Improving Pilot Training

Origins of the Essential Concepts

This paper sets out arguments supporting a set of important assertions:

- *"High Effect" instruction* is feasible.
- It is easy for trainers to adopt, should they wish.
- When *"HE"* is activated, student progress along the training continuum is smoother and less demanding.
- The diligent trainee will attain greater heights of piloting proficiency.
- Graduates' superior aptitude in critical competencies is confirmed objectively.
- They thus get better bang for the buck form money invested in their training courses.
- The overall aviation safety system benefits – also measurably.
- Benefits are "whole-of-life" for the individual and career-persistent for aviation.

A first-draft set of guidelines for HE training has been produced. They will be further refined in early 2008 – through practical application, starting with training flight instructors. Also tested will be paradigms for fitness testing for the human attributes involved and design and trial of HE training routines. Products of these trials will serve as the resource foundation for the next stage of development. They include benchmarks for empirical appraisal of essential Human Factors attributes. Project transition to practical trial will enable conversion of assertions into hard guidelines. The advantages to aviation are quantifiable, in both safety and operational terms. Further action is imperative.

The paper does not provide detail of practical factors such as aspects of pedagogy relied on in developing guidelines for training, assessment and the like. These matters are set out on the website, so as to be accessible to all. Brief insights into the theoretical basis training design are in "Core Concepts". (It is in two parts.) http://www.linklearn.com.au/redflag/home.htm

Website map and links are on page 51 of Core Concepts part 2.

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Narrative

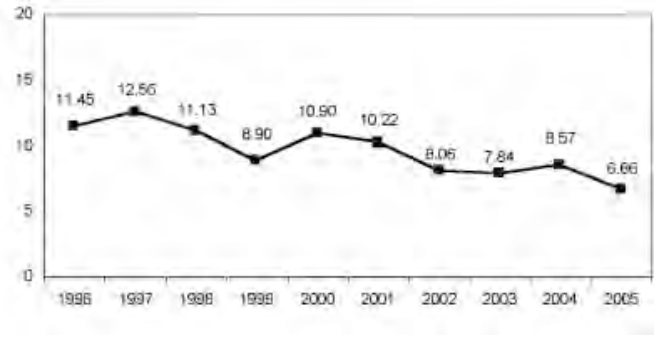
The general desirability of more efficient and effective flight training aside, the principal prompts for a Project aiming to lay the foundations for better pilot training were (and are):

- The current shortage of pilots ready to assume passenger-carrying duties, and,
- Concerns over certain Gen Y characteristics induced by, for example, habituation to learning (and performing) tasks while listening to music.

Prima facie, these and related influences possess the potential to reduce current and future safety factors. Aviation accident experience – especially in the RPT sectors – does not lend itself to actuarial analysis delivering firm conclusions on risk-factors-metamorphosing-into-adverse-events. Nonetheless, the least-risk strategy dictates prevention before hard evidence is to hand. In safety, *on the balance of probabilities* outranks *beyond reasonable doubt*.

Personal characteristics are manifest in each zone of concern. There is not so much a "pilot drought" as too few deemed suitable for airline service. Any unwelcome Gen Y attributes would similarly be definable in terms of human performance. Training possesses antidote potential – both short- and long-term. The degree of precision achieved in design of problem-focussed training solutions varies, of course, with the intimacy of problem definition.

From that perspective, evidence is scant. GA is the "ground floor" of the industry and would seem to be the first place to look for a safety change. CASA's 05-06 Report shows a steady fall in the accident rate. Statistics also show fewer (roughly 1/3rd) accidents in training vs GA. An adverse trend may not show until some years after "carriers" have left the training scene.



Historically, the accident experience has been the main indicator of safety performance and trends. A consequent criticism is that less serious events – slips, lapses, errors, etc – are not reported – and so latent accident causes evade identification and containment campaigns. In RPT, recorded data (FOQA), especially when integrated with observed performance (LOSA), is delivering a clearer overall picture. *And that picture is startling: the prevalence of threats and errors per flight, and the rate at which they are either not detected or mismanaged, are all much higher than at least one experienced safety professional expected.*

There is no equivalent in the training or GA sectors to in-flight data tracking. Arguably, the origins of future accidents are to be found in these breeding grounds. From there, error causes – potential accident causes – migrate into the pilot workforce. Tacit acknowledgement of this problem has always existed: *Pilot employers (and aircraft insurers) require minimum hours levels.* That is, fresh pilot training graduates are not regarded as fully ready for professional service. (In contrast, military pilots enter operational service upon graduation.)

Of many flaws in the "hours barriers" policy, one is especially relevant to this Project – the safety factor; strategies for reducing the error rate. "N" hours may suggest that a person has harvested the safety and operational benefits of "maturing as a pilot" – but it is by no means certain. Doubt is resolved by taking the "safe option", experience, even though that is vastly inferior to empirical checks/tests based on good science. And, as FOQA/LOSA show, serious Human Factors "bugs" are evading the traps supposedly erected by experience provisions.

The term "bug" is a version of James Reason's "pathogens". To take Reason's pathology analogy further, the medical treatment cycle starts with identification of the root cause of an infection. Pathogen identified, it is tested for sensitivity; the most effective "killer" is sought.

Bacteria and viruses mutate as they multiply, to develop defences against medication they've been exposed to. But the nature of the mutation varies depending on the environment. Some bugs become resistant to antibiotic A (and remain vulnerable to B), while others can shrug off B (and fall victim to A). "Smart weapon" remedies are precision-targetted, more effective in small doses, lethal to specific "versions" of the bug, and, leaving no survivors, don't promote evolution of antibiotic-resistance and make the hazard worse.

You can see parallels with aviation. Our bugs are shown up by accidents. Analysis is applied to identify the nature of causes and define preventive measures. However, the picture is not complete. As noted, review of flight parameters (FOQA/LOSA) is confined to RPT. There's no objective equivalent in the training, charter or GA sectors. *Another difference is that, in medicine, many dangerous pathogens are defeated by pre-emptive action: inoculation.*

Differences aside for now, the critical stage in a war against a pathogen, whether infection or error cause, is identification. While RPT is achieving maturity in intelligent and responsive surveillance, errors are rarely detected in sectors not given to voluntary reporting. To try to fill in the picture, two recent analyses of GA accidents were consulted. One was produced by CASA, the other, the ATSB. (It was reviewed in Flight Safety Australia.) No reference is cited for either; Flight Safety Australia's database is no longer practicably searchable.

To put it mildly, neither report is helpful. The CASA analysis concludes that poor flight planning causes most GA accidents. Well, maybe, but it's hardly a basis for precision targetting. The ATSB report is even worse, a real shocker. It says that most accidents are caused by collision.[1] To get your head around that you have to conclude they count collision with the ground. And its utility as a guide to accident prevention … ?

The grim reality is – in aviation as well as medicine – that prescription of a "cure" relies on identification of the pathogen. Sensitivity testing is important – the more precise you can get the better – but first you must know what you are dealing with.

The CASA report had long been promised and I was amongst those (few?) who were waiting. In frustration at its inconclusive findings, I ran my own survey of accident reports. Reviewing 300 ATSB reports, chosen at random, I more closely analysed the 54 that involved fatalities. (Copy of summary document attached.) All but three featured cause factors associated with:

- Decision-Making (especially failure to identify a threat),
- The presence of cause for stress (generally linked to threat denial), and
- Actual experience of stress (affecting both decision and aircraft handling).

Similar RAAF accident experience in the 70s and 80s prompted action. As set out in Core Concepts, accident prevention measures – once they kicked in – had dramatic effect. The accident rate dropped to zero. One issue remains unexplained, however – *the link between the error- or accident-causing pathogen and individual pilot "trainability".*

Indeed, when the Air Force chose to alter its screening processes in the light of the *error-prone* hypothesis, the main focus was *trainability*. A pilot course failure rate of 50% was deemed too high, a waste of public funds. The argument was that possession, at peak strength, of the error-prone attribute also rendered that individual difficult or impossible to train. New selection paradigms implemented certainly reduced the accident rate. The effect on the training failure rate was minuscule. It fell to 45%.

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[1] To be serious, reports such as this invite ridicule and diminish the pressure on accident prevention.

Insufficient information is to hand to explain this aberration. However, there is a persuasive hypothesis: *The error-prone type is also an efficient, intuitive, learner.*

Faced with a task to be performed, he or she rapidly acquires mastery of the necessary skills. It's heuristic learning, easy, and unstressed. (Others, compelled to learn by *thinking through* the processes needed, find it harder and stressful.) In military pilot training, rapid learners prosper – at first. To take the hypothesis further, a downside to easy, intuitive, learning is that the *thought-through* process is not exercised to any great extent. As a result, the supporting "cognitive muscles" are not maintained at high levels of "fitness". Use it or lose it.

Moreover, there is a limit to which skills alone provide the solution to tough, intricate, flying challenges. Eventually, complex manipulations and procedures are encountered that call upon the highest cognitive rate humanly possible. These manoeuvres are of such a nature that only "thought through" operation will accomplish them. They are too long and complex for trial-and-error skill learning.

The students who had to think through their flying from the beginning have plenty of practice at operating the necessary cognitive mechanisms. And they are adapted to the accompanying stress levels. The intuitive learner is not: and suddenly faces three challenges:

- Learning how to learn complex tasks,
- Learning the complex routines/manoeuvres, and,
- Learning how to do the former while coping with unfamiliarly severe stress loads.

Most can't cope. They fail flight assessments. Failure begets failure: The term "down-hill spiral" is commonly applied. It is otherwise seen as "performance failure under stress". *This is also the syndrome characteristic of the error-prone type.* The error may be failure to recognise the onset of a threat – a subliminal stress avoidance strategy – or it may be the more straightforward manifestation of lower-than-normal *collapse-under-stress* threshold.

The Air Force experience shows that this particular pathogen no longer gets into the pilot force. The continuing high failure rate on pilot course suggests that it is not the selection process, alone, that can take credit. More likely is that a combination of selection and the nature of the training does it. In other words, the pilot course is acting as an extension of a selection process designed to "weed out" this personality type, the *syndrome-carrier*.

There is more evidence: Some students who were earlier seen to be efficient intuitive learners *do not fail* when they experience the first setback. As the learning-demand gradient steepens, they falter, for sure. But they realise they have to "change gear" in their learning style. The old system won't work anymore. They take on the challenge; typically adopting strategies such as breaking the complex manoeuvres down into component "chunks" and working on them repeatedly during their own time. ("Part-Task Training.") Some benefit from insightful instructors. Whatever, the clear conclusion is that *you can train through the "stress barrier"*.

As noted earlier, many pilots who fail an Air Force course go on to successful careers as airline pilots. Prima facie, the civilian flight training and development continuum leading to the door to the flight deck contain no obstacle likely to expose the syndrome; at least to full view of a safety authority or other interested party. Insofar as this is a safety concern – albeit a latent one, and for which trigger events are one-in-millions probabilities – it must be seen as a defect in the current pilot training system. On the other hand, the evidence suggests that the right sort of training will bring the gremlin under control.

Confidence in the potential for training to resolve cognitive competency shortcomings in individuals comes from an unexpected source. The role of Neuroscience in adding to our knowledge of how learning takes place is the key factor in delivering certainty as to such outcomes. Understand the nature of synaptic modification as the basis for learning "storage", and the accompanying effects of age and training delivery strategy, and you enable precise,

intelligent, planning for optimum training uptake. Further, the ground is established for before-and-after competency appraisal as well as through-training control mechanisms.

These matter are discussed in greater length under "Learning" on the website. Suffice to say at this stage is that the RAAF experience, interpreted in the light of Neuroscience, proves an essential component of the overall thesis: that *training will overcome latent preferences for intuitive learning and enable full development of the critical competencies.* Again, they are described and briefly analysed in Core Concepts, and described as: *The ability to maintain Situation Awareness under stress.*

Conclusions

The preceding arguments can be summarised as:

- A potent safety factor has been discovered.
- It is linked to individual aptitudes.
- They, in turn, are definable by the cognitive competencies they rely on.
- These abilities are related to "trainability".
- Objective appraisal of the fitness levels of the cognitive competencies is feasible.
- That is, the safety factor can be defined and its potential quantified. (The idea that to manage something, you must to be able to measure it – is thus satisfied.)
- The concept of "fitness" is vital to any scheme to improve the safety factor's potential.
- Initial testing establishes existing ("natural") fitness levels.
- Subsequent testing establishes training effectiveness (and efficiency, too).
- But above all, first you must know what it is you want to measure.
- The Project, so far, has identified the competencies to be strengthened. More practical work is needed to confirm fitness training solutions.
- Training design is assisted by reference to Neuroscience – to establish key components in High Effect training.
- The critical training issues highlighted by are those of "Effect" and "Intensity". They are complex issues, but clearly seen as essential ingredients in High Effect learning.

The end of *preliminary planning* has been reached. The concepts are ready for trial. That will begin in early 2008. An "Action Plan" is on the website. Inter alia, it addresses accreditation of the training (ASFA to have this role). In short, the base is established to support a start to instructor training in HE theory and methods. Experience in conducting the first course will augment the capacity to do it better – to deliver the same maximum impact – and so on.

Attachment: A summary of the GA accidents referred to in the paper.

#	Date	Report	Location	Fatalities	Avoidable?	Defences
1	24-Jul-00	16-May-02	Marlborough, Qld	5	Yes	ç
… helicopter departed Rockhampton with insufficient fuel to carry out the intended flight … pilot was apparently unaware of this until some point during the return flight … did not attempt to divert from Marlborough to look for a fog-free landing site …						
2	29-Apr-01	22-Apr-02	Nagambie, Vic	1	No	
… four-person skydiving team exited … reserve parachute deployed and tangled around the tailplane … tail section separated from the fuselage … remaining parachutists and pilot abandoned … parachutist whose parachute tangled on the tailplane … fatal injuries.						
3	24-Nov-99	18-Apr-02	Sweers Island, Qld	6	Yes	*
… pilot's limited experience in instrument flight conditions may have been insufficient to prevent a loss of aircraft control had he inadvertently entered an area of low visibility in the Sweers Island area.						
4	04-Sep-00	07-Mar-02	Burketown, QLD	8	Probably	*
… several possible reasons for the pilot and passengers …incapacitated … probably a result of hypobaric hypoxia due to the aircraft being fully or partially unpressurised …						
5	18-Jan-01	05-Mar-02	Bencubbin, WA	2	Yes	*
… pilot turned the helicopter across the powerlines into an area that had not been assessed for hazards.						
6	10-Apr-01	05-Feb-02	85 km N Cairns, Qld	4	Yes	*
… pilot continued flight into marginal weather conditions at an altitude that was insufficient to ensure terrain clearance …						
7	28-Jan-01	17-Jan-02	Logan Village, QLD	1	Yes	*
Why the aircraft impacted the ground could not be determined … possible that the air temperature and humidity affected the pilot's performance … pilot's new parachute pack (may have) … changed his position relative to the cockpit controls …						
8	03-Aug-00	20-Dec-01	Cairns, QLD	2	Yes	*
… pilot departed later than planned and without certainty that flight could be completed in … daylight conditions … continued flight in weather conditions for which he was not … qualified … possibly experienced spatial disorientation and loss of control …						

9	29-Aug-01	20-Dec-01	Mount Archer, QLD	1	Yes	*
… loss of control or structural failure due severe turbulence… Bureau of Meteorology (BOM) area forecast … indicated isolated severe turbulence and mountain waves below 9,000 ft … (all training flights at nearby airfield suspended, due wind, on same day)						
10	31-May-00	19-Dec-01	28 km SE Whyalla	8	Yes	*
(A gravely defective ATSB report is reviewed in the Case Study, 'The Missing Link?'. In essence, the pilot ignored initial warning of left engine failure during a 10-minute-plus period when return to Adelaide – and presumably a safe landing – was possible.)						
11	02-Sep-00	14-Dec-01	24 km NNE Port Keats, NT	1	Probably	*
… in flight structural failure due to loss of control … pilot age 68 (FAA study shows increase in likelihood of error over 60.) … awake in excess of 15 hours … fatigue cannot be eliminated as factor … insufficient evidence draw conclusions as to its significance						
12	29-Sep-01	04-Dec-01	Southport, Qld	2	Yes	*
… simulated engine failure and glide approach … impacted short of runway … wind recorded … 15 kts, gusting to 18 … likely that the aircraft entered area of turbulence and high sink rate generated by the prevailing wind over the adjacent trees … pilot initiated a go around … not possible to establish a positive rate of climb. (Age not reported.)						
13	29-Jul-00	19-Nov-01	Yarromere Stn Qld	1 (+2)	Yes	*
… main rotor blade incurred a fatigue-related in-flight separation failure … … operating hours … under-reported … same factors cause related accident with 2 fatalities						
14	28-Sep-01	24-Oct-01	Latrobe Valley, Vic	1	No	
… event as described by witnesses … confirmed by ground and flight tests … consistent with the pilot seat sliding back … denying pilot adequate control input to avoid accident.						
15	28-Jan-01	12-Oct-01	Canberra, ACT	4	Yes	*
… four occupants … Canberra about 0130 … driving two vehicles from Brisbane… pilot had risen by 0630 … angle of climb … shallower than normal **...** rising terrain ahead … aircraft stalled at an altitude from which a recovery was not effected						
16	12-Sep-00	02-Oct-01	Inverell, NSW	1	Yes	*
… reason for the loss of control of the aircraft could not be positively established … pilot incapacitation leading to a loss of control was a likely factor … coughing fits in previous flight had distracted from controlling plane …						

17	18-Mar-00	27-Sep-01	2.5 km NNW Moorabbin, Vic	1	Yes	*
… aircraft got airborne … takeoff run 719% longer … angle of climb lower … consistent with restriction in fuel supply … selector valve … partly open … hydraulic pump … in landing gear retraction cycle … consumes 3.8 % of engine output at max power … but proportionally greater effect when engine not generating full power …						
18	20-Apr-01	03-Aug-01	Goulburn, NSW	2	Yes	*
… circumstances of the accident … consistent with … pilot attempting to continue flight into non-visual meteorological conditions.						
19	03-Apr-00	24-Jul-01	Shepparton, Vic	3	Yes	*
… retracting flap … high nose attitude probably reduced aircraft's speed … wings stalled at a height … insufficient … recovery before aircraft impacted the ground.						
20	27-Oct-99	11-Jul-01	Hernani, NSW	2	Yes	*
… likely engine RPM reduced significantly … aircraft operating in conditions for which it was not designed or certified … inflight breakup of the airframe resulted from the airframe being stressed beyond design limit						
21	13-Mar-01	13-Jun-01	Nangiloc, Vic	2	Yes	*
… circumstances … consistent with loss of control during demonstration of handling characteristics of the aircraft at low speed with landing gear and flaps extended.						
22	02-Sep-00	29-May-01	Bowen, Qld	1	Yes	*
… the first spray run for the day … aircraft collided with … high tension … lines. … did not conduct .. examination of the area to be sprayed prior to …						
23	04-Feb-01	22-May-01	Lake Evella, NT	1	Yes	*
… circumstances … consistent with pilot attempting a wing-over type manoeuvre after takeoff … losing control of the aircraft at low speed.						
24	29-Jan-01	30-Apr-01	Sarina, Qld	1	Yes	*
… oblique angle of approach to wires limited pilot's ability to detect … "contour flying" offered minimal reaction time for the pilot to avoid the wires had they been detected.						
25	10-Jul-99	22-Mar-01	Avalon, Vic	1	Yes	*
… observed manoeuvres … consistent with a stall from an uncoordinated right turn, followed by an incipient spin … recovery was not effected						

26	24-Oct-99	20-Mar-01	Binnu 83 km N Geraldton, WA	1	Yes	*
… no information to indicate immediate landing required … likely if the pilot had conducted reconnaissance … he would have had a higher probability of seeing spur line						
27	08-Aug-00	08-Dec-00	104 km ESE, Kingscote, SA	1	No	
… aircraft engine was operating normally until it suddenly made a loud grinding sound and the propeller stopped rotating ... pilot drowned after successful ditching …						
28	14-Jun-00	08-Dec-00	100 km E Halls Creek, WA	1	Yes	*
… eagerness and lack of experience … evidence consistent with pilot losing control … while manoeuvring at low level in adverse wind conditions …						
29	12-Mar-00	01-Dec-00	Toowoomba, QLD	1	Yes	*
… fuel line connecting fuel filter to engine-driven pump … loose connection … aircraft fitted with … but pilot did not normally use … electrically-powered fuel pump …						
30	30-Oct-99	31-Oct-00	Oberon, NSW	3	Yes	*
… pilot continued flight into non-visual meteorological conditions						
31	02-Mar-99	27-Sep-00	Waikerie, SA	2	Yes	*
… mid-air collision between glider and tug aircraft towing a second glider …						
32	20-Oct-99	19-Sep-00	Wrotham Park, QLD	1	Yes	*
… pilot in hurry … bag belonging to aircraft occupant left behind … drove to aircraft … handed bag to pilot, who left aircraft to collect it… runway … shortest, and first gravel runway pilot had used in this aircraft … did not fasten seatbelt after collecting bag … stress? … control loss during the takeoff … unexplained (accident survivable if belt on?)						
33	28-Nov-99	23-Aug-00	Canberra, ACT	1	Yes	*
(After fuel exhaustion) … engine failed on downwind in circuit … while manoeuvring to land in a field … aircraft struck a tree and impacted the ground …						
34	16-Jul-99	08-Aug-00	46 km SW Onslow, WA	1	Yes	*
On day of the accident, the pilot … flying … at low level most of day, minimal rest … only recently qualified for PPL … significant portion of total flying hours accumulated in 9 days before … exceeded flight and duty times permitted for commercial operation.						

35	13-Feb-98	18-Jul-00	Mangalore, Vic	1	Yes	*
… cause of death … head injuries … consistent with head having impacted upper door surround structure … did not have upper body restraint harness secured … accident was most probably survivable						
36	01-Mar-98	04-Jul-00	Mt Gambier, SA	1	Yes	*
(After fire-fighting water drop display) … aircraft speed rapidly reduced in unusually steep climb … flaps extended beyond 10 degrees during climb (probably unintentionally) … control of aircraft lost at height … recovery impossible. (Pilot had previously asserted that he planned) … spectacular display … would "pull something out of the box" …						
37	14-Oct-99	26-Jun-00	7 km NE Esk, Qld	2	Yes	*
… circumstances … consistent with uncontrolled collision with terrain following pilot's loss of adequate external visual reference (in cloud) entered a left spiral dive … (Amberley's military air traffic control service could have performed better to assist.)						
38	10-Mar-99	21-Jun-00	Hoxton Park, NSW	1	Yes	*
(Approaching Pitts lands on Sundowner taking off.) … CTAF radio procedures (do) not give pilots adequate opportunity for "alerted-see-and-avoid" … probably neither pilot saw other aircraft … briefly lowering nose on final approach did not allow the Pitts pilot to be certain that the runway clear before he committed … to a landing.						
39	01-Dec-99	05-Apr-00	Gisborne Vic	4	Yes	*
… probably operating in turbulent conditions … manoeuvre … consistent with the stalling during unbalanced steep left turn … likely that the aircraft's reduced performance in the ambient temperature and the gusty and turbulent conditions contributed to the stall.						
40	12-Mar-99	31-Mar-00	5 km SE Cairns, Qld	1	Yes	*
… (helo) pilot continued the flight into adverse weather conditions to point where flight using external visual reference no longer possible … (personal) operating culture conditioned from having "got through" adverse weather on previous occasions.						
41	07-Mar-99	17-Mar-00	282 km NNW Coober Pedy, SA	2	Yes	*
… engine stopped from fuel exhaustion … collided heavily with the ground nose low ... wreckage did not reveal … defects … intense post-impact fire fuelled by 7x20 L cans …						
42	06-Jun-98	24-Dec-99	Hoxton Park, NSW	2	Yes	*
… Archer and Tomahawk collide at about 1,200 ft as Archer tracks to enter crosswind for landing on R 34 at Hoxton Park … collision in fine and clear conditions … pilot of Archer unaware of … Tomahawk … did not see … in time to avoid a collision.						

43	02-Apr-99	21-Dec-99	Aldinga, SA	2	Yes	*
(… fuel exhaustion after early morning take-off causes engine failure … pilot loses control … aircraft spins to ground impact … had been fuelled night before … likelihood is that fuel has been stolen, siphoned by local rev heads … pilot had time-based rendezvous with other aircraft in mind, proceed on next leg in company.)						
44	20-Feb-99	21-Dec-99	26 km ESE Holbrook, NSW	2	Yes	*
… flying helicopter (sister to her wedding, accompanying mother's car) at a low height above the ground … collides with power line … had not obtained authorisation for low flight … had not previously flown route … without reconnaissance or a detailed map of area unlikely to have been aware of the power line …						
45	16-Jan-99	16-Dec-99	Coconut Island, Qld	3	Yes	*
… go around initiated at low altitude because of vehicle on strip … "pilot was cross" … full flap not retracted … left engine does not deliver power … loss of control …						
46	26-Feb-97	16-Dec-99	32 km E Gladstone, ACT	1	Yes	*
(Helo strikes crane assembly on departure from ship. Non-compliance with company procedures is apparent from facts but not commented on in investigation report.)						
47	18-Aug-98	05-Nov-99	Mt Coot-tha, Qld	1	Yes	*
(Unexplained crash of helicopter.) The pilot … had recently been under some personal emotional stress … continued to fly after consulting a doctor regarding severe headaches with vision disturbances.						
48	09-Jul-99	03-Nov-99	Ross River H'stead, 80 km E Alice Springs, NT	1	Yes	*
… remain(ed) overnight at resort … consumed a quantity of alcohol … about 2345-2400 helicopter was seen to take-off and depart … climbed steeply …600 ft … engine noise appeared to change and the aircraft descended quickly until impact with the terrain.						
49	02-Jan-99	28-Sep-99	37 km E Coolah, NSW	1	Yes	*
… uncontrolled collision with terrain … inadvertent flight into cloud … pilot felt that he was under pressure to complete the flight that day						
50	26-Apr-98	24-Sep-99	Eucumbene NSW	6	Yes	*
… planned route over mountainous terrain, in adverse weather … above forecast freezing level … moderate to severe turbulence forecast … formation of mountain waves. .. impacted an attitude consistent with a loss of control.						

51	02-Sep-98	10-Sep-99	Dalgety Downs, WA	1	Yes	*
During turn aircraft descended into the ground, caught fire … pilot had (not) completed aerial stock-mustering training … not qualified to conduct stock-mustering operations						
52	29-Jun-98	27-Aug-99	15 km S Leonora, WA	2	Yes	*
… loss of engine power, stall, loss of control in go around … (possible that fuel mishandling caused power loss) … pilot indicated (to DAME) that he had a significant family cardiac history. The post-mortem examination established that one of the pilot's coronary arteries was approximately 90 per cent blocked.						
53	30-Sep-98	20-Aug-99	24 km SW Ivanhoe, NSW	2	Yes	*
(… after go around from too-fast, downwind, landing, full flap remaining selected … aircraft does not gain speed or height and hits obstacle.)						
54	19-Sep-98	03-Aug-99	Kajabbi, Qld	2	Yes	*
(Wire strike while helicopter cattle mustering.)						