NO. 94-016

SIKORSKY S-55B

ZK-HSS

TE APITI VALLEY

14 JULY 1994

ABSTRACT

On 14 July 1994, Sikorsky S-55B ZK-HSS was engaged in aerial spraying in the Te Apiti Valley, 6 NM east of Elsthorpe, Hawkes Bay. The engine lost power at low level, necessitating a forced landing during which the helicopter caught fire and was burned out. The pilot escaped without injury.

TRANSPORT ACCIDENT INVESTIGATION COMMISSION

AIRCRAFT ACCIDENT REPORT NO 94-016

Aircraft Type, Serial Number and Registration:	Sikorsky S-55B, 55-3218, ZK-HSS
Number and Type of Engines:	1 Curtiss-Wright R-1340-D3
Year of Manufacture:	1956
Date and Time:	14 July 1994, 0910 hours*
Location:	Te Apiti Valley, Hawkes Bay Latitude: 39° 55' S Longitude: 176° 56' E
Type of Flight:	Agricultural—Spraying
Persons on Board:	Crew: 1
Injuries:	Crew: Nil
Nature of Damage:	Destroyed
Pilot-in-Command's Licence:	Commercial Pilot Licence (Helicopter)
Pilot-in-Command's Age:	46
Pilot-in-Command's Total Flying Experience:	13 900 hours 230 on type
Information Sources:	Transport Accident Investigation Commission field investigation
Investigator in Charge:	Mr A J Buckingham

* All times in this report are in NZST (UTC + 12 hours)

1. NARRATIVE

1.1 On 14 July 1994, ZK-HSS was engaged in spraying thistles on Te Apiti Station and the neighbouring property, approximately 6 nm east of Elsthorpe. At 0910 hours, the pilot was positioning the helicopter on the eastern side of the Te Apiti Valley to spot-spray some isolated clumps, when the engine suddenly lost power.

1.2 The helicopter was at an altitude of about 50 feet agl, over a grove of cabbage trees when the power loss occurred, and there was insufficient altitude in which to establish autorotation. The pilot was obliged to land straight ahead on a small flat area after having "stretched the glide" to clear the trees.

1.3 The touchdown was very heavy, the rotor rpm having decayed significantly, and the helicopter rolled onto its right side. The main rotor struck and severed the tail boom during the impact sequence. The pilot, who was uninjured, was able to extricate himself from the cockpit; by this time fire had already broken out.

1.4 The underfloor fuel tanks were probably ruptured in the heavy landing, spilling fuel which was ignited by the hot engine. The fire rapidly gained in intensity, reducing the non-ferrous alloy components of the helicopter to either ash or a molten state.

1.5 The pilot thought at first that the engine had failed completely, but did not have time to carry out any trouble checks before landing. At touchdown, as the helicopter rolled onto its side, the engine suddenly burst back into life at high rpm. The pilot did not try to control the rpm with the throttle, but pulled the mixture control into idle cut-off before vacating the cockpit.

1.6 A witness confirmed the sequence of events, stating that the engine sounded as if it had "run back to idle", but "revved up" as the helicopter landed. No rough running or backfiring was heard during the short time the engine was apparently idling.

1.7 The helicopter had been performing normally up to the time of the power loss, and the spraying had been progressing well, in ideal weather conditions.

1.8 Because of the extensive destruction by fire, there was little in the wreckage that could be examined to determine the cause of the engine power loss. The body of the injection carburettor was reduced to ash, and the external linkages which survived showed no abnormality.

1.9 Examination of another Sikorsky S-55 showed that there was a number of points in the throttle control run where either the failure of a crank arm or the loss of a connecting bolt could have deprived the pilot of throttle control. The cranks, being of aluminium alloy construction, were lost in the fire, and the push rods that were located still had their bolts and nuts in place on the rod ends.

1.10 The continuity of the throttle linkage system was not established, as the correlation cam, two push rods and one torque tube could not be found despite a thorough search. Three of these components were situated in the area of the fire's maximum intensity, and were probably destroyed.

1.11 The mixture control cable was found to be still intact and connected to its operating arm at the carburettor end, and given that the pilot used the mixture control to shut the engine down, it is unlikely that the power loss was related to this control.

1.12 The possibility of fuel contamination was investigated, but was considered unlikely. It was thought that in the event of fuel contamination, the engine would have been more likely to stop completely, rather than run back to idle rpm. Helicopter engines do not have the "flywheel effect" of a propeller to keep them rotating should the engine stop firing for any reason. The nature of the power loss was not symptomatic of carburettor icing.

2. FINDINGS

2.1 The pilot was appropriately licensed and rated.

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

2.3 The helicopter had been operating normally prior to the accident.

2.4 A sudden loss of engine power necessitated an immediate forced landing.

2.5 There was insufficient altitude for the pilot to establish autorotation, and the aircraft landed heavily.

2.6 The aircraft was destroyed by fire.

2.7 Because of the extensive fire damage, the cause of the power loss could not be determined, although the possibility of some form of disruption to the throttle linkage could not be ruled out.

12 October 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
ATIS	Automatic terminal information service
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
cm	Centimetres
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
km	Kilometres
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
mm	Millimetres
mph	Miles per hour
N	North
NDB	Non-directional radio beacon
NOTAM	Notice to Airmen
nm	Nautical mile
NZ	New Zealand
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)
octa	Eighths of sky cloud cover (eg: 5 octas = 5/8 of cloud cover)
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
TIS	Time-in-service
UHF	Ultra high frequency

US	United States
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