Aviation Investigation Final Report

Location:	North Captiva Island, Florida	**Accident Number:**	ERA14FA343
Date & Time:	July 16, 2014, 17:45 Local	**Registration:**	N297AS
Aircraft:	Piper PA-32R-301T	**Aircraft Damage:**	Substantial
Defining Event:	Aircraft loading event	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

A witness familiar with the pilot reported that the accident flight was the pilot's second flight to the airport that day to transport ceramic tiles to that location. One witness reported that the airplane appeared to be "taking off attempting to recover [from] an aborted landing and did not have the airspeed to recover." Several witnesses observed the airplane having difficulty climbing before it impacted water in a left-wing-low attitude. Based on the witness statements, the pilot was likely performing a go-around maneuver before the accident, and the airplane entered an aerodynamic stall. The airplane came to rest on its left side in about 8 ft of water and 200 yards from the departure end of the intended runway. Several witnesses reported hearing the engine operating with no hesitations noted, and postrecovery examination revealed no mechanical malfunctions or abnormalities of the airframe or engine that would have precluded normal operation.

During the examination, 666 lbs of ceramic tiles were found unsecured in the cargo compartment; this exceeded the cargo compartment weight limit by 57 lbs and would have degraded the airplane's climb performance and increased its stall speed. The investigation could not determine the actual distribution of the unsecured tiles in the cargo compartment before the accident, so postaccident weight and balance calculations were performed for several tile distribution scenarios. The calculations revealed that, with a relatively even distribution or with the tiles in the forward position of the cargo compartment, the center of gravity (CG) would have been within the CG envelope limits; with the tiles in the forward position, the CG would have been near its forward limit. However, with the tiles in the aft position, the CG could have exceeded the aft CG limit by as much as about 4 inches.

Based on the evidence, it is likely that, during the approach to land, the unsecured tiles began to slide forward, which would have made the airplane's nose feel heavy and might have led to the pilot's decision to go around. However, when the pilot applied power and began to pitch the airplane's nose up during the go-around, it is likely that the unsecured tiles slid aft, which resulted in the CG exceeding its aft limit, the airplane's nose pitching up further, and the pilot's pitch control authority decreasing. These conditions resulted in the airplane exceeding its critical angle-of-attack, experiencing an aerodynamic

stall, and colliding with water. Although pilots operating under 14 Code of Federal Regulations (CFR) Part 91 are not required to conduct preflight weight and balance calculations, 14 CFR 91.9 does require the pilot-in-command to comply with the operating limits, including weight and balance, in the approved airplane flight manual, which provides pilots weight and balance computations, charts, and graphs.

Although toxicology testing of the pilot revealed ethanol in both the liver and muscle specimens, the variation in the amount of ethanol in the tissue specimens suggests that most, and perhaps all, of the ethanol came from sources other than ingestion. Therefore, it is very unlikely that the pilot was impaired by ethanol at the time of the accident. Further, no evidence for medical impairment or incapacitation was found.

Probable Cause and Findings

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

The pilot's failure to secure the cargo in the cargo compartment, which resulted in a weight shift that led to the center of gravity exceeding its aft limit during a go-around attempt and a subsequent aerodynamic stall. Also causal to the accident were the pilot's inadequate preflight inspection and his loading the airplane beyond the cargo compartment weight limit.

Findings

Aircraft	CG/weight distribution - Capability exceeded
Aircraft	Pitch control - Capability exceeded
Personnel issues	Weight/balance calculations - Pilot
Personnel issues	Decision making/judgment - Pilot
Aircraft	Descent/approach/glide path - Not attained/maintained
Aircraft	Airspeed - Not attained/maintained
Aircraft	Angle of attack - Not attained/maintained
Personnel issues	Preflight inspection - Pilot

Factual Information

History of Flight

Prior to flight	Aircraft loading event (Defining event)
Approach-VFR pattern final	Abrupt maneuver
Approach-VFR go-around	Collision with terr/obj (non-CFIT)

On July 16, 2014, about 1745 eastern daylight time, a Piper PA-32R-301T, N297AS, was substantially damaged when it impacted the water near North Captiva Island, Florida. The airplane departed from Page Airport (FMY), Ft. Myers, Florida about 1735 with an intended destination of Salty Approach Airport (FL90), Ft. Myers, Florida. Day, visual meteorological conditions prevailed and no flight was filed. The private pilot was fatally injured. The personal flight was conducted under the provisions of Title 14 Code of Federal Regulations (CFR) Part 91.

Numerous witnesses reported that the airplane appeared to be departing from FL90. Some of those accounts stated that the airplane "was having a hard time trying to climb" or "that it appeared that the pilot was trying to build up speed to gain elevation" prior to the left wing making contact with the water. One eyewitness, who was familiar with the pilot, reported that the pilot had flown in earlier in the afternoon with a load of tile and the accident flight was the second trip for the day. Another eyewitness reported that the airplane appeared to be "taking off attempting to recover [from] an aborted landing and did not have the airspeed to recover." Several of the witnesses reported that they audibly observed the engine operating at the time of the accident. Some of the witnesses reported the airplane was about 7 feet above the ground when it passed over the beach.

Pilot Information

Certificate:	Private	**Age:**	62
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Unknown
Other Aircraft Rating(s):	None	**Restraint Used:**	None
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	October 22, 2013
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 2020.6 hours (Total, all aircraft)		

According to Federal Aviation Administration (FAA) records, the pilot held a private pilot certificate for airplane single-engine land with a rating for instrument airplane. His most recent third class medical certificate was issued on October 22, 2013. The pilot's flight logbook was located in the forward baggage compartment of the airplane. The logbook was saturated with

water and considerable damage was done to the edge of the logbook; however, some pages were separated and on the last full page of handwritten entries indicated that the pilot had accumulated 2,018.7 total hours of flight experience. The subsequent page had four entries of 0.5 hours each, for a total flight experience of 2,020.7 hours; however, those entries were not dated.

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N297AS
Model/Series:	PA-32R-301T	**Aircraft Category:**	Airplane
Year of Manufacture:	1999	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	3257122
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:		**Certified Max Gross Wt.:**	3600 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	Lycoming
ELT:	C91 installed, not activated	**Engine Model/Series:**	TIO-540-AH1A
Registered Owner:	On file	**Rated Power:**	300 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

According to FAA records, the airplane was issued an airworthiness certificate on December 10, 1999, and was registered to Howard Aviation on June 11, 2007, and the pilot was listed as the "president." It was powered by a Lycoming TIO-540-AH1A engine and driven by a Hartzell propeller model HC-I3YR-1RF. A review of copies of maintenance logbook records showed an annual inspection was completed on January 13, 2014, at a recorded Hobbs meter reading of 1,225 hours and indicated an engine total time in service of 1,225 hours. The Hobbs hour meter was observed at the accident site and indicated 1267.5 hours.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KFMY,18 ft msl	**Distance from Accident Site:**	20 Nautical Miles
Observation Time:	17:45 Local	**Direction from Accident Site:**	93°
Lowest Cloud Condition:	Scattered / 2500 ft AGL	**Visibility**	2 miles
Lowest Ceiling:	Broken / 3400 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	19 knots / 30 knots	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	330°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.98 inches Hg	**Temperature/Dew Point:**	26°C / 23°C
Precipitation and Obscuration:	In the vicinity - Thunderstorm - Rain		
Departure Point:	Ft. Myers, FL (FMY)	**Type of Flight Plan Filed:**	None
Destination:	North Captiva Island, FL (FL90)	**Type of Clearance:**	None
Departure Time:	17:35 Local	**Type of Airspace:**	Class G

The 1745 recorded weather observation at FMY, located approximately 20 miles to the east of the accident location, included wind from 330 degrees at19 knots with gusts of 30 knots, visibility 1 3/4 miles with thunderstorms in the vicinity and light rain, scattered clouds at 2,400 feet above ground level (agl), broken clouds at 3,400 feet agl, overcast at 5,500 feet agl, temperature 26 degrees C, dew point 23 degrees C and barometric altimeter 29.99 inches of mercury. The remarks section included a peak wind at 1741, lightning in all quadrants surrounding the airport, rain began at 1745 and a thunderstorm was present between 1727 and 1744.

No witnesses or first responders reported lighting, rain, or adverse winds in the vicinity of FL90 at the time of the accident.

Airport Information

Airport:	SALTY APPROACH FL90	**Runway Surface Type:**	Grass/turf
Airport Elevation:	6 ft msl	**Runway Surface Condition:**	Vegetation
Runway Used:	W	**IFR Approach:**	None
Runway Length/Width:	1800 ft / 100 ft	**VFR Approach/Landing:**	Full stop;Go around;Straight-in

The airport was privately owned and at the time of the accident did not have a control tower. There was one runway designated runway E/W. The turf runway was 1,800 feet long and 100 feet wide. The airport was about 6 feet above mean sea level and had a sandy beach area located at both ends of the runway.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	26.60361,-82.227218

The airplane was located in 8 to 10 feet of water, approximately 200 yards west-southwest of the extended centerline of the runway designated "W." The main wreckage was located at coordinates 26:36'215N 082:13.640W. The airplane was resting its left side on the sea floor. The left wing separated during the impact sequence and was originally found at coordinates 26:35'250N 082:13.670W. The engine remained attached to the airplane and was collocated with the main wreckage. The airplane came to rest on a magnetic heading of approximately 340 degrees.

The airplane was recovered utilizing three lifting air bags. During recovery the tie straps damaged the right wing in the vicinity of the aileron. The stabilator and left wing could not be located utilizing sonar or visual sighting.

Post recovery examination of the wreckage and witness statements indicated that the airplane impacted the water in a left wing low attitude. The fuselage was placed on a hangar floor for the examination. The right wing was removed to facilitate transportation and the left wing was not located at the accident location. The nose gear as viewed was in the nose wheel well; however, the hydraulic extension ram was extended and bent aft during the accident sequence. The right main landing gear was impact-separated at the attach point; however, the hydraulic ram was extended 8 inches, correlating to the right main landing gear being extended and locked at the time of impact. The flap jackscrew was measured at 3 exposed threads, which correlated to a flaps 40 position or fully extended position.

Porcelain tiles and two wooden pallets were located, unsecured in the cabin section of the airplane. The tiles and pallets were removed and weighed, on a scale; the contents weighed a total of 666 pounds. A placard located on the aft wall of the cargo compartment indicated that 609 pounds was the maximum allowed cargo weight.

Fuselage

The fuselage remained intact; the left cargo/passenger door remained attached, had an approximate 8 inch gouge just aft of the forward hinge point, and the cabin had a gouge on the roof approximately 6 inches above the pilot, or left side, window. The windows remained in position; except for the pilot side windscreen and pilot side window, which were not located. The forward cabin door remained attached and during recovery the locking mechanism operated normally; however, during post recovery examination the door was slightly ajar and would not lock into position. The airplane was equipped with two front seats; the four aft passenger seats were removed sometime prior to the accident flight. The pilot seat exhibited torsional twist to the left, similar to the torsional twist of a mass in place at the time of impact. Both seats remained on their respective seat tracks and locked in place. Seat restraints were located and all were unremarkable, operated normally with no abnormalities noted and exhibited no web

stretching. The two front seatbelts were unlatched when found. No cargo securing mechanism was noted in the accident aircraft other than the passenger seatbelts and a single cargo strap that were found folded and stowed inside the aircraft.

Cockpit

The instrument panel remained attached and the "L Mag" and "R Mag" switch on the ceiling were in the "ON" position. All instrumentation remained attached and the turn and bank indicator indicated a left bank turn. The control "T"-bar and the sprockets and chains remained attached; however, binding was noted at the base of the "T"-bar. Removal of the channel cover indicated that the floor had a slight buckling and manipulation of the buckling allowed the control cables to operate. Control cable continuity was traced to all the cable breaks from the associated attach points and the breaks had the appearance of broomstrawing at the fracture points. The right side aileron balance cable was cut to facilitate transport to the salvage yard. The fuel selector valve indicator and fuel selector valve both indicated that the right fuel tank was selected. The throttle, mixture, and propeller levers were in the full forward positions. The throttle was operated and was confirmed operating through the full arc of operation at the throttle linkage. The fuel pump and air-conditioner switches were found in the "OFF" positions. The landing gear lever was in the "DOWN" position and the gear switch was bent to the right. The flap handle was in the "40 degree" or full flap position.

Empennage

The vertical fin and rudder remained attached; however, the stabilator was impact-separated from the fuselage and was not recovered. The impact damage was consistent with overload fractures. The rudder was attached to the vertical fin at its hinge points and control cable continuity was confirmed to the rudder pedals. The stops were in place and exhibited no peening. The rudder balance weight was located in the rudder assembly. The rudder position at impact could not be determined.

The stabilator was separated from its mounting. The fracture points were consistent with being separated in an aft and right direction. The stabilator trim drum was absent and not located.

Left Wing

The left wing was impact separated and was not located. However, the attach structure exhibited overload fractures in the aft and positive direction. The primary balance cable was fractured and exhibited tensile overload signatures. Control continuity was established to the fracture point.

Right Wing

The right wing remained attached to the fuselage. The wing was unremarkable, except for the damage that resulted from the recovery of the airplane. The right main landing gear was impact separated at the attach fitting; however, considering the hydraulic ram position of 8 inch, the landing gear was determined to be in the down and locked position. The flap remained attached to the wing and on the flap track; however, the exact position could not be determined except by utilizing the exposed threads under the floor in the cabin section. The aileron remained attached and was operated by the control cables, which were cut to facilitate transport, and revealed no anomalies. The aileron balance weight was

in position and attached to the outboard section of the aileron. The fuel tank contained 15 gallons of blue fluid similar in color and smell as aviation 100LL fuel. The fuel cap was tight and secure and no water was present in the fuel when drained to facilitate recovery. A small hole was punctured by investigators into the forward section of the tank to facilitate draining of the fuel into containers. The wing tip remained attached.

Engine

The engine remained attached to the airframe via the mounts, cables, and wires. The propeller remained attached to the propeller hub, which remained attached to engine. The fuel inlet screen was removed and was free of debris. The fuel injectors were removed from the engine and a partial obstruction was observed in all injectors, however, utilization of low air pressure air removed the obstructions. All lines from the divider and vent return were intact. The turbocharger remained attached to the engine; the impeller rotated smoothly by hand and exhibited soft or minor damage to two of the impeller blades. An undetermined quantity of oil was observed in the turbocharger drain back tank. The turbocharger waste gate operated smoothly with no abnormalities noted. All ignition leads were intact and secured to the spark plugs. The top and bottom spark plugs were removed and appeared normal in wear and slightly dark in color. The bottom sparkplugs were wet with oil, which was consistent with the at-rest position of the engine. The engine was rotated utilizing the propeller through the propeller hub and continuity was confirmed to the right rear magneto pad and the magneto impulse coupling was audibly observed to be actuating. Thumb suction and compression was confirmed on all six cylinders. The magnetos were removed and were spun utilizing a cordless drill; however, no spark was observed. The left and right magnetos remained attached to the engine. The engine driven fuel pump was removed and the shaft remained intact. The vacuum pump was removed and rotation was accomplished by hand with suction noted at the intake fitting. The oil dipstick was present and oil was observed on the oil dipstick; however, an accurate quantity could not be determined. The density control and pop off valves remained attached to the engine. The oil filter was removed, cut open, and was free of metallic particulates. The air/oil separator was removed and examined, revealing oil was present in the screen and a minimal amount of debris was noted.

No obstructions were observed in the exhaust crossover section.

Propeller

The Hartzell 3-bladed propeller exhibited S-bending and tip curling on all blades. All three propeller blades were bent in the aft direction between 17 and 19 inches from the propeller hub. The propeller governor remained attached to the engine and operated with no abnormalities noted.

Medical and Pathological Information

An autopsy was performed on the pilot on July 19, 2014 by District 21, State of Florida, Office of the District Medical Examiner. The cause of death was listed as "Drowning."

Forensic toxicology was performed on specimens from the pilot by the FAA Bioaeronuatical Sciences

Research Laboratory, Oklahoma City, Oklahoma. The toxicology report revealed the following:
96 (mg/dl, mg/hg) Ethanol detected in Liver
46 (mg/dl, mg/hg) Ethanol detected in Muscle
N-Propanol detected in Liver
N-Propanol detected in Muscle

Additionally, putrefaction (which consists of the post-mortem creation of ethanol) was noted as yes. The report further stated that no drugs were detected in the liver.

Additional Information

CFR Part 91.9(a) states, "Except as provided in paragraph (d) of this section, no person may operate a civil aircraft without complying with the operating limitations specified in the approved Airplane or Rotorcraft Flight Manual, markings, and placards, or as otherwise prescribed by the certificating authority of the country of registry."

Pilots Handbook of Aeronautical Knowledge (FAA-H-8083-25A)

Section 4 "Aerodynamics of Flight" states "The CG [center of gravity] range is very important when it comes to stall recovery characteristics. If an aircraft is allowed to be operated outside of the CG, the pilot may have difficulty recovering from a stall. The most critical CG violation would occur when operating with a CG which exceeds the rear limit. In this situation, a pilot may not be able to generate sufficient force with the elevator to counteract the excess weight aft of the CG. Without the ability to decrease the AOA [angle of attack], the aircraft continues in a stalled condition until it contacts the ground."

The "Glossary" defines CG as "the point at which an airplane would balance if it were possible to suspend it at that point. It is the mass center of the airplane, or the theoretical point at which the entire weight of the airplane is assume to be concentrated. It may be expressed in inches from the reference datum, or in percentage of mean aerodynamic chord (MAC). The location depends on the distribution of weight in the airplane."

Advisory Circular (AC) 61-67C "Stall and Spin Awareness Training"

Chapter 1 "Ground Training: Stall and Spin Awareness" states in part "The CG location has a direct effect on the effective lift and AOA of the wing, the amount and direction of force on the tail, and the degree of stabilizer deflection needed to supply the proper tail force for equilibrium. The CG position, therefore, has a significant effect on stability and stall/spin recovery. As the CG is moved aft, the amount of elevator deflection needed to stall the airplane at a given load factor will be reduced…this could make the entry into inadvertent stalls easier…IN an airplane with an extremely aft CG, very light back elevator control forces may lead to inadvertent stall entries…"

Saratoga II TC PA-32R-301T Pilot Operating Handbook (POH)

Section 6 "Weight and Balance" states in part "Misloading carries consequences for any aircraft. An Overloaded airplane will not take off, climb or cruise as well as a properly loaded one. The heavier the airplane is loaded, the less climb performance it will have. Center of gravity [C.G.] is a determining factor in flight characteristics. If the C.G. is too far forward in any airplane, it may be difficult to rotate for takeoff or landing. If the C.G. is too far aft, the airplane may rotate prematurely on takeoff or tend to pitch up during climb. Longitudinal stability will be reduced. This can lead to inadvertent stall and even spins…"

Weight and Balance

According to the POH the airplane's maximum gross weight limit was 3600 pounds and the CG envelope was between 78 and 95 inches, depending on the aircraft weight. The airplane's weight and balance was calculated utilizing the available information for the fuel, pilot's weight at autopsy, cargo distribution, and airplane configuration. Although it could not be conclusively determined the amount of fuel on board at the time of departure, 15 gallons of fuel was removed from the right fuel tank. Assuming that the left fuel tank was devoid of fuel, the airplane would have weighed approximately 3,547 pounds. The CG Moment Envelope indicated that the accident airplane's CG may have been near the aft CG limit, but within the envelope. However, it could not be accurately determined how the tiles were distributed in the cabin. If the tiles were loaded in, or shifted to, the forward section of the cargo compartment the CG could have been as far forward as 91.56 inches. If the tiles were loaded in, or shifted to, the aft section of the cargo compartment then the CG could have been as much as 98.93 inches or 3.93 inches aft of the most rearward approved CG.

Administrative Information

Investigator In Charge (IIC):	Etcher, Shawn
Additional Participating Persons:	William J Stokes; FAA/FSDO; Tampa, FL Ron Maynard; Piper Aircraft; Vero Beach, FL Judson L Rupert; Lycoming Engines; Williamsport, PA
Original Publish Date:	April 6, 2015
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=89674