NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, D.C. 20594

September 9, 2009

MAINTENANCE RECORDS GROUP CHAIRMAN'S FACTUAL REPORT

A. ACCIDENT: LAX08PA259

Location: Weaverville, California

Date/Time: August 5, 2008 about 7:41 PM pacific daylight Time (PDT)

Aircraft: Carson Helicopter Services, Inc. Sikorsky S-61N Helicopter, N612AZ, S/N 61297

B. MAINTENANCE GROUP:

Chairman: Pocholo Cruz
National Transportation Safety Board
Washington, District of Columbia

Member: Mark Watson/Levi Phillips
Carson Helicopter Services, Inc.
Grants Pass, Oregon

Member: William Rush/Jerry Henninger
FAA Flight Standards District Office
Aviation Safety Inspector
Allentown, Pennsylvania

Member: Gil Elmy
U.S. Forest Service
Ogden, Utah

C. SUMMARY:

On August 5, 2008, about 1941 Pacific daylight time,[1] a Sikorsky S-61N helicopter, N612AZ, impacted trees and terrain during the initial climb after takeoff from Helispot 44, located at an elevation of about 6,000 feet in mountainous terrain near Weaverville, California. The airline transport pilot, the safety crewmember and seven firefighters were killed; the commercial copilot and three firefighters were seriously injured.[2] Impact forces and a postcrash fire destroyed the helicopter. The helicopter was being operated by the United States Forest Service (USFS) as a public flight to transport the firefighters from Helispot 44 to another location. The helicopter was registered to Carson Helicopters, Inc. (CHI) of Grants Pass, Oregon, and leased to Carson Helicopter Services, Inc. (CHSI) of Grants Pass. The USFS had contracted with CHI for the services of the helicopter.[3] Visual meteorological conditions prevailed at the time of the accident, and a company visual flight rules flight plan had been filed.

D. DETAILS OF THE INVESTIGATION:

1.0 Air Carrier Certificates

Carson Helicopter Services, Inc. (CHSI)[4], 828 Brookside Boulevard, Grants Pass, Oregon 97526, received the following certificates from the Federal Aviation Administration (FAA) Hillsboro Flight Standards District Office (FSDO), Northwest Mountain Region:

- 14 CFR Part 135 Air Carrier Certificate (Number C4NA128K) issued on March 30, 2006
- 14 CFR Part 133 Rotorcraft External – Load Operations Certificate (C4NL128K) issued on June 6, 2008
- 14 CFR Part 137 Commercial Agricultural Aircraft Operations Certificate (C4NG128K) issued on June 6, 2005

See Attachment 1 for further information

[1] All times in this report are expressed in terms of a 24-hour clock and Pacific daylight time unless otherwise noted.
[2] The safety crewmember was a USFS Inspector Pilot.
[3] Initially, the NTSB was informed that the contract was between the USFS and CHSI. For further information refer to the Operations Factual Report.
[4] Carson Helicopter, Inc. (Perkasie, PA) has a West Coast office with the same address as Carson Helicopter Services, Inc. (Grants Pass, OR). Carson Helicopter Inc. has a 14 CFR Part 145 Repair Station Certificate (NBER647G), a Part 133 Certificate (NBEL647G) and 137 Certificate (NBEG647G). Frank Carson owns both companies.

2.0 Operation Specifications (OpSpecs)[5]

CHSI has a Part 135 Certificate, which included the standards, terms, conditions, and limitations contained in the FAA approved Operations Specifications (Parts D and E).

(a) The operator was authorized as a 14 CFR Part 135 operations.

(b) According to Section D072 of the OpSpecs, the Continuous Airworthiness Maintenance Program (CAMP) authorized CHSI to use the manufacturer/CHSI maintenance and engine maintenance programs to maintain their helicopters.

(c) According to Section D085 of the OpSpecs, CHSI has 6 Sikorsky SK-61-N helicopters.

(d) According to Section D089 of the OpSpecs, CHSI was authorized to use the Maintenance Time Limitations listed in the CHSI General Maintenance Manual (GMM), Rev 2, July 17, 2007.

(e) According to Section D095 of the OpSpecs, CHSI was authorized to use an approved Minimum Equipment List (MEL).

(f) According to Section E096 of the OpSpecs, CHSI was authorized for a Weight and Balance Program. The helicopters were to be weighed every 36 months. According to the records reviewed, the last time the accident helicopter was weighed was on January 4, 2008.

3.0 Type Certificate Data Sheet

A Type Certificate (TC) is the way the FAA approves the design of a specific aircraft, aircraft engine, aircraft propeller or other major aviation-related product. A type certificate authorizes a manufacturer to make the product in the specific way covered by the certificate. A Type Certificate Data Sheet (TCDS) is a formal description of the aircraft, engine or propeller. It lists limitations and information required for type certification including airspeed limits, weight limits, thrust limitations, etc.

TCDS 1H15 shows the Type Certificate information for the Sikorsky S-61N Helicopter. According to the document, Sikorsky Aircraft, Stratford, Connecticut is the holder of the TC.

See Attachment 2 for further information

[5] Operations Specifications contains the authorizations, limitations, and certain procedures under which each kind of operation, if applicable, is to be conducted by the certificate holder.

4.0 Helicopter History

Per FAA, Civil Aviation Registration records, the helicopter was built and originally registered as N10057, to Sikorsky Aircraft Division, Stratford, Connecticut on June 2, 1965. The helicopter was then de-registered, in September 1969 and sold to Okanagan Helicopters Limited of Richmond, British Columbia, Canada. In May 1984, the helicopter was leased to ERA Helicopters Inc., Anchorage, Alaska who registered the helicopter as N147EH. The helicopter was de-registered October 9, 1984 by ERA Helicopters Inc. and returned to Canada. Records indicate that CHC Helicopters International Inc., Richmond, British Columbia, Canada sold the helicopter to CHI, Grants Pass, Oregon on June 25, 2007, who eventually registered the helicopter as N612AZ. The helicopter was then leased to CHSI. According to the records, the helicopter started to fly 14 CFR Part 135 operations on June 10, 2008.

At the end of the day's flying on August 4, 2008, the accident helicopter had accumulated 35,396.4 hours[6]. CHSI does not track landing cycles.

5.0 Powerplant History

The helicopter was equipped with two General Electric GE T58-140-1 Turbo-Shaft engines. The engines had accumulated the following times:

Table 1 – Powerplant Information

		NO.1 ENGINE	NO.2 ENGINE
Manufacturer		General Electric	General Electric
Part Number		CT58-140-1	CT58-140-1
Manufacture Date		1/31/74	10/3/69
Date Installed		12/20/07	10/2/07
Serial Number		295-120	296-024D
Location of Engine Installation		Perkasie, PA	Perkasie, PA
Total Time (engine hours) at installation		22,085.3	32,200.6
Total Cycles (engine cycles) at installation		70,673	21,050
Total Time of Airframe during engine installation (hours)		35,161.9[7]	35,161.9[7]
Total Cycles of Airframe during engine installation		Not tracked by Carson Helicopters Services, Inc.	Not tracked by Carson Helicopters Services, Inc.

[6] Based on data from Sky Connect Automated Flight Following (AFF) System and the Cockpit Voice Recorder Transcript, the accident helicopter accumulated an additional 3.5 hours on August 5, 2008 for a total of about 35,399.9 hours. For further information see Airworthiness Group Chairman's Factual Report.
[7] The engines on the helicopter were installed at different times but still maintain the same airframe total time at engine installation. The helicopter did not fly from August 31, 2007 through December 26, 2007.

Time Since Overhaul (hours)		1,012.9	234.5
Hours since last installation (cycles)		234.5 (154)	234.5 (154)
Total Time in hours and (Cycles) as of 8/4/2008 (See Footnote 6)		22,319.8 (70,827)	32,435.1 (21,204)

6.0 Maintenance and Inspection Program

The following chart shows the recent maintenance program inspections accomplished on N612AZ:

Table 2 – Inspection Program

CHECK	DATE	LOCATION	TOTAL TIME
Preflight Inspection	8/5/08	Trinity Helibase, CA	35,396.4* (See Footnote 6)
Safety Inspection	7/30/08	Trinity Helibase, CA	35,389.8
Phase 1	6/14/08	Washington, NC	35,297.8
Phase 2	6/30/08	Redding, CA	35,327.7
Phase 3	7/11/08	Willow Creek, CA	35,355.2
Phase 4	7/28/08	Trinity Helibase, CA	35,384.7
Phase 5	6/10/08	Washington, NC	35,297.8
25 Hr Inspection	7/27/08	Trinity Helibase, CA	35,380.2
Transfer to Continuous Airworthiness Inspection Program 135.411(a)(2)	6/11/08	Washington, NC	35,285.0
Avionics Inspection	12/07	Perkasie, PA	35,161.9
Standard Airworthiness Certificate	8/10/07	Perkasie, PA	35,131.5

*****Some helicopter records were in the helicopter at the time of the accident and were not recovered. A mechanic that was on duty prior to the accident stated that he accomplished a preflight inspection on August 5, 2008.

Per the CHSI Continuous Airworthiness Maintenance Program (CAMP), CHSI has reviewed and analyzed data accumulated during aircraft design system analysis, manufacture's data, field experience and the intervals established by the manufacturer's maintenance schedule document (MSD) and regulatory requirements and incorporated these into their inspection program. The required maintenance tasks, for CHSI aircraft, are integrated into scheduled maintenance checks.

Preflight Inspection:

The preflight inspections are accomplished with no elapsed flight time between start and finish just before the first flight of the day. The inspection is a visual examination to make sure the helicopter is in a state of flight readiness after completion of the previous day's maintenance and inspection requirements.

Safety Inspection:

The safety inspection is accomplished each 15 flight hours. If the helicopter is not flown daily or is stored for any extended period, the safety inspection must be done within the 24-hour period immediately preceding the next scheduled flight. The inspection is a comprehensive visual inspection of the helicopter structure, equipment and furnishings in order to detect and correct defects which, if allowed to progress, could cause aborted flight or require major maintenance.

Phase Checks:

Phase Checks are servicing and inspection checks that require opening of panels and detailed visual inspections of components and zones as specified in the maintenance program. These checks are performed every 30-flight hours from the previous one, so that all five phases are completed within 150 hour period.

25-Hour Inspection:

Engine compressor wash accomplished.

Special Frequency Inspections:

Consists of inspection having frequencies that do not match the time intervals for the repeating preflight, safety, and phase inspections. The special frequencies of these inspections may be specific flight hours, equipment hours or cycles of operation.

Avionics Inspection:

Functional/Operational Check of certain Avionics equipment on the helicopter are accomplished annually.

7.0 Continuing Analysis and Surveillance (CASS)[8]

CHSI holds weekly meetings to review its operation. The CASS is an accepted program by the FAA. The program was put in place to ensure helicopters are properly maintained and to ensure the adequacy of the maintenance program by identifying and correcting problems or potential problems as they arise

In addition, CHSI conducted quarterly CASS meetings. The quarterly meetings are held within the first two weeks of the following quarter. The CASS report covered the preceding quarters activity. The investigative team reviewed CASS reports from July 7, 2008, April 9, 2008 and January 8, 2008. The report contained QA audits that were accomplished during the past quarter as well as management and operational issues. No issues were identified in the CASS reports that were reviewed.

See Attachment 3 for further information

8.0 Minimum Equipment List (MEL)[9]

CHSI was authorized to use an approved MEL on its Sikorsky S-61N Helicopter per its OPS-SPECS. At the time of the accident, there were no deferred maintenance items or MEL items for any helicopter system or component documented in the helicopter records. Additionally, the helicopter did not have any carry over items in the logbook at the time of the accident.

9.0 Supplemental Type Certificates (STC)[10]

Supplemental Type Certificates (STC), supplied by the operator, were reviewed. A total of 8 STCs were documented by the operator and installed in the helicopter.

Table 3 – Supplemental Type Certificates Accomplished

STC NO.	DESCRIPTION	DATE ACCOMPLISHED
SR01552SE	Installation of Aerial liquid dispensing tank	3/25/2008
SR02507NY	Installation of 600 lb capacity Goodrich AC rescue hoist system	3/25/2008
SR02057NY*	Upgrade of S6135-20600 series Main Gear Box (MGB) by replacing Input Freewheeling Unit	3/14/2008

[8] As established by 14 CFR Part 135.431, each certificate holder shall establish and maintain a system for the continuing analysis and surveillance of the performance and effectiveness of its inspection program and the program covering other maintenance, preventative maintenance and alterations and for the correction of any deficiency in those programs, regardless of whether those programs are carried out by the certificate holder or by another person.

[9] The FAA approved Minimum Equipment List contains a list of equipment and instruments that may be inoperative on a specific helicopter for continuing flight beyond a terminal point.

[10] The FAA issues Supplement Type Certificates, which authorize a major change or alteration to an aircraft, engine or component that has been built under an approved Type Certificate.

SR01585NY	Installation of Carson Helicopters composite main rotor blades	8/10/2007
SR09448RC	Installation of Concord Battery model RG-38E/44, lead acid type	8/10/2007
SA01288SE**	Installation of Auxiliary Hydraulic System	12/20/2007
SR681SE**	Installation of Cargo Hook Weighing System	12/20/2007
SH3379NH**	Installation of Precision Flight Pulse Light Control System	12/20/2007

* The MGB was not actually installed on the accident helicopter until July 21, 2008.
**The following STCs items were annotated in the Carson Helicopter Services, Inc. Aircraft Maintenance Log as installed on December 20, 2007, but were not included in the FAA Oklahoma City records.

10.0 Airworthiness Directive (AD)[11] and Service Bulletin (SB) Summary

According to CHSI GMM, Chapter 3, Sections 3-8 (Airworthiness Directive Compliance Record) and 3-9 (Service Bulletin Compliance Record) states that CHSI will have an up to date Airworthiness Directive Compliance Record (Form 80-275) and Service Bulletin Compliance Record (Form 80-286). Furthermore, if the helicopter is maintained on a Computerized Record System and that system has a sufficient Airworthiness Directive Compliance Record System/Service Bulletin Compliance Record System, it may be used to track Airworthiness Directive Compliance/ Service Bulletin Compliance in lieu of forms 80-275/80-286 respectively. The Airworthiness Directive Compliance Record/Service Bulletin Compliance Record or any form containing the same information will be used to track Airworthiness Directive/Service Bulletin compliance for helicopter which are not tracked on a Computerized Record System or as a supplement to the Computerized Record System.

CHSI provided Airframe and Powerplant ADs and SBs summaries for review. A review of SB listing revealed no discrepancies.

A review of the Airframe AD listings revealed several ADs (i.e. 74-20-07 R5, 75-08-15, 85-18-05 R2, 89-04-01 R3) compliance notes stated: Not Applicable due to Part Number or Serial Number installed and Alternate Means of Compliance (AMOC) pending. According to CHSI representatives, CHSI sent AMOCs letters for these ADs to the FAA in May 2006 but did not receive approval prior to the accident. According to the FAA, CHSI was supposed to "comply" with the ADs until a written AMOC approval was delivered to CHSI even though the component listed in the AD was not physically installed. In July 2008, the FAA issued Letters of Investigations regarding the ADs. The FAA has since found the requested AMOC letters, reviewed them and approved them. It could not be determined why the AMOC letters were not approved by the FAA two years prior.

See Attachment 4 for further information

[11] Airworthiness Directive (AD) is a regulatory notice sent out by the FAA informing the operator of an action that must be taken for the aircraft to maintain its airworthiness status.

11.0 Aircraft Flight and Maintenance Log (AFML)

The Aircraft Flight and Maintenance Log (Form 86-101) required by 14 CFR Part 135.65 is used to track helicopter details that are pertinent to the airworthiness of the helicopter. It is a self-duplicating form that is a permanent aircraft record. Some helicopter records (i.e. AFML, MEL Deferred Maintenance List, Carry Over Maintenance List, etc.) were in the helicopter and destroyed at the time of the accident.

The accident helicopter AFML pages from August 10, 2007 to July 30, 2008 were reviewed for repetitive items, discrepancies that referenced flight controls, and engine controls. The scheduled maintenance as described in the CAMP was accomplished on time and recorded in the helicopter records. See Attachments 5, 5.1 and 5.2 for further information

There is a gap in the helicopter AFML from July 30, 2008 to the date of accident, August 5, 2008. As previously mentioned, these records were in the helicopter at the time of the accident. A mechanic that was on duty during that time provided the following information:

- On July 31, 2008, the mechanic conducted the post flight maintenance and a re-torque of the main rotor head.

- On August 1, 2008, the mechanic preformed the preflight inspection and a safety inspection of the rotor head area as a precaution due to the maintenance preformed the night before.

- On August 2, 2008, the mechanic preformed the preflight and later in the day replaced the #2 engine tach generator due to pilot reports of it fluctuating. He also replaced the center fuel tank overflow sensor due to pilot reports of it fluctuating and he adjusted the sliding cabin door open warning light (it was not going out every time the door was closed)

- On August 3, 2008 – August 4, 2008 the mechanic performed preflight inspections. No other maintenance was accomplished.

Additionally, the helicopter AFML from June 2008 to July 2008 showed maintenance discrepancies and corrective actions written by Airframe and Powerplant (A & P) mechanics. It was observed that there were no write-ups by pilots. According to the Carson Helicopter Services, Inc. representative, at times the pilots tell the mechanics the discrepancy and the mechanics write it up in the maintenance logbook. According to the Carson Helicopter Services, Inc. General Maintenance Manual Section 4-1 (a), “Federal regulations stipulate that the pilot-in-command will enter each mechanical irregularity noted. Each irregularity

(discrepancy) noted by the flight crew will be recorded in the DISCREPANCY block on the AIRCRAFT FLIGHT AND MAINTENANCE LOG (AFML)(Form 86-101), at the end of that flight."

Table 4 – Aircraft Flight and Maintenance Log (June 07 – August 2008)

Date	Maintenance Write-Up and Corrective Action
8/2/08	Replaced engine #2 tach generator (due to fluctuating indication). Also replaced the center fuel tank overflow sensor due to pilot reports of it fluctuating and adjusted the sliding cabin door open warning light (it was not going out every time the door was closed)
7/31/08	The mechanic conducted the post flight maintenance and a re-torque of the main rotor head.
7/28/08	#1 & 2 torque system purged for air due to filter replacement, ops check ok.
7/27/08	#1 engine oil temp bulb replaced.
7/25/08	Removed 2 point lap belt P/N 42868 from crew seat position C-1 and replaced with 4 point shoulder harness P/N 1-10-Y30401.
7/22/08	Replacement of main gear box P/N S6135-20600-046 S/N 1101, TSO 212.9 with same P/N, S/N A14-B-22-77-1057 TSO 1,470.3 Rotor head removed and reinstalled
7/7/08	Adj. #1 engine HF stop in 1 turn (#1 flat pitch high 108%)
7/6/08	Adjusted open loop (Collective flight control system). Adjusted pitch links 2 turns (lengthened) (autorotation speed to high) A/C TT 35,339.0
7/1/08	#1 engine Adj. stator vane actuator 1% open from normal. #1 engine replaced torque press. Transmitter A/C TT 35,333.7. Preformed 25 hr compressor wash.
6/10/08	Aircraft was transferred to Carson Helicopter Services, Inc.
6/7/08	Replaced #1 fuel control unit P/N 725725-6 A/C TT 35,278.1
6/6/08	Replaced all #1 engine fuel filters due to fuel pressure fluctuation
5/12/08	Replaced #2 fuel control unit P/N 725725-5 A/C TT 35,207.0
3/5/08	Replaced #1 engine starter bleed valve A/C TT 35,172.1
12/20/07	Engines CT58-140-1 S/N 295120C & 296024D installed A/C TT 35,161.9
6/18/07	Standard airworthiness certificate issued.

NOTE: The helicopter was in maintenance from August 31, 2007 to December 26, 2007

See Attachments 5, 5.1 and 5.2 for further information

13.0 Service Difficulty Reports (SDR)[12]

According to CHSI GMM Chapter 3, Section 3-14, Service Difficulty Reports (Form 8070-1) shall be completed and submitted by the Director of Maintenance or his delegates.

CHSI reported one SDR to the FAA for helicopter N612AZ. On July 21, 2008, a Main Transmission chip detector light was illuminated. After landing, maintenance found the chip plug lead had fallen off the chip detector. The lead was reinstalled and the helicopter was returned to service. There were no chronic or repetitive issues and all discrepancies to the helicopter were rectified.

[12] A Service Difficulty Report (SDR) is a report of the occurrence or detection of each failure, malfunctions, or defects as required by 14 CFR 135.415.

14.0 Major Repairs and Alterations

There were no Major Repairs noted in any of the records reviewed, or in the FAA Oklahoma City records.

The following are Major Alterations approved under Field Approvals procedures for the accident helicopter:

Per FAA 337 Form dated December 31, 2007:

- Locking Fuel Caps, Shaw P/N 416-1601
- Artex Model C406-N HM
- Engine Electrical Chip Detector System
- Whelan Model A413-HAD, DF-14/28, Strobe Light System
- Keyed Master Switch, Tyco P/N SWK123F315
- Sky Connect Automated Flight Following (AFF) System

Per FAA 337 Form dated August 10, 2007:

- Cargo Hook replaced with a hook similar to hook approved under STC SH639NE. Per the FAA 337 Form used as the acceptable data for N4263A, S-61R, S/N 61551, this is an Eastern Rotorcraft hook, P/N 7102-1.
- External Instrument support for Torquemeter and Load Cell.

See Attachment 6 for further information

15.0 Time Limit Control Components

Per CHSI GMM Chapter 3, Section 3-3, The AIRCRAFT & COMPONENT TRACKING REPORT is a pre-printed form which is used to verify complied with and next due times (i.e. A/C TT) of recurring inspections, ADs and SBs, and status of life limited and overhauled parts. A current copy of the form was kept with the helicopter daily logbook and as part of the maintenance work package that was filed by registration number in the maintenance office at the helicopter's home station. This report was revised by the Director of Maintenance or Chief Inspector using maintenance entries, component log cards, and any applicable data required to ensure accurate record keeping and be done at intervals that will allow for on-time maintenance scheduling. Maintenance personnel review the component historical report as part of a daily preflight inspection and enter the applicable data in the blocks provided on the form.

Time limited component status for the helicopter and two installed GE T58-140-1 powerplant engines was reviewed. The compliance status was satisfactory.

See Attachment 7 for further information

16.0 Approved Vendor Requirements

In an effort to ensure effective maintenance coverage for on- and off-route flying, CHSI utilizes the services of various Certified Repair Stations, and Aircraft Maintenance Organizations. Maintenance performed must be within the scope of the facility's capabilities, including a Certified Repair Station's Operations Specifications and limitations.

According to the Carson Helicopter Services Inc. General Maintenance Manual Chapter 11, Section 11-6.1, the Contract Maintenance List maintained in Chapter 15 shows major contract agencies approved to provide maintenance for Carson Helicopter Services Inc. aircraft, engines and appliances. Included in the list with the agency's name is the type of service provided to Carson Helicopter Services Inc. The original manufacturers of components are also considered to be an approved vendor when parts have been overhauled or rebuilt (re-manufactured) to FAA acceptable data, FAR 43.2(a) or (b). The investigative team observed that the vendor listing was not in the GMM Chapter 15. CHSI representatives then provided an Approved Vendor Listing for review. There were no discrepancies noted in the listing.

See Attachment 8 for further information

17.0 Method of Record Keeping

Helicopter AFML pages, Check Cards, non-routine forms as well as company generated forms as noted in the CHSI GMM, were used by CHSI to keep track of all the maintenance performed on their helicopters. CHI (Perkasie, PA) was hired to keep track of all time-limited component, recurring AD inspections, and maintenance due on the helicopters for CHSI. This information is then emailed to CHSI management and Crew Chiefs out in the field.

Original records of the Part 135 maintenance paperwork were kept in CHSI except for the component records, which are kept in CHI (Perkasie, PA)[13]. However, CHSI does keep copies of the component records. There were no discrepancies with the way the records were kept.

The maintenance program was managed manually by both CHSI and their Crew Chiefs.

[13] CHSI arranged for CHI (Perkasie, PA) to update all helicopter and engines manuals and the helicopter component tracking forms.

18.0 Manuals

CHSI used the following manuals to maintain the airworthiness of its fleet and management of the airline.

General Maintenance Manual (GMM), REV 2, July 17, 2007 – A guide to company polices and procedures to be followed by all persons performing maintenance and inspection services on company aircraft.

Continuous Airworthiness Inspections Program Manual – FAA approved time limits for the accomplishment of the overhaul, replacement, periodic inspection and routine checks of the helicopter, and its component parts, accessories and appliances.

Minimum Equipment List (MEL) – List of equipment and instruments that may be inoperative on a specific helicopter.

Weight and Balance Manual – Weight and balance procedures to be followed by maintenance and flight operations personnel on all helicopters operated by CHSI.

Manufacture Supplied Manuals - Aircraft/Engine Maintenance Manuals, Structural Repair Manuals, Wiring Diagrams, Overhaul Manuals, Illustrated Parts Catalog.

19.0 Engine/System Component Information

Main Gear Box (MGB)

According to the Component Log Card, the helicopter had the following MGB installed at the time of the accident:

MGB Part Number:	S6135-20600-046
MGB Serial Number:	A14-B-22-77-1057

The MGB was installed on N612AZ, July 21, 2008, at a helicopter total time of 35,374.8. At that time, the MGB had a total time since overhaul of 1,470.3 hours and a total time of 20,282.5 hours. At the end of the day's flying on August 4, 2008 (See Footnote 6) the MGB had approximately 20,307.1 total time in service and 1,491.9 hours since overhaul. The MGB was last overhauled on September 9, 2004, at a total time in service of 18,815.1. According to Sikorsky Service Bulletin No. 61B General-2P, the MGB is due for an overhaul every 2,500 hours.

See Attachment 9 for further information

Input Freewheeling Unit (IFWU)

According to the Component Log Card, the helicopter had the following IFWU installed at the time of the accident:

L/H Part Number:	CHI-R-003-1
L/H Serial Number:	G042-01023
R/H Part Number:	CHI-R-003-2
R/H Serial Number:	B042-00031

Both L/H and R/H IFWUs were new when they were installed on the MGB on March 14, 2008. At the end of the day's flying on August 4, 2008 (See Footnote 6), both IFWUs had approximately 21.6 hours total time in service. According to STC SR02057NY, the IFWUs were "On Condition" maintenance items. However, CHSI has a self-imposed overhaul time of 750 hours.

See Attachment 10 for further information

Engine Fuel Control Unit Information

#1 Engine Fuel Control Unit

Part Number:	725725-5
Model Number:	JFC26
Serial Number:	72835BR

The #1 Engine Fuel Control Unit was installed on the accident helicopter at ACTT 35,278.1 hours. The #1 Engine Fuel Control Unit had accumulated 118.3 hours since installation to the end of days flying on August 4, 2008 (See Footnote 6).

#2 Engine Fuel Control Unit

Part Number:	725725-5
Model Number:	JFC26
Serial Number:	49882

The #2 Engine Fuel Control Unit was installed on the accident helicopter at ACTT 35,207.0 hours. The #2 Engine Fuel Control Unit had accumulated 189.4 hours since installation to the end of days flying on August 4, 2008 (See Footnote 6).

According to the CHSI Maintenance Program, Engine Fuel Control Units have a visual inspection accomplished every 150 flight hours (Phase 2 Inspection). The last Phase 2 Inspection was accomplished on June 30, 2008.

Centrifugal Fuel Purifier Information

#1 Centrifugal Fuel Purifier
Part Number: 4005T01P03
Serial Number: 8087BR

The #1 Centrifugal Fuel Purifier was installed with the #1 engine at ACTT 35,161.9 hours on December 20, 2007. The #1 Centrifugal Fuel Purifier had accumulated 234.5 hours since installation to the end of days flying on August 4, 2008 (See Footnote 6).

#2 Centrifugal Fuel Purifier
Part Number: 4005T01P03
Serial Number: 5794

The #2 Centrifugal Fuel Purifier was installed on the #2 engine at ACTT 35,161.9 hours on October 10, 2007. The #2 Centrifugal Fuel Purifier had accumulated 234.5 hours since installation to the end of days flying on August 4, 2008 (See Footnote 6).

According to the CHSI Maintenance Program, Centrifugal Fuel Purifiers were inspected and cleaned every 150 flight hours (Phase 2 Inspection). The last Phase 2 Inspection was accomplished on June 30, 2008.

20.0 Transmission Inspection Panels

During the on-scene investigation, investigators noted seven inspection panels were not installed on the helicopters main rotor fairings. According to CHSI representatives, the removal of the inspection panels were accomplished only during public use operations for the purpose of cooling the helicopter's main transmission. The removal of the inspection panels was accomplished without any known manufacturer's data, Supplemental Type Certificates, or Field Approval. Investigators could not find any maintenance records that documented the removal of the inspection panels.

The following are the part numbers of the transmission inspection panels from the S61-N Illustrated Parts Catalog:

Figure 58, Main Rotor Fairing Installation, Station 247 through 303.

Item 33 S6120-62610-37, L/H
S6120-62610-38, R/H

Figure 59, Main Rotor Fairing Installation, Station 303 through 335.

Item 32	S6120-62620-5, L/H
Item 28	S6120-62620-3, L/H, (attached to S6120-62620-5)
Item 53	S6120-62620-13, R/H
Item 47	S6120-62620-14, R/H, (attached to S6120-62620-13)
Item 54	S6120-62611-44

See Attachment 11 for further information

21.0 Four-Point Shoulder Harness Documentation[14]

The investigative team requested documentation for the installation of the four-point shoulder harness into the passenger seats. CHSI provided investigators with FAA Form 8110-3, Report No. SR2006-1 NC (Stress Report, "Installation of Seat Harnesses") dated July 12, 2006 for the structural design data and analysis for the installation of shoulder harness restraints on the seats installed in the S-61N (Serial Numbers: 61216, 61220, 61242, 61465, 61472, 61744, 61426, and 61453). The accident helicopter was serial number 61297 and was not owned by CHSI when the report was issued. There were no maintenance records that showed Report No. SR2006-1 NC was ever revised to include the accident helicopter's serial number. The report was for approval of the engineering design data only and not for the installation of the seat harnesses. CHSI maintains the installation of the four-point shoulder harness was not a major alteration; and that the installation did not affect the structural strength of the seat.

Investigators could not find any documentation in the helicopter maintenance records of when the four-point harnesses were installed to the seats and when the seats were installed in the helicopter. There was however, one logbook entry for the installation of the four-point harness to the rear-facing seat (C-1) on July 24, 2008.

For further information see Survival Factor's Group Chairman's Factual Report and Survival Factor Attachment 7.

22.0 Forest Service Cargo Box

The US Forest Service had requested that a Cargo Box be installed on the helicopter during Public Use operations. CHSI procured a cargo box as requested by the Forest Service. It was CHSI's understanding that it was the Forest Service's responsibility to install and secure the box, just as they did with other

[14] According to the Federal Aviation Administration, the installation of the four-point shoulder harness installation to the passenger seats was a Major Alteration. Additionally, logbook entries, a Supplemental Type Certificate (STC) or FAA Form 337 field approval was required for the installation (See Attachment 12 - FAA Response Letter).

cargo like Bambi Buckets and personal backpacks. The Cargo Box is currently listed as cargo on the helicopter load manifest.

According to CHSI, the cargo box was normally loaded and the contents secured by the Forest Service employees. The cargo box was not placarded for the Maximum Weight allowed as required per 14 CFR Part 29.787. There was no systematic method in place for how the cargo box was loaded, for weight and balance purposes.

Pocholo Cruz
Aerospace Engineer

Attachments:

1. CHSI Certificates
2. Type Certificate Data Sheet
3. Continuing Analysis and Surveillance System
4. Airworthiness Directive and Service Bulletin Summary
5. Aircraft Flight and Maintenance Log
5.1 Aircraft Flight and Maintenance Log
5.2 Aircraft Flight and Maintenance Log
6. Major Repairs and Alterations
7. Time Limit Control Components
8. Approved Vendor List
9. Main Gear Box Information
10. Input Freewheeling Unit Information
11. Transmission Inspection Panel Information
12. FAA Response Letter