

2542



National Transportation Safety Board

Washington, D.C. 20594
Safety Recommendation

Date: January 9, 1997

In reply refer to: A-96-180 through -183

Honorable Linda Hall Daschle
Acting Administrator
Federal Aviation Administration
Washington, D.C. 20591

On January 28, 1994, during an external load operation, a turbine-powered Sikorsky S58-JT helicopter, N4995G, crashed in the downtown area of San Jose, California. The flight was being operated under the provisions of Title 14 Code of Federal Regulations (CFR) Part 133 in visual meteorological conditions. The pilot was in a 100-foot hover above the roof of a 13-story building when the helicopter lost power and crashed onto the roof. The helicopter was destroyed by the impact and postcrash fire, and the pilot was killed. The flight had originated at the San Jose International Airport, about 1 1/2 miles from the accident site.

The operation was to have been staged from the west parking lot of the building; however, the proposed landing area in the parking lot was obstructed by numerous light poles. Instead, the operation was staged from the roof of the building. The pilot used a 100-foot "long line" lifting cable attached to the helicopter to remove a large fan from the top of the building and to place an 1,800-pound steam cleaning machine onto the roof, adjacent to a cooling tower.

About 17 minutes after the initiation of the flight, the helicopter ground crew on the roof detached the cleaning machine from the lifting cable and prepared to unhook the cable from the hovering helicopter's hook when the ground crew heard the engine sounds decrease and observed the main rotor blades slowing down. The helicopter then descended vertically to the roof, rolled onto its right side, and became engulfed in a postcrash fire. The ground crew attempted to battle the fire with portable fire extinguishers, but could not bring the fire under control.

Examination of the engines at the manufacturer's facility did not reveal any evidence of preimpact malfunction or mechanical failure of the engines. Safety Board investigators calculated the fuel consumption rate and the approximate fuel remaining based on information contained within the helicopter flight manual, and the flight planning and fueling records. The flight time and refueling records indicated that at the time of takeoff, the fuel on board the helicopter was 266.6 pounds. The flight manual lists the fuel consumption rate at 670 pounds per hour (pph).

At a burn rate of 670 pph, the helicopter would have consumed 189.8 pounds in 17 minutes, leaving 76.8 pounds fuel in the fuel tanks.¹

The unusable fuel in the forward and aft tanks was 9.5 gallons (63.7 pounds). The unusable fuel is calculated at a slightly nose-down attitude, corresponding to forward flight. With 63.7 pounds unusable, the usable fuel on board when the engine lost power would have been less than 13.1 pounds (1.95 total gallons in the forward and aft tanks). However, considering that additional fuel may have been consumed after start but before flight, that fuel gauges are not highly accurate, and that in hover there may have been slightly less usable fuel than for forward flight, the Safety Board concluded that there was insufficient fuel to sustain engine power immediately preceding the crash and that the engines lost power because of fuel starvation. The Safety Board determined that the probable cause of the accident was "the pilot's inadequate preflight planning/preparation and subsequent fuel starvation, due to an inadequate supply of fuel."²

During the investigation of this accident, the Safety Board was concerned to find that under 14 CFR Part 133, there is no requirement for annual recurrent training if a pilot has performed external load operations within the previous 12 months. However, the Safety Board notes that practice emergency procedures, such as load jettison, autorotation with load, oscillatory loads, and practice load overweight procedures, are not performed during working conditions, and the Safety Board was unable to find records indicating that the pilot of the accident helicopter had practiced such emergency procedures within the 12 months preceding the accident. Although this accident was the result of poor fuel planning and the failure of the pilot to safely autorotate to the roof of the building, had the pilot been thoroughly trained and familiar with emergency procedures, he would have been more likely to land safely.

In other regulated commercial operations, pilots and crewmembers are required to annually demonstrate emergency procedure knowledge and skills. The training required for these other commercial operations is accomplished during non-revenue flights and through simulation. The Safety Board believes that simulated emergency procedures training in 14 CFR Part 133 commercial flight operations is essential for safe operations and would generate positive safety benefits to the helicopter external load industry. This accident and other external load accidents and incidents investigated by the Safety Board show that helicopter external load operations are conducted with risks not normally experienced in other commercial aircraft operations,³ and therefore, the Safety Board believes that all pilots engaged in 14 CFR Part 133 operations should

¹The fuel consumed is a calculation based on flight manual information and does not include fuel for start, taxi, or delays before takeoff from the San Jose airport.

²For more detailed information, see Brief of Accident #LAX94FA106 (attached).

³External load operations add complex tasks to helicopter operations in areas such as redundant load release mechanisms, weights that are frequently over maximum allowed internally, long lines (oscillatory), extra crewmembers, and emergency procedures complicated by jettisoning of the load.

be required to demonstrate annually their current knowledge and skill to safely conduct such operations. Also, the Safety Board believes that recurrent emergency procedure training is necessary to ensure an adequate margin of safety during confined-area, external load flight operations because there is little time for pilots to react when they must promptly respond to unforeseen emergencies.

In reviewing the circumstances of this accident, the Safety Board was concerned to find that neither 14 CFR Part 133 nor the Federal Aviation Administration's (FAA) principal operations inspector's (POI) handbook include requirements to ensure that safety issues are adequately considered during load planning. The operator had prepared an external load plan for the accident flight that was approved by the FAA's San Jose Flight Standards District Office (FSDO) on January 27, 1994, with a note that the operation was to be monitored by an FAA inspector. Before the accident, the operator had conducted two external load operations at the same building; the pilot had conducted the most recent flight on January 6, 1994, and had logged 12 minutes of flight time for that flight.

For each external load operation, an operator must develop a plan that is approved by the FAA. The plan must include an agreement with local authorities to exclude unauthorized persons from the area of operations, coordination with air traffic control if necessary, and a chart depicting flight routes and altitudes. The flight must be conducted at an altitude and route that will allow a jettisonable load to be released, and the helicopter landed, in an emergency without hazard to persons or property on the surface.

The POI who was assigned responsibility for oversight of the certificate holder's 14 CFR Part 133 operations reported that he had approved the load plan provided by the operator without visiting the job site. The approved load plan noted the two previous lift operations at the same building and included a hand-drawn sketch of the area. Examination of the sketch after the accident revealed that the building, a rooftop penthouse, the parking lot, and obstructions were misoriented, and the light poles that obstructed the parking lot were not shown. The POI indicated that based on the sketch, the emergency landing area would have been on the roof of the building; however, the roof had multiple vents, structures, and a 14-foot wall surrounding the edge. The POI could not be present for this lift so he arranged for another inspector to monitor the lift from the ground. From that location, the inspector could not communicate effectively with the operator or ensure adherence to preflight planning documents. Therefore, the Safety Board believes that the FAA should amend 14 CFR Part 133 and POI requirements to ensure that operators conduct specific and adequate crew safety briefing procedures during preflight preparation and to ensure that load planning provides for realistic safety margins during helicopter external load work.

Each external load operator is required by 14 CFR Part 133 to have a rotorcraft-load combination flight manual for each helicopter used. The load combination manual sets forth specific operating limitations, procedures, performance, and other limitations required for 14 CFR

Part 133 operations.⁴ The FAA requires that the load combination manual be submitted before a rotorcraft external load operator certificate is issued. The Safety Board notes that the manual is not required to address performance specifications particular to emergencies, does not specify any fuel planning requirements specific to external load operations, and does not require operators to perform maintenance checks that may be crucial to their operation. Because of its finding that this accident was the result of poor fuel planning, the Safety Board believes that all 14 CFR Part 133 rotorcraft-load combination manuals should include standard procedures for fuel quantity planning that allow for delays and completion of the mission with an appropriate fuel reserve.

During the investigation of the above accident, staff reviewed Safety Board data for accidents during 14 CFR Part 133 operations,⁵ which indicate that, during the past 12 years, 19 helicopter external load accidents have been precipitated by fuel exhaustion or starvation. In addition, 11 unexplained engine failures⁶ and 10 fuel system anomalies⁷ have caused engine failures resulting in crashes. During that time, 187 external load accidents were recorded; thus, 21 percent of the external load accidents involved fuel anomalies. Comparison with other Safety Board data for other commercial operations indicate that 14 CFR Part 133 fuel-related accident statistics are much greater than in other commercial operations. The Safety Board's accident data further indicate that 98 percent of 14 CFR Part 133 flights that were involved in accidents had originated with reduced fuel quantities on board, and in half of the cases, with tanks less than half full. (Reduced fuel loads are used to allow greater lifting capability of the helicopter.)

Title 14 CFR Part 91.151(b) specifies fuel minimums for operations conducted in visual flight rules (VFR)⁸ and states that no person may begin a flight in a helicopter unless there is enough fuel to fly to the first point of intended landing, and assuming normal cruising speed, to fly after that for at least 20 minutes. Title 14 CFR Part 133 does not specify any additional minimum fuel requirements for external load operations, yet fuel exhaustion and fuel starvation are common elements of the probable causes of about 10 percent of 14 CFR Part 133 accidents. It is apparent from these accidents that external load operations are frequently, perhaps routinely, conducted with fuel loads that do not meet 14 CFR Part 91 requirements. The Safety Board is aware that external load operations, by the nature of hooking, unhooking, ground crews, and marshalling, have the potential for delays not associated with other types of flight operations.

⁴See 14 CFR 133.47 (a) and 14 CFR Parts 27 or 29 subpart G for further information.

⁵Rotorcraft external load operations are regulated by 14 CFR Part 133.

⁶Unexplained engine failures include those accidents in which the engine is determined to be fully operational before the accident. The engine has not been found to have had a malfunction or failure before the accident.

⁷Fuel system anomalies include contaminated fuel, contaminated tanks, cavitated fuel lines, and other fuel problems in which proper fuel handling and maintenance procedures would have positive effects.

⁸VFR requires operations in VMC and specifies visibility and cloud clearance requirements.

The Safety Board is concerned that fuel-related accidents occur more frequently in 14 CFR Part 133 operations than in other commercial operations despite regulations that apply to all flights.

The Safety Board's accident records of fuel exhaustion accidents contain many statements from surviving pilots that indicate that the pilot was relying on the fuel gauge(s). The Safety Board has also found that the fuel quantity indicating systems in many aircraft are not periodically checked for accuracy and recalibrated. The Safety Board is concerned that helicopters used for 14 CFR Part 133 operations are routinely operated at reduced fuel loads, and that those helicopters' fuel quantity gauging and indicating systems may not be sufficiently accurate for the safe conduct of such operations without periodic recalibration of the systems. Therefore, the Safety Board believes that the FAA should amend 14 CFR Part 133 to require periodic recalibration of fuel quantity indicating systems and to establish appropriate minimum fuel requirements for external load operators such that the potential for fuel exhaustion accidents in external load operations is substantially reduced.

The attached four accident briefs⁹ illustrate the Safety Board's concern that reduced fuel external load operations create situations in which pilots may believe that enough fuel is on board or the fuel indicating system inaccurately depicts the total fuel. In each of these accidents, the pilots survived and indicated to Safety Board investigators a reliance on fuel quantity indicating systems that they deemed essential because of reduced operations with low fuel states. Each pilot believed that there was adequate fuel to conduct the intended flight.

The Safety Board believes that helicopter external load commercial operations provide efficient, economical uses for helicopters; however, enhanced pilot training, maintenance, and FAA mandated procedures would ensure a greater margin of safety for the helicopter external load industry.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Amend 14 CFR Part 133 to require all pilots who intend to conduct external load operations to undergo initial and annual recurrent training, similar in frequency as in Parts 135 and 121, to demonstrate appropriate knowledge and skill in such operations including simulated emergency procedures likely to be encountered during flight operations. (A-96-180).

Amend 14 CFR Part 133 and principal operations inspector requirements to ensure that operators conduct specific and adequate crew safety briefing procedures during preflight preparation and to ensure that load planning provides for realistic safety margins during helicopter external load work. (A-96-181).

⁹For more detailed information, see Briefs of Accident #LAX91LA054, #ANC91LA146, #SEA94LA094, and #LAX95LA024 (attached).

Require that all 14 CFR Part 133 rotorcraft-load combination flight manuals include standard procedures for fuel quantity planning that allow for delays and completion of the mission with an appropriate fuel reserve. (A-96-182).

Amend 14 CFR Part 133 to require periodic recalibration of fuel quantity indicating systems and to establish appropriate minimum fuel requirements for external load operators such that the potential for fuel exhaustion accidents in external load operations is substantially reduced. (A-96-183).

Chairman HALL, Vice Chairman FRANCIS, and Members HAMMERSCHMIDT, GOGLIA, and BLACK concurred in these recommendations.

By: 
Jim Hall
Chairman

National Transportation Safety Board
Washington, D.C. 20594

Brief of Accident

Adopted 01/27/1995

LAX94FA106
FILE NO. 654
01/28/94
SAN JOSE, CA
AIRCRAFT REG. NO. N4995G
TIME (LOCAL) - 07:37 PST

MAKE/MODEL - SIKORSKY S-58
ENGINE MAKE/MODEL - P&W PT6T-3
AIRCRAFT DAMAGE - Destroyed
NUMBER OF ENGINES - 2

OPERATING CERTIFICATES
- On-demand air taxi
- Rotorcraft-external load operator

TYPE OF FLIGHT OPERATION
- Other work use

REGULATION FLIGHT CONDUCTED UNDER - 14 CFR 133

LAST DEPARTURE POINT
DESTINATION - Same as Accident
- Local

AIRPORT PROXIMITY - Off airport/airstrip
AIRPORT NAME - SAN JOSE INTERNATIONAL
RUNWAY IDENTIFICATION - Unk/Nr
RUNWAY LENGTH/WIDTH (Feet) - Unk/Nr
RUNWAY SURFACE - Unk/Nr
RUNWAY SURFACE CONDITION - Unk/Nr

CONDITION OF LIGHT - Daylight
WEATHER INFO SOURCE- Weather observation facility

BASIC WEATHER - Visual (VMC)
LOWEST CEILING - None
VISIBILITY - 0035.000 SM
WIND DIR/SPEED - Calm
TEMPERATURE (F) - 37
OBSTR TO VISION - None
PRECIPITATION - None

PILOT-IN-COMMAND AGE - 46

CERTIFICATES/RATINGS
Commercial, Airline transport, Flight instructor
Single-engine land
Helicopter

INSTRUMENT RATINGS
Helicopter

FLIGHT TIME (Hours)
TOTAL ALL AIRCRAFT - 7000
LAST 90 DAYS - 43
TOTAL MAKE/MODEL - 1500
TOTAL INSTRUMENT TIME - Unk/Nr

THE PILOT WAS CONDUCTING AN EXTERNAL LOAD OPERATION ABOUT 1-1/2 MILES FROM THE DEPARTURE AIRPORT. AFTER FINISHING A LIFT, THE HELICOPTER WAS HOVERING AT ABOUT 100 FEET OVER A 13-STORY BUILDING. WITNESSES HEARD THE ENGINES SPOOL DOWN AND SAW THE ROTOR BLADES SLOWING. THE HELICOPTER DESCENDED ONTO A TWO-LEVEL PENTHOUSE ON THE BUILDING ROOF AND ROLLED ONTO ITS RIGHT SIDE. A PARKING LOT ADJACENT TO THE BUILDING HAD BEEN SELECTED BY THE COMPANY AS A LANDING AREA IN AN FAA-APPROVED LIFT PLAN, BUT OBSTRUCTIONS PREVENTED ITS USE. THE HELICOPTER, COMPRISED PRIMARILY OF MAGNESIUM, WAS CONSUMED BY A POSTCRASH FIRE. FUEL CONSUMPTION WAS ABOUT 11 POUNDS PER MINUTE. THE PILOT BEGAN THE FLIGHT WITH ABOUT 266 POUNDS OF FUEL; DURING THE 17 MINUTE FLIGHT, THE ENGINE WOULD HAVE CONSUMED ABOUT 190 POUNDS OF FUEL. UNUSABLE FUEL FOR THE HELICOPTER WAS 64 POUNDS. OPERATIONS AT MINIMAL FUEL REQUIRED FUEL TANK CROSSFEEDING.

FATAL 1
CREW 0
PASS 0
SERIOUS 0
MINOR/NONE 0

Brief of Accider (ntinued)

LAX94FA106
FILE NO. 654
01/28/94
SAN JOSE, CA
AIRCRAFT REG. NO. N4995G
TIME (LOCAL) - 07:37 PST

Occurrence# 1 LOSS OF ENGINE POWER(TOTAL) - NON-MECHANICAL
Phase of Operation HOVER

Findings

1. - ALL ENGINES
2. - PREFLIGHT PLANNING/PREPARATION - INADEQUATE - PILOT-IN-COMMAND
3. - FLUID, FUEL - STARVATION
4. - FUEL SUPPLY - INADEQUATE - PILOT-IN-COMMAND

Occurrence# 2 FORCED LANDING
Phase of Operation DESCENT - EMERGENCY

Findings

5. - AUTOROTATION - PERFORMED - PILOT-IN-COMMAND

Occurrence# 3 IN-FLIGHT COLLISION WITH OBJECT
Phase of Operation EMERGENCY LANDING

Findings

6. - TERRAIN CONDITION - HIGH OBSTRUCTION(S)
7. - OBJECT - BUILDING(NONRESIDENTIAL)

The National Transportation Safety Board determines that the Probable Cause(s) of this Accident was:
THE PILOT'S INADEQUATE PREFLIGHT PLANNING/PREPARATION AND SUBSEQUENT FUEL STARVATION, DUE TO AN INADEQUATE SUPPLY OF
FUEL. A FACTOR RELATED TO THE ACCIDENT WAS: THE PROXIMITY OF HIGH OBSTRUCTIONS.

National Transportation Safety Board
Washington, D.C. 20594

Brief of Accident
Adopted 12/14/1992

LAX911A054
FILE NO. 2062
12/08/90
HALEAKIA NAT PK, HI
AIRCRAFT REG. NO. N1113L
TIME (LOCAL) - 14:00 HST

MAKE/MODEL - MCDONNELL DOUGLAS 369D
ENGINE MAKE/MODEL - ALLISON 250-C20B
AIRCRAFT DAMAGE - Substantial
NUMBER OF ENGINES - 1
OPERATING CERTIFICATES - On-demand air taxi
- Rotorcraft-external load operator
TYPE OF FLIGHT OPERATION - Other work use
REGULATION FLIGHT CONDUCTED UNDER - 14 CFR 133

LAST DEPARTURE POINT - KAHULUI, HI
DESTINATION - KAHULUI, HI OGG
AIRPORT PROXIMITY - Off airport/airstrip
AIRPORT NAME - Unk/Nr
RUNWAY IDENTIFICATION - Unk/Nr
RUNWAY LENGTH/WIDTH (Feet) - Unk/Nr
RUNWAY SURFACE - Unk/Nr
RUNWAY SURFACE CONDITION - Unk/Nr

CONDITION OF LIGHT - Daylight
WEATHER INFO SOURCE- Pilot
BASIC WEATHER - Visual (VMC)
LOWEST CEILING - None
VISIBILITY - 0010.000 SM
WIND DIR/SPEED - 070 / 010 KTS
TEMPERATURE (F) - 0
OBSTR TO VISION - None
PRECIPITATION - Unk/Nr

CREW
PASS
FATAL 1
SERIOUS 0
MINOR/NONE 0
0

FLIGHT TIME (Hours)
TOTAL ALL AIRCRAFT - 14000
LAST 90 DAYS - 250
TOTAL MAKE/MODEL - 8000
TOTAL INSTRUMENT TIME - Unk/Nr

PILOT-IN-COMMAND AGE - 41
CERTIFICATES/RATINGS
Commercial
Single-engine land, Multiengine land
Helicopter
INSTRUMENT RATINGS
Airplane

THE PILOT WAS ATTEMPTING TO UPRIGHT AN ANIMAL CAGE BY PULLING IT OVER WITH A "LONG LINE" ATTACHED TO THE HELICOPTER. THERE WAS APPROXIMATELY 115 POUNDS OF FUEL IN THE HELICOPTER'S FUEL TANK. THE POWER PLANT FAILED WHEN THE HELICOPTER'S NOSE RAISED DURING THE TOW. THE HELICOPTER LANDED HARD COLLAPSING THE LEFT REAR LANDING GEAR STRUT AND THE MAIN ROTOR BLADES IMPACTED POSTS AROUND THE PERIMETERS OF THE CORRAL OVER WHICH THE HELICOPTER WAS HOVERING. DUPLICATING THE AIRCRAFT'S PITCH ATTITUDE AND FUEL LOAD, AT THE TIME OF THE ACCIDENT, REVEALED THAT THE FUEL PICK-UP POINT IS UN-PORTED AT FUEL QUANTITY LEVELS AT OR BELOW 115 POUNDS.

Brief of Accider (ntinued)

LAX911A054
FILE NO. 2062
12/08/90
HALEAKIA NAT PK, HI
AIRCRAFT REG. NO. N1113L
TIME (LOCAL) - 14:00 HST

Occurrence# 1 LOSS OF ENGINE POWER (TOTAL) - NON-MECHANICAL
Phase of Operation MANEUVERING

Findings
1. - FLUID, FUEL - STARVATION

Occurrence# 2 FORCED LANDING
Phase of Operation DESCENT - EMERGENCY

Occurrence# 3 IN-FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation LANDING - FLARE/TOUCHDOWN

The National Transportation Safety Board determines that the Probable Cause(s) of this Accident was:
FUEL STARVATION DUE TO THE UNREPORTING OF THE FUEL SUPPLY PICK-UP.

National Transportation Safety Board
Washington, D.C. 20594

Brief of Accident

Adopted 01/22/1993

ANC911A146
FILE NO. 2113
09/11/91
ILLIAMNA, AK
AIRCRAFT REG. NO. N29JV
TIME (LOCAL) - 08:30 ADT

MAKE/MODEL - HUGHES 369-D
ENGINE MAKE/MODEL - ALLISON 250-C20B
AIRCRAFT DAMAGE - Substantial
NUMBER OF ENGINES - 1
OPERATING CERTIFICATES - On-demand air taxi
- Rotorcraft-external load operator
TYPE OF FLIGHT OPERATION - Business
REGULATION FLIGHT CONDUCTED UNDER - 14 CFR 133

LAST DEPARTURE POINT - JOHNSON CREEK, AK
DESTINATION - Same as Accident
AIRPORT PROXIMITY - Off airport/airstrip
AIRPORT NAME - Unk/Nr
RUNWAY IDENTIFICATION - Unk/Nr
RUNWAY LENGTH/WIDTH (feet) - Unk/Nr
RUNWAY SURFACE CONDITION - Unk/Nr

PILOT-IN-COMMAND AGE - 45
CERTIFICATES/RATINGS
Commercial, Airline transport, Flight instructor
Single-engine land, Multiengine land, Single-engine sea
Helicopter
INSTRUMENT RATINGS
Airplane, Helicopter

CONDITION OF LIGHT - Daylight
WEATHER INFO SOURCE- Pilot
BASIC WEATHER - Visual (VMC)
LOWEST CEILING - None
VISIBILITY - 0050.000 SM
WIND DIR/SPEED - Light & variable
TEMPERATURE (F) - 55
OBSTR TO VISION - None
PRECIPITATION - None

FATAL 0
SERIOUS 0
MINOR/NONE 1
CREW PASS 0
FLIGHT TIME (Hours)
TOTAL ALL AIRCRAFT - 13704
LAST 90 DAYS - 251
TOTAL MAKE/MODEL - 4215
TOTAL INSTRUMENT TIME - 424

WHILE AT 200 FEET MSL, THE ENGINE QUIT AND THE HELICOPTER CRASHED ON THE TUNDRA. EXAMINATION OF THE HELICOPTER FUEL SYSTEMS REVEALED THE FUEL TANKS WERE EMPTY.

Brief of Accident (continued)

ANC911A146
FILE NO. 2113

09/11/91

ILIMNA, AK

AIRCRAFT REG. NO. N293V

TIME (LOCAL) - 08:30 ADT

Occurrence# 1 LOSS OF ENGINE POWER (TOTAL) - NON-MECHANICAL
Phase of Operation CRUISE

Findings

1. - FUEL SYSTEM - FOREIGN OBJECT
2. - PREFLIGHT PLANNING/PREPARATION - IMPROPER - PILOT-IN-COMMAND
3. - FUEL CONSUMPTION CALCULATIONS - NOT PERFORMED - PILOT-IN-COMMAND

Occurrence# 2 FORCED LANDING
Phase of Operation DESCENT - EMERGENCY

The National Transportation Safety Board determines that the Probable Cause(s) of this Accident was: WAS FUEL EXHAUSTION DUE TO THE PILOT-IN-COMMAND'S IMPROPER PREFLIGHT PLANNING. CONTRIBUTING TO THE ACCIDENT WAS THE ROUGH AND UNEVEN TUNDRA LANDING SITE.

Format Revision 7/95

National Transportation Safety Board
Washington, D.C. 20594

Brief of Accident

Adopted 05/16/1995

TIME (LOCAL) - 12:45 PST

AIRCRAFT REG. NO. N90944

WILLITS, CA

10/30/94

LAX95LA024
FILE NO. 1723

FATAL 0
SERIOUS 1
MINOR/NONE 0

MAKE/MODEL - KAMAN HH-43F
ENGINE MAKE/MODEL - LYCOMING T53-L-9
AIRCRAFT DAMAGE - Destroyed
NUMBER OF ENGINES - 1

CREW 0
PASS 0

OPERATING CERTIFICATES - Rotorcraft-external load operator
TYPE OF FLIGHT OPERATION - Other work use
REGULATION FLIGHT CONDUCTED UNDER - 14 CFR 133

CONDITION OF LIGHT - Daylight

LAST DEPARTURE POINT - Same as Accident
DESTINATION - Local

WEATHER INFO SOURCE- Witness

AIRPORT PROXIMITY - Off airport/airstrip

BASIC WEATHER - Visual (VMC)
LOWEST CEILING - None
VISIBILITY - 0030,000 SM
WIND DIR/SPEED - Unk/Nr
TEMPERATURE (F) - 75
OBSTR TO VISION - None
PRECIPITATION - None

FLIGHT TIME (Hours)

TOTAL ALL AIRCRAFT - 18400
LAST 90 DAYS - Unk/Nr
TOTAL MAKE/MODEL - 300
TOTAL INSTRUMENT TIME - Unk/Nr

PILOT-IN-COMMAND AGE - 46

CERTIFICATES/RATINGS
Commercial, Airline transport
Single-engine land, Multiengine land
Helicopter
INSTRUMENT RATINGS
Airplane, Helicopter

THE PILOT HAD COMPLETED A SERIES OF LOGGING OPERATIONS AND WAS RETURNING TO THE LANDING SITE WHEN THE ENGINE FLAMED OUT.
THE PILOT EXECUTED A SUCCESSFUL AUTOROTATION ONTO THE SIDE OF A HILL. AFTER LANDING, HOWEVER, THE HELICOPTER ROLLED DOWN
THE HILL AND COLLIDED WITH A TREE. THE WRECKAGE EXAMINATION DISCLOSED NO EVIDENCE OF ANY FUEL IN THE ENGINE FUEL SYSTEM
OR ANY PREEXISTING MALFUNCTIONS OR FAILURES.

Brief of Accider. (continued)

LAX951A024 10/30/94 WILLITS, CA AIRCRAFT REG. NO. N90944 TIME (LOCAL) - 12:45 PST
FILE NO. 1723

Occurrence# 1 LOSS OF ENGINE POWER(TOTAL) - NON-MECHANICAL
Phase of Operation CRUISE

Findings
1. - FLUID, FUEL - EXHAUSTION
2. - FUEL CONSUMPTION CALCULATIONS - IMPROPER - PILOT-IN-COMMAND

Occurrence# 2 FORCED LANDING
Phase of Operation DESCENT - EMERGENCY

Findings
3. - AUTOROTATION - PERFORMED - PILOT-IN-COMMAND

Occurrence# 3 ROLL OVER
Phase of Operation LANDING - FLARE/TOUCHDOWN

Findings
4. - TERRAIN CONDITION - MOUNTAINOUS/HILLY

The National Transportation Safety Board determines that the Probable Cause(s) of this Accident was:
the pilot's improper fuel consumption calculations resulting in fuel exhaustion. The hilly terrain was a factor in this accident.

Brief of Accident (continued)

SEA94LA094 04/01/94 RIMROCK, WA AIRCRAFT REG. NO. N5211R TIME (LOCAL) - 12:40 PST
FILE NO. 10

Occurrence# 1 LOSS OF ENGINE POWER(TOTAL) - NON-MECHANICAL
Phase of Operation HOVER

Findings
1. - FLUID FUEL - EXHAUSTION
2. - REFUELING - NOT PERFORMED - PILOT-IN-COMMAND

Occurrence# 2 FORCED LANDING
Phase of Operation DESCENT - EMERGENCY

Occurrence# 3 HARD LANDING
Phase of Operation LANDING

Findings
3. - AUTOROTATION - NOT POSSIBLE

The National Transportation Safety Board determines that the Probable Cause(s) of this Accident was:
FUEL EXHAUSTION, THE PILOT IN COMMAND'S FAILURE TO REFUEL THE AIRCRAFT, AND THE INABILITY TO SUCCESSFULLY EXECUTE AN
AUTO-ROTATION LANDING BECAUSE OF THE LOW ALTITUDE.