NO. 94-006

HUGHES 269B

ZK-HTU

TARARUA RANGE, 9 NM SOUTH-EAST OF LEVIN

27 FEBRUARY 1994

ABSTRACT

On 27 February 1994, ZK-HTU, a Hughes 269B helicopter collided with a ridge at an elevation of 4500 feet in the Tararua Range. One passenger was killed, and the pilot and another passenger received serious injuries.

TRANSPORT ACCIDENT INVESTIGATION COMMISSION

AIRCRAFT ACCIDENT REPORT NO 94-006

Aircraft Type, Serial Number and Registration:	Hughes 269B, 840132 ZK-HTU
Number and Type of Engines:	One Lycoming HIO-360-A1A
Year of Manufacture:	1964
Date and Time:	27 February 1994, 0915 hours*
Location:	Pukematawai, Tararua Range, 9 nm south-east of Levin Latitude: 40° 45' S Longitude: 175° 25' E
Type of Flight:	Air Transport, Charter
Persons on Board:	Crew: 1 Passengers: 2
Injuries:	Crew: 1 Serious Passengers: 1 Fatal 1 Serious
Nature of Damage:	Destroyed
Pilot in Command's Licence:	Commercial Pilot Licence (Helicopter)
Pilot in Command's Age:	31
Pilot in Command's Total Flying Experience:	405 hours 70 on type
Information Sources:	Transport Accident Investigation Commission field investigation
Investigator in Charge:	Mr A J Buckingham

* All times in this report are NZDT (UTC + 13 hours)

1. NARRATIVE

1.1 On the morning of 27 February 1994, Hughes 269B ZK-HTU was chartered to transport seven trampers from Gladstone to Arete Bivouac in the Tararua Range, 10 nm south-east of Levin.

1.2 After a pre-flight inspection, the pilot, accompanied by an assistant, flew the helicopter to Gladstone, 3 nm south-east of Levin, and landed in a paddock where the seven trampers were waiting. The intention was to shuttle them in twos to Arete Bivouac, with their packs to be flown in separately as a sling load.

1.3 The helicopter had sufficient fuel on board for approximately 40 minutes flying when it took off for the first shuttle, and extra jerrycans of fuel were stored at the pickup point. As each shuttle flight was estimated to take about 15 minutes, the intention was to refuel from these cans between flights in order to keep the fuel weight as low as practicable.

1.4 On the first flight, the assistant and one tramper were to be flown to the site. The assistant, who was familiar with helicopter operations, was to remain at the site and assist in the subsequent offloading of the passengers and the sling load. The tramper occupied the centre seat and was restrained by a lap belt. The assistant sat in the right seat and was restrained by a lap belt, although a full shoulder harness was available to him.

1.5 Although the centre seat was only equipped with a lap belt, the aircraft Flight Manual required that a shoulder harness be provided as well.

1.6 ZK-HTU departed from the pickup point shortly after 0905 hours and climbed towards the Arete Bivouac area, the elevation of which was 4400 feet amsl.

1.7 The weather in the area of the pickup point was fine and clear, with the tops of the Tararua Range clearly visible. The surface wind was a light southerly breeze, and members of the tramping party felt that they had a "perfect day" for their expedition.

1.8 On arrival in the destination area, the pilot observed that there was extensive cloud cover to the east of the main divide, obscuring the Arete Bivouac area and "swirling around" the tops. He decided that it was not possible to cross the main divide to Arete Bivouac, and decided instead to look for a suitable landing area west of the divide, within a reasonable walking distance of the destination.

1.9 He reconnoitred an area about 1 nm west of Arete Bivouac and noticed what appeared to be a suitable landing spot on a ridge on the western slopes of Pukematawai, at an elevation of some 4500 feet. He approached the ridge line towards the south-west with the intention of overflying it for a closer inspection.

1.10 During the approach, "sink" was encountered, and the pilot thought initially that the helicopter was losing power. However, he found that he was already utilising the maximum available, and in order to maintain the rotor rpm he lowered the collective lever slightly and ensured that the throttle was fully open.

1.11 He realised that the helicopter was probably going to collide with the ridge top, and he raised the collective lever and moved the cyclic control forward in an attempt to clear the ridge and fly down the gully on the other side.

1.12 The helicopter cleared the crest of the ridge, but landed heavily on its skids about 12 m beyond the crest, on the south-west face of the ridge. The initial impact point was on gently sloping ground, but several metres beyond this point, the slope increased sharply to an average value of about 40°. The helicopter "somersaulted" forward and rolled some 250 m down the rocky slope, breaking up extensively, and came to rest inverted in bushes in a gully. No fire occurred, despite the rupturing of the fuel tank and the spilling of most of its contents.

1.13 During the roll down the hillside, the pilot released his seat belt and managed to vacate the helicopter. His helmet chin-strap had not been fastened, and the helmet came off his head soon after the initial impact. The centre seat passenger remained strapped in the helicopter, but the assistant was thrown clear. The assistant received fatal injuries and the centre seat passenger serious injuries. The pilot sustained serious injuries, but was able to make his way to the wreckage after it came to a stop, and render assistance to the injured passenger.

1.14 The ELT activated on impact, and its signal was subsequently received by passing aircraft and re-

ported. When the other members of the tramping party realised that the helicopter was overdue they reported it to the local Police, and a search was commenced some three hours after the accident.

1.15 Because of terrain scattering effects on the beacon signal, and the intermittent clouding in of the accident site, it was several hours before rescue helicopters were able to locate the wreckage. The two survivors were airlifted directly to hospital by helicopter.

1.16 Another pilot had been operating his Hughes 369D helicopter on deer capture operations in the same general area on the morning of the accident. He departed about 30 minutes before the accident occurred, having decided to delay his planned return until later in the day because of the unsuitable weather conditions.

1.17 He reported that the weather to the west of the Tararua Range was generally fine with good visibility, but that the wind was blowing from the east to south-east at 25 to 30 knots. He found the conditions to be very turbulent, with strong downdraughts west of the main divide. He had encountered thick cloud cover to the east of the divide, in places spilling over the tops to the west.

1.18 In July 1993, the pilot of ZK-HTU had completed the basic sling load and mountain flying training necessary for the issue of a New Zealand CPL(H). (At this time he held an Australian Commercial Pilot (Helicopter) Licence.) He had not received any subsequent instruction in advanced mountain flying, and since the issue of his CPL(H), he had gained between ten and twenty hours of mountain flying experience. This was mainly overflying mountainous terrain on scenic trips with occasional landings on prepared helipads.

1.19 The pilot worked part-time for the operator on a voluntary basis. Before the accident he had never flown into the Arete Bivouac area, and was thus unfamiliar with the terrain and the possible weather conditions that could be encountered. He had completed a Civil Aviation Regulation 76 check on 14 December 1993, but this did not include a mountain flying check. The latter was not deemed necessary at the time. His previous Regulation 76 check was on 26 July 1993, at the completion of the training for his New Zealand CPL(H). (These checks are required only at 12 month intervals for VFR air transport and aerial work operations.)

1.20 The full-time pilot (who was also the operator) of ZK-HTU was overseas on the day of the accident, and was unable to supervise the flight.

1.21 The helicopter's weight on departure for Arete Bivouac was calculated to have been 740 kg, 18 kg under the maximum authorised weight of 758 kg. Allowing for fuel burn-off, its weight would have been approximately 730 kg at the time of the accident.

1.22 The pilot did not make any load or performance calculations before departure, but intended to carry out a power check at altitude before landing. The method he had been taught was to check the power requirement (inches MAP) in level flight at 40 knots at the desired altitude, check the maximum power available from the engine, and determine from the margin what performance was available.

1.23 The advice of an experienced Hughes 269B operator was that on the accident flight, the pilot could have expected a power requirement of 18 inches MAP at 40 knots, but would not have had more than about 23.5 inches MAP available at 4500 feet altitude. For OGE hover, a margin of 8 to 10 inches MAP would be required, and for IGE hover, about 6 inches MAP. (The pilot was taught these performance figures during his mountain flying training, some six months prior to the accident.) The only means the pilot had of increasing the (5.5 inches MAP) available power margin was to operate the helicopter at a lighter weight. ZK-HTU was also fitted with a muffler, which reduced the maximum available power by about one inch MAP.

1.24 ZK-HTU was caught in a strong downdraughting flow leeward of the main divide, and had insufficient power available to overcome its effects. By the time the pilot recognised this, he was committed to flying the helicopter across the ridge line rather than turning away into clear airspace in the valley to his right. In his attempt to clear the ridge, it is possible that he overpitched the main rotor, losing rpm and lift.

1.25 At the time of the accident the operator of ZK-HTU did not hold an Air Service Certificate in his own right but had an agreement with another operator to operate ZK-HTU under the terms of that operator's Air Service Certificate. This agreement required that:

> ZK-HTU be flown in accordance with the provisions of that Air Service Certificate holder's Operations Manual,
>
> the aircraft be flown only within a 6nm radius of its operating base, on tourist oriented scenic flights, with

the take-offs and landings restricted to the base helicopter pad,

any flights not within the above description be subject to prior specific approval by the holder of the Air Service Certificate on each occasion.

1.26 The operator of ZK-HTU had discussed the proposed flight with the holder of the Air Service Certificate some months previously, and the latter had assisted him to prepare a quote for the tramping party. He assumed that as a result of that discussion the flight was approved. The pilot of ZK-HTU on the day of the accident submitted that he was aware of the inferred approval, but nonetheless had sought, albeit unsuccessfully, to contact the holder of the Air Service Certificate two days before the flight to verify the situation.

1.27 The Civil Aviation Authority subsequently advised the Commission that any arrangement for one operator to operate under another's Air Service Certificate had no legal standing under the Civil Aviation Regulations.

1.28 The Air Service Certificate holder's Chief Pilot stated that he would not have approved the flights into the Arete Bivouac area because of the low experience level of the pilot and the unsuitability of ZK-HTU for the task, and that he himself would not have attempted to carry two passengers to a landing site at that altitude.

1.29 Some time before the accident, the operator and the ground assistant had, in the course of conversation, discussed their likely actions in the event of an accident. The assistant indicated his preference for unfastening his seat belt and vacating the aircraft as early in the accident sequence as practicable. The pilot carried out this action during the roll down the slope, and it is possible that the assistant did the same. His body was found at the bottom of a 3 to 4 m vertical rock face not far from the initial impact point; if he exited the helicopter at the top of this face, his momentum would have carried him over the drop. It was not possible to determine if he would have survived had he been properly restrained, and remained with the aircraft.

1.30 The centre-seat passenger, although not restrained by a shoulder harness, was protected to some extent by the rotor mast and cabin firewall structure, which together formed an effective "roll cage".

2. FINDINGS

2.1 The pilot was appropriately licensed and rated to fly ZK-HTU.

2.2 The pilot was inexperienced in helicopter mountain flying.

2.3 The helicopter had a valid Certificate of Airworthiness and Maintenance Release.

2.4 The centre seat was not equipped with a shoulder harness as required by the aircraft's Flight Manual.

2.5 Strong south-easterly wind conditions with downdraughts and turbulence were present in the area at the time of the accident.

2.6 The helicopter encountered downdraughting air during an approach to a ridge.

2.7 By the time the pilot recognised the adverse effect of the downdraughting air on the helicopter's performance, he was committed to his attempt to cross the ridge and was unable to avoid colliding with the terrain.

2.8 The helicopter was operating normally at the time of the accident.

2.9 The operating weight of the helicopter was within limits but was inappropriate for a landing attempt at the intended altitude.

2.10 The Air Service Certificate agreement entered into by the operator did not allow for the flight to be made without the approval of the Certificate holder.

2.11 Specific approval for the flight was not obtained by the pilot.

24 August 1994

M F Dunphy
Chief Commissioner

ABBREVIATIONS COMMONLY USED IN TAIC REPORTS

AD	Airworthiness Directive
ADF	Automatic direction-finding equipment
agl	Above ground level
AI	Attitude indicator
AIC	Aeronautical Information Circular
AIP	Aeronatical Information Publication
amsl	Above mean sea level
ASI	Airspeed indicator
ATA	Actual time of arrival
ATC	Air Traffic Control
ATD	Actual time of departure
ATPL (A or H)	Airline Transport Pilot Licence (Aeroplane or Helicopter)
AUW	All-up weight
C	Celsius
CAA	Civil Aviation Authority
CASO	Civil Aviation Safety Order
CFI	Chief Flying Instructor
CPL (A or H)	Commercial Pilot Licence (Aeroplane or Helicopter)
DME	Distance measuring equipment
E	East
ELT	Emergency location transmitter
ERC	En route chart
ETA	Estimated time of arrival
ETD	Estimated time of departure
F	Fahrenheit
FAA	Federal Aviation Administration (United States)
FL	Flight level
g	Acceleration due to gravity
GPS	Global Positioning System
HF	High frequency
hPa	Hectopascals
IAS	Indicated airspeed
IGE	In ground effect
IFR	Instrument Flight Rules
ILS	Instrument landing system
IMC	Instrument meteorological conditions
ins Hg	Inches of mercury
kHz	Kilohertz
KIAS	Knots indicated airspeed
kt	Knot(s)
LF	Low frequency
LLZ	Localiser
M	Mach number (e.g. M1.2)
M	Magnetic

MAANZ	Microlight Aircraft Association of New Zealand
MAP	Manifold absolute pressure (measured in inches of mercury)
MAUW	Maximum all-up weight
METAR	Aviation routine weather report (in aeronautical meteorological code)
MF	Medium frequency
MHz	Megahertz
mph	Miles per hour
N	North
NDB	Non-directional radio beacon
NOTAM	Notice to Airmen
nm	Nautical mile
NZAACA	New Zealand Amateur Aircraft Constructors Association
NZGA	New Zealand Gliding Association
NZHGPA	New Zealand Hang Gliding and Paragliding Association
NZMS	New Zealand Mapping Service map series number
NZDT	New Zealand daylight time (UTC + 13 hours)
NZST	New Zealand standard time (UTC + 12 hours)
NTSB	National Transportation Safety Board (United States)
OGE	Out of ground effect
PAR	Precision approach radar
PIC	Pilot in command
PPL (A or H)	Private Pilot Licence (Aeroplane or Helicopter)
psi	Pounds per square inch
QFE	An altimeter subscale setting to obtain height above aerodrome
QNH	An altimeter subscale setting to obtain elevation above mean sea level
RNZAC	Royal New Zealand Aero Club
RNZAF	Royal New Zealand Air Force
rpm	Revolutions per minute
RTF	Radio telephone or radio telephony
S	South
SAR	Search and Rescue
SSR	Secondary surveillance radar
T	True
TACAN	Tactical Air Navigation aid
TAF	Terminal aerodrome forecast
TAS	True airspeed
UHF	Ultra high frequency
UTC	Coordinated Universal Time
VASIS	Visual approach slope indicator system
VFG	Visual Flight Guide
VFR	Visual flight rules
VHF	Very high frequency
VMC	Visual meteorological conditions
VOR	VHF omnidirectional radio range
VORTAC	VOR and TACAN combined
VTC	Visual terminal chart
W	West