



Aviation Investigation Final Report

Location:	Newberg, Oregon	Accident Number:	WPR15FA205
Date & Time:	July 1, 2015, 22:15 Local	Registration:	N2096W
Aircraft:	Schweizer 269C	Aircraft Damage:	Destroyed
Defining Event:	Sys/Comp malf/fail (non-power)	Injuries:	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

The instructor and student were conducting a night orientation flight. According to a witnesses who worked for the operator, about 15 minutes after the helicopter departed, he heard what sounded like an engine rollback and the helicopter making an autorotation. This was followed by the sound of an increase in engine rpm and the drive belts squealing, culminating with the sound of the helicopter making a loud thud-type noise. Another witness stated that the engine sounded rough and that the helicopter was making a high pitch whining/squealing sound, after which it went silent. A third witness also heard the helicopter making high pitch noise just before the accident. The helicopter was subsequently located in an open field near the departure airport; a postcrash fire erupted, which consumed the helicopter.

A postaccident examination of the lower coupling drive shaft showed evidence of severe wear completely around the forward spline that extended beyond the root of the spline teeth. Severe wear of the forward spline teeth could have been caused by a loss of alignment between the engine and the drive shaft or an inflight loss of lubrication in the rubber boot. The rubber boot that retains grease for the forward spline portion of the drive shaft was not recovered and was presumed missing. Loss of grease coverage for the forward spline, either from a rupture of the rubber boot or a loss of the clamp for the rubber boot, could cause sudden inflight wear and overheating of the spline teeth. Severe wear of the forward spline portion of the lower coupling drive shaft most likely led to sudden and complete loss of translational/rotational power between the engine and the transmission. The reason for the severe wear of the forward spline could not be definitively determined due to fire damage and the loss of associated components, which were not located during the investigation.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The loss of translation/rotational power between the engine and the transmission due to the severe wear of the forward spline portion of the lower coupling drive shaft. The reason for the severe wear of the forward spline could not be definitively determined due to fire damage and the loss of associated components, which were not located during the investigation.

Findings

Not determined	(general) - Unknown/Not determined
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Factual Information

History of Flight

Approach-VFR pattern downwind	Sys/Comp malf/fail (non-power) (Defining event)
Emergency descent	Off-field or emergency landing
Landing-flare/touchdown	Hard landing

On July 1, 2015, about 2215 Pacific daylight time, a Schweizer 269C helicopter, N2096W, was destroyed by impact forces and a postcrash fire as a result of a hard landing during an emergency autorotation near the Chelaham Airpark (17S), Newberg, Oregon. The certified flight instructor (CFI) and student pilot received fatal injuries. The helicopter was owned by Precision Flight Training Incorporated, of Newberg, and operated by Precision Aviation Training, LLC, also of Newberg. Visual meteorological conditions prevailed at the time of the accident. The local instructional flight was being operated in accordance with 14 Code of Federal Regulations Part 91, and a flight plan was not filed. The operator reported the flight departed 17S about 2200.

During the postaccident investigation, the company's Director of Operations revealed to the National Transportation Safety Board (NTSB) investigator-in-charge (IIC), that the purpose of the instructional flight was for student night orientation. In a statement provided by a mechanic/witness who had worked for the operator for about three years, the witness reported that he observed the helicopter take off about 15 minutes prior to the accident. It then departed to the northwest, and when it was about 500 feet above ground level he heard the engine roll back, followed by the helicopter making an autorotation. The witness stated the he heard the engine rpm increase and the drive belts squeal, then heard the helicopter make a loud thud. The witness opined that he knew the helicopter was in trouble because of how low it was. Further, he recalled that the engine sounded normal during the flight, including the autorotation, and that the only thing he heard before the crash that raised his concern was the squealing belts.

In a telephone interview with the NTSB IIC, a second witness reported that at the time of the accident he was in his home with the windows open, and the helicopter passed his residence very, very low. He said the engine sounded rough, somewhat like the sound cards make in bicycle spokes, and that it went by very fast toward the south. He further stated that the helicopter was making a high pitch whining/squealing sound, after which it went silent. He heard it hit, and then called 911. The witness added that he drove to the accident site, which was just a short distance away, and said that the fire started right away, right after it hit the ground.

It a written statement submitted to the NTSB IIC, a third witness, also an employee of the operator, reported that at about the same time as the accident, he heard a high-pitched noise like ungreased belts on a car, followed by a loud sound similar to a backfire. About five minutes later he was advised of the accident.

A postaccident examination of the accident site by the NTSB IIC and a Federal Aviation Administration (FAA) aviation safety inspector, revealed that while the helicopter was on a left downwind leg for the

departure airport, the flight crew experienced an inflight anomaly, which was followed by an emergency descent and a hard landing. The helicopter impacted a harvested wheat field on a magnetic heading of about 173 degrees, and came to rest on a magnetic heading of about 355 degrees, and about .75 nautical miles northwest of the departure airport. The first point of impact was located about 27 feet north of the main wreckage site. A postcrash fire subsequently erupted, which consumed the helicopter.

The helicopter was recovered to a secured location for further examination.

Flight instructor Information

Certificate:	Commercial; Flight instructor	Age:	31, Male
Airplane Rating(s):	None	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	4-point
Instrument Rating(s):	Helicopter	Second Pilot Present:	Yes
Instructor Rating(s):	Helicopter	Toxicology Performed:	Yes
Medical Certification:	Class 2 With waivers/limitations	Last FAA Medical Exam:	August 20, 2014
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	March 13, 2015
Flight Time:	354.6 hours (Total, all aircraft), 146.1 hours (Total, this make and model), 284.2 hours (Pilot In Command, all aircraft), 122.5 hours (Last 90 days, all aircraft), 66.8 hours (Last 30 days, all aircraft), 3.7 hours (Last 24 hours, all aircraft)		

Student pilot Information

Certificate:	Student	Age:	29, Male
Airplane Rating(s):	None	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	4-point
Instrument Rating(s):	None	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 3 Without waivers/limitations	Last FAA Medical Exam:	April 17, 2015
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	55.2 hours (Total, all aircraft), 55.2 hours (Total, this make and model), 6 hours (Pilot In Command, all aircraft), 38.2 hours (Last 90 days, all aircraft), 19.1 hours (Last 30 days, all aircraft), 2.2 hours (Last 24 hours, all aircraft)		

Certified Flight Instructor (CFI)

The CFI, age 31, possessed a commercial pilot certificate with rotorcraft-helicopter, and instrument helicopter ratings. He also possessed a flight instructor certificate with rotorcraft-helicopter, and instrument rotorcraft ratings. The CFI's most recent flight review was successfully accomplished on March 13, 2015, and his most recent second-class airman medical certificate was awarded on August 28, 2014, with the stated limitation, "Must wear corrective lenses for near and distant vision."

A review of the CFI's personal flight records revealed that he had accumulated a total flight time of 354.6 hours, 278.1 hours in the same make and model as the accident helicopter, and 123.7 hours of flight instruction given. Additionally, the CFI had accumulated 122.5 hours, 66.8 hours, and 3.8 hours in the last 90 days, 30 days, and 24 hours respectively.

The CFI was given a company evaluation flight by the operator on February 9, 2015, and a company Federal Aviation Regulation Part 141 check ride on March 13, 2015. The CFI began performing flight instructor duties for the operator on April 22, 2015. This was the CFI's initial employment as a flight instructor.

Pilot Undergoing Instruction (PUI)

According to records provided by the operator, the PUI, age 29, received his student pilot certificate concurrent with his airman third-class airman medical certificate on April 17, 2015, with no limitations.

According to the PUI's personal flight logbook, he had logged a total of 41.6 hours of flight time, of which 38.4 hours were in helicopters, 6.0 hours was as pilot in command/solo flight time, and 35.8 hours were in the same make and model as the accident helicopter. Additionally, the PUI had flown 32.0 hours and 19.1 hours in the preceding 90 days and 30 days respectively.

Aircraft and Owner/Operator Information

Aircraft Make:	Schweizer	Registration:	N2096W
Model/Series:	269C	Aircraft Category:	Helicopter
Year of Manufacture:	2004	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	S1865
Landing Gear Type:	Skid	Seats:	2
Date/Type of Last Inspection:	June 22, 2015 Condition	Certified Max Gross Wt.:	2050 lbs
Time Since Last Inspection:	22 Hrs	Engines:	1 Reciprocating
Airframe Total Time:	3820.5 Hrs as of last inspection	Engine Manufacturer:	Lycoming
ELT:	Not installed	Engine Model/Series:	HIO-360
Registered Owner:	Precision Flight Training Inc.	Rated Power:	220 Horsepower
Operator:	Precision Aviation Training, LLC	Operating Certificate(s) Held:	Pilot school (141)

The helicopter, N2096W, serial number S1865, was manufactured in 2004. It was powered by a Lycoming HIO-360-D1A reciprocating engine, serial number RL-7497-51A, rated at 190 horsepower.

According to the operator, the engine had accumulated a total time of 3,729.2 hours, 21.9 hours since its most recent inspection, which was performed on June 22, 2015, and 849.8 hours since its last major overhaul. Additionally, the most recent 100-hour inspection was performed on June 2, 2015, at an

airframe total time of 3,757.5 hours. It was also noted that the engine lower coupling drive shaft, part number 269A5559, serial number S345, was installed on this date with a total time of 5,199 hours.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Night
Observation Facility, Elevation:	MMV, 163 ft msl	Distance from Accident Site:	85 Nautical Miles
Observation Time:	22:53 Local	Direction from Accident Site:	200°
Lowest Cloud Condition:	Clear	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	4 knots /	Turbulence Type Forecast/Actual:	/ None
Wind Direction:	260°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.94 inches Hg	Temperature/Dew Point:	22°C / 14°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Newberg, OR (17S)	Type of Flight Plan Filed:	None
Destination:	Newberg, OR (17S)	Type of Clearance:	None
Departure Time:	22:00 Local	Type of Airspace:	Class G

At 2253, the weather reporting facility at the McMinnville Municipal Airport (MVV), McMinnville, Oregon, which is located about 8.5 nautical miles south-southwest of the accident site, reported wind 260°; at 4 knots, visibility 7 miles, sky clear, temperature 22°C, dew point 14°C, and an altimeter setting of 29.94 inches of mercury.

Airport Information

Airport:	Chehalem Airpark 17S	Runway Surface Type:	
Airport Elevation:	190 ft msl	Runway Surface Condition:	Dry;Vegetation
Runway Used:		IFR Approach:	None
Runway Length/Width:		VFR Approach/Landing:	Forced landing;Traffic pattern

Wreckage and Impact Information

Crew Injuries:	2 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:		Aircraft Fire:	On-ground
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 Fatal	Latitude, Longitude:	45.329166,-123.069725

The aircraft and engine were examined at the facilities of Nu Venture Air Service, Dallas, Oregon, on August 20, 2015, under the supervision of the NTSB IIC and FAA inspectors. Participants to the examination included representatives from Sikorsky Aircraft and Lycoming Engines. The results of the examinations revealed the following.

Airframe

Photos of the site provided by a Portland Flight Standards District Office aviation safety inspector revealed that the helicopter was severely damaged by a postcrash fire. All components appeared to be closely located to the main fuselage.

The frame tubing exhibited multiple fractures, kinks and bends. It also showed it had been exposed to the fire, with all paint burned away. Both forward cluster fittings that attach the cross beam were separated from the frame tubing. Other portions of the frame were separated by fractures of the tubing or welds.

The aft mast support strut was intact. The right support strut exhibited minor mid span bending, and the left strut appeared straight. All exhibited thermal damage.

The tail boom was separated from the fuselage, appeared intact with minor damage, with no blade strikes apparent. The forward bulkhead attachment lug was fractured and was consistent with overload separation. There was minor fire damage to the paint on the forward end, and oily soot deposits further aft. The tail gear box adapter remained in the boom with several attach bolt holes deformed. The tail stinger was separated at the adapter. Both tail boom support struts exhibited a compression buckle at mid-span, and separated attach fittings at the center attachment to the tail boom. The horizontal stabilizer forward attach fitting was fractured. The vertical stabilizer was crushed and bent aft with vegetation remaining in the folded sheet metal.

The landing gear and crossbeams were severely damaged. The aft crossbeam was largely intact, separated from the frame, and exhibited significant bending, and was fractured and separated at the right side cluster fitting; additionally, the right outboard end was burned away. All landing gear dampers were separated at one or both ends and several were burned.

The left skid was fractured and separated just forward of the forward skid strut. The right skid appears to have been intact but suffered melting and burning. The support struts were separated at the crossbeam attach areas, and several suffered significant fire damage and burning.

The root ends of all three main rotor blades remained attached to the main rotor head; the outer airfoils were cut away to facilitate recovery. Each blade was relatively intact, and exhibited minor impact damage. Two blades exhibited thermal damage, with some of the aluminum airfoil consumed.

The main rotor head was intact and remained attached to the drive shaft. The swashplate and rotating scissor links were intact. The rotor head turned freely in the mast bearing.

Both tail rotor blades were intact, with one having remained attached to the hub via the strap pack. The opposite blade had separated thru a fracture at the inboard end of the hub spindle and fractured the strap pack also. Tip damage and some airfoil compression damage was present with the separated blade tip cap gone. The pitch change links were attached, although the separated blade link was badly bent. Both blades exhibited thermal damage to the paint.

The tail rotor fork and teetering bolt were intact, and the assembly teetered properly. The fork was equipped with the elastomeric bearings. The pitch control unit was intact, rotated freely, slid in and out on the pinion, and was attached to the pitch links. The control bell crank was engaged in the pitch control housing and attached to the tail gear box and the control rod. The inboard rubber boot was consumed by fire.

The tail rotor gear box (TGB) remained attached to the tail boom with elongation of several of the attachment bolt holes. The TRG was rotated and exhibited continuity from the input to the TGB output. The chip detector was not examined.

The tail rotor drive shaft (TRDS) was separated at the forward end from the main gear box (MGB) pinion drive spline. The retention nut exhibited damage to the flange. MGB drive adapter splines were intact. The forward TRDS splines were intact, and the cup contained grease. The forward end of the TRDS exhibited no torsional buckling with some minor tearing and flattening, and was fractured and separated at the point where it passed through the forward bulkhead. The aft spline joint at the TGB was intact, remained assembled and exhibited continuity through the TGB.

The main gearbox (MGB) housing was consumed by fire. The pinion and pinion shaft bearings survived. The ring gear and support structure survived and were engaged on the lower drive splines of the main rotor drive shaft. All gear teeth were intact with no indications of breakage. The lower portion of the mast was consumed by fire.

The belt drive assembly was largely gone, having been consumed by the fire. The lower pulley was intact and thermally damaged, with both bearings in proper location, and complete except for seals. The linear actuator was in the fully engaged position. The idler pulley tension cable was separated mid-span. Subsequent to an examination with a magnifying glass, it exhibited clean fresh cut marks which occurred during recovery operations. The upper pulley internal wheel was consumed by fire, while the outer ring remained intact. The over-running clutch in the upper pulley functioned properly, engaged counterclockwise (looking forward), and rotated freely clockwise when mounted on the pinion. The engine coupling shaft (short shaft) was located in the lower pulley, and was separated from the engine. The shaft was removed from the pulley, found to be intact, and appeared to be straight. The aft splined end appeared intact with no obvious damage to the teeth. The rubber grease retention boot was melted. The forward splines exhibited severe damage to the extent that they were not visibly discernable. The

rubber boot was not present, although the snap ring and safety wire retention hardware remained on the shaft. The engine mounted spline adapter exhibited an external strike with minor deformation. The rubber grease boot retention clamp was observed in place. The engine mounted adapter splines were present with little damage, although there was a hard metallic deposit in the spline groove covering through about a third of the circumference. It was about a quarter of an inch long, positioned about the mid-point longitudinally in the spline. The forward end of the pulley hollow shaft exhibited a deformation from internal contact with the drive shaft, bending the outer wall outboard.

Several parts were retained by the NTSB IIC to be sent to the NTSB Materials Laboratory, located in Washington, D.C. The engine driveshaft, the engine mounted drive adapter, and a bag of sample grease and debris from the Impeller were retained.

The helicopter was equipped with the optional 60-gallon fuel system, which is made up of an additional fuel tank mounted on the left aft of the cabin wall; plumbing is connected to the standard right side mounted tank. The tanks were breached, and exhibited significant burning. Due to impact forces and thermal damage, the throttle and mixture cables were not able to be examined. No investigation of rotation, timing or compression was possible due to the extensive postcrash thermal damage.

The majority of the flight control system, which is comprised of aluminum and magnesium, was consumed in the postcrash fire. Control continuity was established for the MR swashplate input control rods to the pitch housings. The input rods ended in melted aluminum at about the same point that the mast was consumed. The steel TR pedal torque tube survived the fire, with the TR pedal arms incurring a varying degree of thermal damage.

TR control continuity was established from the TR blades through the TGB mounted bell crank and control rod in the tail boom, to the forward bulkhead where the rod was fractured.

The electric cyclic trim system was not located, and was presumed to have been consumed in the postcrash fire.

Engine

The engine was separated from the airframe and sitting upside down on a tarp for the examination.

The number 1 and 3 cylinder heads and oil sump were consumed by fire. The rear accessory case was deformed and partially consumed by fire. The engine case was deformed by heat. Both magnetos were partially consumed by fire and deformed. The fuel servo was also consumed by fire. The starter ring gear support center was broken apart. The attached fan blades were separated. The edge of the fan blade disk revealed signs of rotation at impact.

The engine to airframe drive coupler shaft splines were found sheared off and ground down on the engine side. The engine drive adapter splines contained the sheared off spline from the shaft, and also had damaged splines.

The cooling fan disk with the starter ring gear attached was located about 20 feet south of the main wreckage.

The engine crankshaft prop flange was observed cracked in several places.

No evidence was found of a catastrophic in flight engine failure.

Medical and Pathological Information

Flight Instructor

On July 2, 2015, an autopsy on the flight instructor was performed at the Office of The State Medical Examiner, Clackamas, Oregon. The examination revealed that the cause of death was the result of blunt force chest trauma.

The FAA's Civil Aeromedical Institute in Oklahoma City, Oklahoma, performed toxicology testing on the flight instructor. The test was negative for carbon monoxide, ethanol, and tested drugs. Acetone, which was not quantified, was detected in the blood. Testing for cyanide was not performed.

Pilot Undergoing Instruction

On July 2, 2015, an autopsy on the pilot receiving instruction was performed at the Office of The State Medical Examiner, Clackamas, Oregon. The examination revealed that the cause of death was the result of blunt force chest trauma.

The FAA's Civil Aeromedical Institute in Oklahoma City, Oklahoma, performed toxicology testing on the flight instructor. The test was negative for carbon monoxide and ethanol. Testing for cyanide was not performed. Pheniramine, a drug commonly used for hay fever, was detected in the urine but not in the blood.

Tests and Research

During the investigation, several of the helicopter's components were retained by the NTSB IIC and subsequently shipped the NTSB Materials Laboratory in Washington, D.C., for examination. The components included the impeller that was attached to the starter ring gear assembly, the drive adapter, the drive shaft assembly, remains of the bump stop, and a grease sample from the engine cooling fan.

All parts received were examined at the Safety Board's Materials Laboratory on July 18, 2016, by a Senior NTSB Metallurgist, with a representative from Sikorsky Aircraft in attendance. Sikorsky is the current holder of the type certificate for the Schweizer 269 helicopter. The results of the examination revealed the following:

Impeller and Starter Ring Gear Assembly

The impeller was attached by twelve bolts and nuts to the starter ring gear assembly. All the blades on the aluminum fan assembly were fractured at the root portion. The impeller fractured completely around the circumference in the areas near the twelve attachment bolts. Bench binocular microscope examination of the fracture faces on both assemblies contained a rough texture on a slant fracture consistent with overstress separation, with no evidence of a pre-existing crack, such as a fatigue crack.

Drive Adapter

The drive adapter's surface contained a blue/gray tint, and isolated areas of the adapter contained scale; both conditions are consistent with a steel part that had been exposed to heat. The outer surface contained a dent. The drive adapter contained an inner spline, with several of the spline teeth having exhibited severe inward deformation and gaping cracks in the general area that corresponded to the dent. The spline teeth were intact and showed evidence of minor wear. Fragments of the mating spline teeth were found wedged in between the inner spline teeth.

Drive Shaft Assembly

The drive shaft contained spline teeth on the forward and aft ends. The shaft portion between the forward and aft spline showed evidence of bending deformation. The as-received aft spline was covered with black lubricant (grease), and all of the spline teeth were intact. The rubber boot for the aft spline was partially torn, attached to the drive shaft, and covered with black grease. A sample of the black grease was removed from the aft spline prior to cleaning and retained. No further work was performed on the grease sample. The aft spline teeth completely around the assembly showed evidence of minor wear.

The forward spline was dry, exhibited a light brown oxide film consistent with iron oxide, with no evidence of grease. The rubber boot (a component that is used to retain grease) was not attached to the forward end. The forward spline exhibited severe wear and deformation damage that extended beyond the root of the spline teeth. The forward and aft ends of the forward spline completely around the spline exhibited metal squeeze out (metal flow that extended forward and aft). The root radii between the spline teeth were not visible. A circumferential-radial section was made through the forward spline. Examination of the section revealed that the spline was worn beyond the root of the spline teeth.

Examination of the aft spline revealed that all of the teeth were intact. The surfaces of the aft spline teeth exhibited minor wear. A circumferential-radial section was made through the intact aft spline. Examination revealed that the core of the shaft contained a microstructure of tempered martensite, typical for a quench and tempered steel, and the surfaces adjacent to the spline teeth contained a darker band consistent with a carburized surface treatment. According to the representative from Sikorsky, the spline teeth are specified to be carburized to a depth of between 0.02 inch and 0.04 inch. The hardness of the carburized layer is specified to be between 57 HRC and 61 HRC. The carburized layer was to have a minimum hardness of 56 HRC at a depth of 0.002 inch below the surface. The measured hardness values adjacent to the spline surface were consistent with the hardness values specified for a carburized surface.

The drive shaft is specified to be made from steel per the composition indicated in SAE-AMS 6425. The polished section from the drive shaft was analyzed with a Thermo Scientific Niton XL3t-980 X-ray

fluorescence (XRF) portable alloy analyzer. The alloy analyzer indicated the drive shaft contained 1.31% manganese, 0.383% chromium, 1.85% nickel, 0.449% molybdenum and 0.242% copper, consistent with the elements specified for the drive shaft.

The core portion of the plug was missing, but the outer circumferential portion remained intact throughout its circumference. The circumferential portion of the plug was covered with black deposits, and revealed no evidence of a fracture feature. It exhibited a smooth surface consistent with an aluminum alloy that had fused and re-solidified.

Grease Sample from Engine Cooling Fan

Bench binocular microscope examination of the grease sample revealed the grease contained evidence of solid particles (fragments).

(Refer to the NTSB Materials Laboratory Factual Report No. 16-060, which is appended to the docket for this investigation.)

Administrative Information

Investigator In Charge (IIC):	Little, Thomas
Additional Participating Persons:	Bruce L Stephanson; Federal Aviation Administration; Hillsboro, OR Steven Gleason; Schweizer Aircraft Corporation; Horseheads, NY Troy Helgeson; Lycoming Engines; Williamsport, PA
Original Publish Date:	October 4, 2016
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=91482

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).