	INVERC4	ARGILL		MCS				13243 Pilot
	98/2062	DGD	10/07/98.00):00	AUCKLAI	ND						33921 MaintOrg
	98/2013	BRD	10/07/98.00	0:30	TAUPO							
	98/1865	ACC	10/07/98 01	1:40	WHITCO	MBE PASS		HUQ				
	98/1910	ASP	10/07/98.05	5:40	NELSON	-	RLK521			KI/UTA/0		
M	Record:	1	of 20		<u>N</u>							
		0.107.100		C-II (P: NI75'					· .		
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	Location A	AKL		Airsp	ace	ATA	1 2735	Na Fr		int	TRANSI	PURT PASSENGER A TU B
	Aircraft B	30eing 74	47-219B			Reg	g NZW 🛛	FIIC	int Phase	1.1	LLIMB	
UTC 9807090000 NST 09Jul-98 12:00 NDT 09Jul-98 13:00 Effect on flight NIL												
Description A lighting struck around galley 2/3. Just after this the stick shaker									ng Strike			
activated, F/O(First Officer) then flew manually. F/E(First Engineer)												
pulled C/B's(Circuit Breakers) eliminating system 1, and isolating system												
2 as faulty C/B pushed in later in climb, stick shaker activated once												
again C/B left out.												
	Hold Per	hoir	Tune	Number	Sta	te P	lole	9	taff	W	8 Title	
		99 SAI	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	157	Assessmer	nt Investiga	ator SI	evenso	nWrightP	ZK-NZ	w Liahtr	inc
۴												



Accident Report

Production Database - Deperators D	currence Report				_ 8 >
<u>Client</u> Work Request Entry/E	xit E <u>n</u> forcement	<u>A</u> nalysis <u>F</u> inance	e <u>T</u> ime <u>R</u> epor	ting <u>S</u> trategio	Support <u>H</u> elp
Accident Incident Rep	oort				97/2
Occurrence Date Time 05/01/	997 08:03:00	NZST 🖸 NZDT	• UTC	CR	
Aircraft manufacturer model GAF N24	1A			Aircraft Registra	tion ZK - NAD
Operator ID 40856 Att Nation	vide Helicopters Ltd		Location WO	DDBOURNE	POB 14
Operational Details					COB 2
Call Sign nad Altitud Departure Point WOODBOURNE	le ASL Destination	ft Alitude AGL	tt Fi	LvI R	unway Used 07 Point WB 🛃
Distance From NRP 0 NM	Bearing From NRP	0 Deg	FR 🖸 IFR		AC 🖸 IMC
Nature of flight 🔽 scheduled 💽 n	on-scheduled	domestic 🔲 intern	ational TRANSP	ORT PASSENGER A	
Flight Phase: LANDING		Effect On I	Flight ABNORN DIVERSI	IAL LANDING ON	<u>.</u>
Description of Incident The aircraft w response from local actuator	vas on approach to runv h the system. As no sou breaker bad nonned ar	vay 16 at Wellington airport nd or movement had been o nd would not reset. The cre	When the crew sel observed the pilot ch w carried out an ove	ected the landing gea ecked the circuit brea r shoot and held clea	r down there was no akers and found the r of the circuit pattern
💽 ACC 🔽 ASP	💭 BRD	🖸 ARC	O DEF	💭 DGD	💭 NIO
🖸 HGA 🛛 INC	🖸 NRO	🖸 PAA	🖸 SEC	🖸 PIO	🖸 ADI
Rule Reference 135 and 145	Registered Date	Time 6Jan	-1997	Registered By	THRIPPP
Form View	11. In				NUM
🏽 🔀 Start 🛛 🍊 🌌 🔍 🖎 🖆 🖭 🔃	7 🛃 🛛 🖀 🖬 🤮	j 🔊 c. 🗃 c. 📶	P. 💯 🖬 🔍 E.	<u>ः</u> त	7 🔍 🖄 🖂 🛛 19.97



- This example used the "Accident Incident" form. If this was an airspace occurrence then the Airspace form would have been used.
- The forms are shared between registration and investigation processes.
- The yellowing of fields indicate the required fields for the occurrence type.
- The initial switch board form used by the investigators has additional buttons giving access to Findings, Cause, Actions (FCAs) and the entry of an occurrence synopsis.


Occurrence Type

- ACC Accident
- ARC Aviation Related Concern
- ASP Airspace Incident
- BRD Bird Incident
- DEF Defect Incident (SDR)
- DGD Dangerous Goods Incident
- INC Aircraft Incident
- NIO Navigation Installation Occurrence
- PIO Promulgated Information Occurrence



Initial Processing of EDI Reports

Specification published on CAA's WEB site.



The interface

- Developed in partnership with Superstructure Development Limited to facilitate the sending of Occurrence Reports, FCAs and Client Safety Investigation Report from AQD to the CAA's systems.
- The information is sent as email over the internet and automatically processed into tables in the corporate database.



- The information is retained as a record of the clients view of the occurrence and their actions to prevent re-occurrence pursuant with Rule Part 12.
- The new items in this list are reviewed daily by the occurrence registration function either linking the report occurrence to an existing recorded occurrence in the CAA System or raising a new occurrence in the CAA system.
- Report Rule Part 12
- Record and track Quality System required by Rule Part Part 119.



Process Occurrence

Client Work Request Entry/Exit Enforcement	<u>A</u> nalysis <u>F</u> inance	<u>T</u> ime <u>R</u> eporting <u>S</u> trategic	Support Help
Occurrence No 97/2 IAccident Incident Report Airspace Incident Report Bird Hazard Report Facility Malfunction Report	Date Time 05/01/1997 Location W00DB0UF Aircraft GAF N24A UTC 9701050803 Description The aircraft w the crew sele the system. A checked the popped and	08:03:00 Call Sign nad Airspace NST 05-Jan-97 20:03 ND was on approach to runway 16 at Wellir acted the landing gear down there was tas no sound or movement had been obs circuit breakers and found the gear act would not reset. The crew carried out a	Severity CR ATA 3230 Reg NAD 05-Jan-97 21:03 Ington airport. When no response from served the pilot truator breaker had n over shoot and
Dangerous Goods Report Aviation Related Concern Promulgated Info Occurence Security Report	Role ID ▶ MaintOrg 29628 Air F Operator 40856 Natio Pilot 45872 Shre Profehk 13305 Grah	Client Name reight NZ Ltd onwide Helicopters Ltd wsbury ham	
Maintain Findings Maintain Occurrence Costs Print Findings Occurrence Synopsis	Nature of flight Flight Phase Effect on flight Effect on flight Operational Incident Aircraft Accident	TRANSPORT PASSENGER A TO B LANDING ABNORMAL LANDING DIVERSION Gear Intentional Wheels-up Landing	
😑 Administer 🖉 🗖 🖂 🗙			



Findings

CII	ent	Work Request Entry	//Exit Enforcement A	nalysis Finance	: Time Rep	orting Str	ategic Support	_ 🗗 🗙
	11 air Date	ntain Findings, Clauses and Discovered 19-Apr-1	999 Client ID	<i>#</i>		OF	Cost Centre	
	Acft	Reg		Aviation Do		Manual Re	f	2
	De	Scription	OBS 🖸 SRC 🛛 🖸 C	ritical 🖲 Major	Q Minor	Rule Re Location Finding Exception Te	f	
	•	No Ca	use Text	Person Org	Category	Item ID 0	Item Text	
l l	Ac	tions						
	•	Action 0A0 Corrective Preventative Recommendation	Open Closed Registered By WHITER	C Cancelled C) Recheck Registered On	Due Date 1	9-Apr-1999 Cost Ce Respon WHITEP 9 15:02:28	sintre sible Officer
	Rec	ord:10 of 10						
For	n Vie	w				FLTR		IM
	Sta	rt 🛛 🍊 🗹 🔍 🔀 😉	😐 W 😤 🛛 💁 🖳 👱	ji 🔊 C. 逽 C. 👔	MP. WT	<u>े</u> ष्ट 🖭 ता	10 C	🖂 IS.02



AQD New List

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11	<u>File Edit View Iools Help</u>								
	← → C → C → C → C → C → C → C → C → C → C →								
	Synchronisation 👻 <u>C</u> lien	t ▼ <u>A</u> ircr	aft 🝷 <u>S</u> urvei	illance 🝷	Safety Investigation \star Time	Sheet ▼ <u>H</u> elp ▼			
	ACO New List								
	Date/Time	Туре	Client	Reg	Location	Occurrence Title	Occ.	Refresh List	
	17/12/98 15:30:00	INC	12861	NAV	Gate 17, WLG.	Aircraft handling incident during catering	While		
	21/01/99 20:00:00	DEF	46009	FDM	Hamilton	CSD internal failure - Metal on Magnetic Plug		Pre Add	
	27/02/99 22:40:00	ASP	30180	REX	Wellington	Deviation from ATC clearance	Aircra	Check	
	1/03/99 10:00:00	DEF	12862	NZC	Christchurch International	Loss of AC Bus 1 after landing		LE IDTA	
	17/03/99	INC	12861	NCM	Enroute AKL-HNL.	CCM incapacitated by food poisoning.	2 Pilol	View/Print	
	17/03/99 14:05:00	INC	12861	NCF	150nm west of ADL.	Aircraft experienced severe unexpected	150nr	Occurrence	
	18/03/99	DEF	12861	NCK	CHC-SIN	Wing slide door warning message.	Aircra	Print List	
	18/03/99	INC	12861	NCK	CHC-SIN	Wing slide door warning message.	Aircra	T MIX Elox	
	19/03/99	DEF	12861	NAU	Ground at AKL.	Safety concern for brake problem defect action.	NAU	Print	
	19/03/99	INC	12861	NAU	Ground at AKL.	Safety concern for brake problem defect action.	NAU	Selected	
	19/03/99 10:00:00	ASP	12861	NBT	On descent into LHR.	TCAS RA during descent to LHR.	While	Occurrences	
	19/03/99 10:00:00	DEF	12861	NBT	On approach to LHR.	Hydraulic system failure.	On cli		
	19/03/99 10:00:00	INC	12861	NBT	On approach to LHR.	Hydraulic system failure.	On cli	Mangers	
	19/03/99 12:00:00	DGD	12861		AKL	Undocumented infectious substance carried	A con	Instructions	
	19/03/99 12:00:00	INC	12861	NAX	WLG	Maintenance clearance for emergency lighting	On the		
	19/03/99 17:25:00	DEF	12737	MCS	Christchurch International	Undercarriage failed to retract			
	20/03/99	PIO	12861	NGB		No information for DOLFN hdding pattern.	Due e	2	
	20/03/99 09:30:00	MIC	12861	NCM	Approach into TPF	MAP shift during ILS approach to TPF	Durine		
F	lecords 62								
D	irectives	Inve ARA	stigation It	*					
1								11	
1	🛾 Start 🛛 🥔 🧭 🗹	🕽 🔀 🛛	2 🖭 👿	1 🛃 📗	🚰-U 🎦 🔊 C. 🍃	30. MP. WT QE. 💷 🖼 🖡	V Q ()	M 15.95	



AQD Client Reports

					<u> </u>
. Client Occurrer	ice Reports				
Client 12861	Air New Zealand Lt Private Bag 92007	d AUCKLAND 1030		Aircraft	
CAA Occurrenc	e No			Location	
Client Occurrenc	e No	Te	et in Title	e includes	
CAA Work Reque	st ID / /	Occurr	ence Da	ate Range	
Occurrence Tur					Staff Member Assigned
	DI CARC C	ASP BRD NRO PAA		DEF 🗆	DGD SEC Active CAA Work Requests only
CAA Occ No	Client Occ No	Date/Time	Tupe	Beg	Desurrance Description
	010111 000 110	D Gtor I mile	TAPE	neg	Occurrence Description
98/3380	0537-98	22/11/98	INC	SUH	ISD attempted to open the aircraft door from inside thus trappin
98/3380 98/3380	0537-98 0546-98	22/11/98 26/11/98	INC INC	SUH NBU	ISD attempted to open the aircraft door from inside thus trappin Aircraft diverted to SLC at Dr. Stammer's request due to Pax H.
98/3380 98/3380 98/3379	0537-98 0546-98 0547-98	22/11/98 26/11/98 25/11/98	INC INC DEF	SUH NBU NZY	ISD attempted to open the aircraft door from inside thus trappin Aircraft diverted to SLC at Dr. Stammer's request due to Pax H. No.3 CSD Oil Light came on. Oil Temp 75C CSD disconnect c
98/3380 98/3380 98/3379 98/3379 98/3379	0537-98 0546-98 0547-98 0547-98	22/11/98 26/11/98 25/11/98 25/11/98	INC INC DEF INC	SUH NBU NZY NZY	ISD attempted to open the aircraft door from inside thus trappin Aircraft diverted to SLC at Dr. Stammer's request due to Pax H. No.3 CSD Oil Light came on. Oil Temp 75C CSD disconnect c No.3 CSD Oil Light came on. Oil Temp 75C CSD disconnect c
98/3380 98/3380 98/3379 98/3379 98/3379 98/3376	0537-98 0546-98 0547-98 0547-98 0547-98 0540-98	22/11/98 26/11/98 25/11/98 25/11/98 25/11/98 24/11/98	INC INC DEF INC INC	SUH NBU NZY NZY NZW	ISD attempted to open the aircraft door from inside thus trappin Aircraft diverted to SLC at Dr. Stammer's request due to Pax H. No.3 CSD Oil Light came on. Oil Temp 75C CSD disconnect c No.3 CSD Oil Light came on. Oil Temp 75C CSD disconnect c Enroute to Rarotonga, AIR NZ Flight Operations advised this ai
98/3380 98/3380 98/3379 98/3379 98/3379 98/3376 98/3371	0537-98 0546-98 0547-98 0547-98 0547-98 0540-98 0554-98	22/11/98 26/11/98 25/11/98 25/11/98 25/11/98 24/11/98 23/11/98	INC INC DEF INC INC INC	NEU NBU NZY NZY NZW NCI	ISD attempted to open the aircraft door from inside thus trappin Aircraft diverted to SLC at Dr. Stammer's request due to Pax H. No.3 CSD Oil Light came on. Oil Temp 75C CSD disconnect c No.3 CSD Oil Light came on. Oil Temp 75C CSD disconnect c Enroute to Rarotonga, AIR NZ Flight Operations advised this ai Aircraft diverted back to Auckland due medical/passenger prot
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Findings, Causes and Actions

- Finding: The problem that has been discovered.
- Cause: Why the problem exists. Is human factor based. Structured on the "James Reason" model for human factor classification and analysis.
- Action: An action that needs to be implemented to address or partly address a cause.







Cause Coding

- Basically three elements:
 - Person/Organisation
 - Cause Category
 - Active Failure
 - Local Violation
 - Local Error
 - Organisation Failure
 - Cause Descriptor
- Local violation, local error and organisation failure are all latent failures working back into the organisation.



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SAV No Discovered 10/09/2004	Rule Ref. 43	Aviation Doc It 137 Agricultural Aircraft Operator Certificate 💌
,	Manual Ref.	Aircraft Reg EUH
Category	DBS ● SBC Critical ● Major	C Minor External Ref.
Finding Description		Location Wanganui
During the 4 year inspection cables were found badly wor	of ZK-EUH being carried out by Wanganui Aero Work both n with one near failure.	direct aileron
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First Last	Next Previous 1 of 1	Add New Delete Save Cancel
No Cause Description	Person Organisatio	n Category
manufacture or repair.		
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Identifying Causes

The Civil Aviation Authority has used the work of Prof James Reason and Dr David O'Hare, as the basis for determining the causes of accidents, incidents, defects and other occurrences, taking organisational and human factors into account.

To enable these to be recorded in a fashion which can be analysed by the computer, the causes have been codified. The NZ CAA has given Superstructure approval to implement these codes within the Aviation Quality Database system.

When recording the causes, the "codes" are selected via drop down lists, as shown below:

Ca	uses for the above Finding	a series and a series of	The same states to see the	The second s	×.
	Cause Text	Person Org	Category	ltem	
•	Flight ops management had not been aware that an alternative route was being used as a short cut for some time	Unit Mgmnt/supervisory	Local Violation Factors	Poor supervision & checking	and a second sec
* Re	ecord: 14 4 2 > >1 >* of 2	I		Poor supervision & checking Group violation condoning attitude Hazard misperception Lack of management care/concern	
Ac	tions for the above Cause	States Strates and a st		Lack of pride in work	
	Action 0 A0 Descri	ption		Kisk taking culture encouraged Complacency (ie it can't happen) Learned helplessness (ie who cares)	

The following slides show the James Reason Model, and David O'Hare's method for determining active failures, both of which have been used as the basis for determining the codes used to classify the causal factors.









ORGANISATION FAILURE ITEMS

- Generate Goals or Policies
- ✔ Inadequate Communications
- ✔ Poor Planning
- G Inadequate Control and Monitoring
- G Design System Deficiencies
- Inadequate Defences
- G Unsuitable Materials
- G Unsuitable Equipment
- Poor Procedures
- Poor Training
- Poor Coordination
- Inadequate Regulation
- Other Organisation Factor







- Task Unfamiliarity
- ✔ Time Shortage
- ✔ Poor Signal: Noise
- ✔ Poor Human-System Interface
- ✔ Designer User Mismatch
- Gerror Irreversibility
- ✔ Information Overload
- ✔ Negative Task Transfer (Habits)
- C Task Overload
- G Risk Misperception
- Poor System Feedback
- Inexperience (Not Lack of Training)
- ✔ Lack of Knowledge
- Task/Education Mismatch
- ✔ Poor Instructions/Procedures

- ✔ Inadequate Checking
- G Hostile Environment
- Other Environmental Factor (e.g. Weather)
- G Interpretation difficulties
- ✔ Disturbed Sleep Patterns
- ✔ Fatigue Other
- ✔ Drugs/Alcohol
- ✔ Visual Illusion
- ← Disorientation/Vertigo
- Physiological Other
- ↔ Monotony/Boredom
- ✔ Lack of Confidence
- Poor Attention Span
- ✔ Psychological Other
- C Other Error Enforcing Condition





VIOLATION ITEMS

- ← Lack of Safety Culture
- G Management/Staff Conflict
- ✔ Poor Morale
- ✔ Poor Supervision & Checking
- Group Violation Condoning Attitude
- G Hazard Misperception
- ← Lack of Management Care/Concern
- ← Lack of Pride in Work
- G Risk Taking Culture Encouraged
- Complacency (i.e.. It Can't Happen)
- ✔ Learned Helplessness (i.e... Who Cares)
- Perceived License to Bend Rules
- Ge Age/Sex Factor
- Other Violation Enforcing Condition



Active Failure Classification



The values shown in the green boxes are the codes loaded into the AQS system for active failures.

Analysis Tools

The analysis tools allow you to select the data to be analysed, and the method by which you want the output to be presented. The data is extracted and passed to Microsoft Excel to produce the appropriate graph. The tools within Excel can then be used, if desired, to alter the appearance of the graph and to apply trend lines.

You go from this:

B Generate Cause Statistics		
Option Totals © Cause © Person/Org © Causes By Person/Org	Source Safety Investigation Surveillance Quality Deficiency	Org/Department
 Causes by CR/MA/MI Trends Person/Org Cause Critical/Major/Minor 	External <u>Limit To</u> Top 10 Top 20 Top 20% (Pareto)	To 31-Dec-97 Output To Excel Graph Word Table List of Findings List of Occurrences
Graph Type O Pie O Line O Column O Area	Data Category C Monthly C Quarterly C Yearly	Generate



Analysis Tools contd.













Graphs and Control Charts





1st Qtr 2nd Qtr 3rd Qtr 4th Qtr







Organisational Factor Profile Cause for concern **Organisational and** managerial factors Priority Reforms factors **Crew factors** Operational mgt. Maintenance mgt. Safety mgt. Organisational structure

Commercial & operational pressures



Courtesy James Reason Manchester University

Below 2,721 kg - Revenue Pax & Freight

Below 2,721 kg - Revenue Pax & Freight Accident Rate - 12 Month Moving Average





Audit 98-2004 NCP, NCF, OBS and SRC Trend





Analysis Tools contd.

Once the graphs are in Excel, trend lines can be applied using the standard Excel regression analysis tools. The graph below shows a linear trend line applied to the number of bird strikes.















DEFECT CRITICALITY TREND











Ineffective incident reporting





AIRSPACE CRITICALITY TREND








Dominant factors for pilot caused airspace incidents.

	DOMINANT FACTORS		
INCIDENT	Active	Local	Organisation
Unauthorized Airspace Incursion	Actions inconsistent with procedures, i.e. execution errors.	Inadequate checking, risk misperception, and inexperience.	Poor planning
Unauthorised Altitude penetration	Actions inconsistent with procedures, i.e. execution errors.	Inadequate checking, high workload factors, and poor concentration/ lack of attention factors	Inadequate control and monitoring
Near Collision	Diagnosis, Procedural and actions inconsistent with procedures, i.e. execution errors almost equal.	Inadequate checking, interpretation difficulties.	Not Enough Data
Pilot Position Reporting Deficiency	Not Enough Data	Inexperience.	Not Enough Data
Breach of Other Clearance	Inaccurate system diagnosis, i.e. diagnostic errors.	Inadequate checking and interpretation difficulties.	Not Enough Data
Flight Assist	Not Enough Data	Inadequate checking	Not Enough Data
Pilot Flight Planning Deficiency	Not Enough Data	Risk misperception and poor concentration/ lack of attention.	Not Enough Data





Dominant factors for controller caused airspace incidents.

	DOMINANT FACTORS		
INCIDENT	Active	Local	Organisation
Loss of separation	Actions inconsistent with procedures, i.e. execution errors.	High controller workload factors and poor concentration / lack of attention factors.	Inadequate control and monitoring, inadequate specifications or requirements.
ATS Coordination Deficiency	Actions inconsistent with procedures, i.e. execution errors.	Poor instructions and procedures and poor concentration/ lack of attention factors	Design system deficiencies and inadequate specifications or requirements
Near Collision	Diagnosis, Procedural and actions inconsistent with procedures, i.e. execution errors almost equal.	Psychological factors.	Poor resource management and inadequate defences.
ATS Clearance/ Instruction Deficiency	Actions inconsistent with procedures, i.e. execution errors.	Inadequate checking and poor concentration/ lack of attention.	Poor resource management and inadequate control and monitoring.
ATS Flight Planning System Deficiency	Actions inconsistent with procedures, i.e. execution errors.	Inadequate checking and poor concentration/ lack of attention	Design system deficiencies and inadequate specifications or requirements
ATS Flight Information Deficiency	Inaccurate system "diagnosis" errors.	Inadequate checking and poor concentration/ lack of attention	Poor procedures and inadequate control and monitoring.



Occurrence Rate / Hours flown





Non-Compliance Index (Audit and Investigation)



Occurrence Rate Comparison by Operator

■ ASP ■ DEF □ INC



Operator



Quality Index Performance



Date of Audit



Management and staff attitude towards safety; Clarity of quality management system; Documentation; Facility suitability & upkeep; Tools/equipment/materials; Adherence to standards and specifications; Personnel skills, knowledge and numbers; Control/management system effectiveness; Corrective and preventive actions; and Auditor assessment.





CAA Enforcement Unit

- Outside of Part 12 reporting, the CAA Enforcement unit receives about 200 to 250 complaints a year most of which come from members of the public and other operators operating within the rules who are being disadvantaged by those who are not. From 1 July 2000 to 30 June 2001 184 alleged offences were reported outside of Part 12, 136 enforcement investigations were carried out. 53 enforcement actions were taken of which 51 (96%) were successful.
- <u>This is outside of and separate from the 4000+ of safety</u> <u>failures reported under Part 12.</u>



Barriers to reporting by industry: "Fear of prosecution"

- Information on incidents reported to the CAA's Safety Investigation Unit may not be used or made available for the purpose of an investigation to establish whether an offence has been committed, or for prosecution action, unless:
 - the information reveals an act or omission that caused unnecessary danger to any other person or to any property;
 - or false information is submitted.
 - The CAA will not release the information gathered under Part 12 to any other person, unless a statutory requirement exists so ordered by the courts.



Examples of unnecessary danger

- Pilot operating a helicopter at an unnecessarily low altitude carrying out an unnecessary 45 degree banked turn resulting in a collision with the ground. One of the two passengers, who were both seriously injured, was not provided with a proper safety harness.
- The logbook entries relating to a set of tail rotor blades were altered to conceal the history to enable the engineer to refit them whilst actually time expired.
- A person knowingly allowed illegal repairs to be carried out to tail rotor blades and intentionally did not pass this information on to the engineer that installed the blades and certified for the installation. These illegal repairs caused the blades to disintegrate in flight resulting in the deaths of the pilot and crew member.
- The overseas engineers carried out a repair to a damaged main rotor blade. The repair was not in accordance with the manufacturers repair limits and was hidden with filler. The main rotor blade cracked in service potentially leading to total blade failure.



Search for Latent Conditions



James Reason quote

"Data without a theory is like a body without a skeleton."

All you can do is carry it around in a bucket."







Civil Aviation Authority of New Zealand

Richard White Manager Safety Investigation

