

National Transportation Safety Board
Washington, DC 20594

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Brief of Accident

Adopted 01/31/2013

ERA11LA388
File No. 30791 07/04/2011 Orange Beach ,AL Aircraft Reg No. N109DP Time (Local): 14:30 CDT

Make/Model: Cessna/172N
Engine Make/Model: Lycoming / O-360-A4M
Aircraft Damage: Substantial
Number of Engines: 1
Operating Certificate(s): None
Type of Flight Operation: Banner Tow
Reg. Flight Conducted Under: Part 91: General Aviation

	Fatal	Serious	Minor/None
Crew	0	0	2
Pass	0	0	0

Last Depart. Point: Foley, AL
Destination: Local Flight, AL
Airport Proximity: Off Airport/Airstrip

Condition of Light: Day
Weather Info Src: Weather Observation Facility
Basic Weather: Visual Conditions
Lowest Ceiling: None
Visibility: 10.00 SM
Wind Dir/Speed: 160 / 008 kts
Temperature (°C): 32
Precip/Obscuration: No Obscuration; No Precipitation

Pilot-in-Command Age: 53

Flight Time (Hours)

Certificate(s)/Rating(s)
Airline Transport; Flight Instructor; Multi-engine Land; Single-engine Land

Total All Aircraft: 7164
Last 90 Days: 75
Total Make/Model: 500
Total Instrument Time: 409

Instrument Ratings
Airplane

*** Note: NTSB investigators may not have traveled in support of this investigation and used data provided by various sources to prepare this aircraft accident report. ***

The airplane had been modified by several Supplemental Type Certificates (STCs) allowing the use of 91 minimum octane alcohol-free fuel, or a combination of 100LL and 91 minimum octane ethanol-free fuel. After takeoff while operating the engine on a mixture of 100LL and 87 octane automotive fuels with 10 percent ethanol additive, the engine experienced abnormal combustion in the No. 3 cylinder, which burned a hole through the cylinder near the lower spark plug hole. The resulting loss of engine power necessitated a forced landing in water. Postaccident examination of the engine revealed no discrepancies with the power train, ignition, lubrication, or air induction systems that would have led to the event. Metallurgical examination of the No. 3 cylinder revealed no manufacturing defects that would have damaged to the cylinder. No placards were noted by either fuel cap; these were required by the installed STCs specifying minimum octane rating of 91 without alcohol; however, on the day of the accident, the airplane underwent a 100-hour inspection by the pilot-in-command who held a mechanic certificate with airframe and powerplant ratings and inspection authorization; he had also performed the modification allowing the airplane to use automotive fuel. Although no fuel samples were retained for testing, the damage to the cylinder was consistent with the usage of unapproved fuel with too low an octane rating.

Updated at Jan 31 2013 3:28PM

Brief of Accident (Continued)

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OCCURRENCES

Enroute-cruise - Loss of engine power (partial)
Emergency descent - Ditching
Landing-flare/touchdown - Nose over/nose down

FINDINGS

Aircraft-Aircraft power plant-Engine (reciprocating)-Recip eng cyl section-Failure - C
Aircraft-Fluids/misc hardware-Fluids-Fuel-Fluid type - C
Aircraft-Aircraft handling/service-Maintenance/inspections-Scheduled maint checks-Inadequate inspection - F
Aircraft-Aircraft handling/service-Placards and markings-(general)-Not serviced/maintained - F

Findings Legend: (C) = Cause, (F) = Factor

The National Transportation Safety Board determines the probable cause(s) of this accident as follows:
The operation of the airplane using unapproved fuels, which resulted in abnormal combustion and subsequent damage to the No. 3 cylinder.
Contributing to the accident was the inadequate 100-hour inspection because the mechanic failed to note the lack of placards by either fuel filler cap specifying the minimum automotive fuel grade and no alcohol allowed as specified by the installed STC's.