



# National Transportation Safety Board Aviation Accident Final Report

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<b>Location:</b>	Elko, NV	<b>Accident Number:</b>	WPR18FA073
<b>Date &amp; Time:</b>	01/11/2018, 1802 PST	<b>Registration:</b>	N54857
<b>Aircraft:</b>	PIPER PA 23-250	<b>Aircraft Damage:</b>	Destroyed
<b>Defining Event:</b>	Turbulence encounter	<b>Injuries:</b>	1 Fatal
<b>Flight Conducted Under:</b>	Part 91: General Aviation - Positioning		

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## Analysis

The commercial pilot departed on the cross-country flight in night visual meteorological conditions over mountainous terrain. About 3 hours after takeoff, the pilot reported to an air traffic controller that he was encountering clouds and was going to turn around to avoid icing conditions. The controller provided the pilot with information for the nearest airport, which was about 40 miles north. The pilot replied that it was "getting super turbulent" and that he was going to "head over" to the airport. Communication and radar contact with the airplane were lost shortly thereafter. Examination of the wreckage revealed no evidence of any preimpact mechanical malfunctions or failures that would have precluded normal operation.

Radar and GPS data revealed that the airplane was flying east when it crossed less than 900 ft above the ridgeline of a high mountain peak and turned toward the downwind (or leeward) side of the ridge, where the airplane began to descend and its speed decayed. The accident site was found near the end of the radar track on the east side and near the summit of the peak, at an elevation about 10,090 ft mean sea level. Review of weather information indicated that the accident site was located in an area favorable for mountain wave conditions with downdrafts as strong as 1,200 ft per minute, and that icing conditions were likely present at the accident site at the time of the accident. It is likely that the downdrafts exceeded the airplane's climb capability and resulted in its descent into terrain.

Although the pilot filed a visual flight rules flight plan, a search of multiple official weather briefing sources revealed that the pilot did not request an official weather briefing before the accident flight. The area of the accident site at the altitude at which the airplane was flying was included in AIRMET's for moderate icing and moderate turbulence. Additionally, winds aloft forecasts near the accident site indicated favorable wind conditions for the development of mountain wave; however, since the pilot did not obtain a weather briefing before the flight, it is likely that he was unaware of these weather conditions along his route, and the hazards that they posed to the flight.

## Probable Cause and Findings

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

The pilot's inadequate preflight weather planning, which resulted in the flight over mountainous terrain into forecast instrument meteorological conditions, icing, and mountain wave, and resulted in an uncontrolled descent and collision with terrain.

### Findings

<b>Aircraft</b>	Altitude - Not attained/maintained (Cause)
<b>Personnel issues</b>	Decision making/judgment - Pilot (Cause) Weather planning - Pilot (Cause) Aircraft control - Pilot (Cause)
<b>Environmental issues</b>	Terrain induced turbulence - Effect on operation (Cause) Below VFR minima - Decision related to condition (Cause) Conducive to structural icing - Effect on operation (Cause)

## Factual Information

On January 11, 2018, about 1800 Pacific standard time, a Piper PA-23-250 airplane, N54857, collided with mountainous terrain about 42 miles south of Elko, Nevada. The commercial pilot was fatally injured, and the airplane was destroyed. The airplane was registered to Mach Tuck, LLC and operated by Air America Flight Center, LLC as a Title 14 *Code of Federal Regulations Part 91* positioning flight. Night visual meteorological conditions prevailed, and a visual flight rules (VFR) flight plan was filed for the flight, which departed about 1500 from McClellan Airfield (MCC), Sacramento, California, with a destination of Salt Lake City International Airport (SLC), Salt Lake City, Utah.

Review of radar and onboard GPS data revealed that the airplane was flying east at an altitude of about 11,500 ft mean sea level (msl) and approaching 11,084-ft-tall Pearl Peak when the pilot reported to air traffic control that he was encountering clouds and was going to turn around to avoid entering icing conditions. The controller then asked if he would like information on nearby airports. The pilot asked for information about the nearest airport and indicated that he would "head over there." The controller provided information for Elko Regional Airport (EKO), Elko, Nevada, about 40 miles north of the airplane's position, and the pilot replied, "Alright, I'm getting super turbulent over here I'm going to head over there." Communication and radar contact with the airplane were lost shortly thereafter. Radar data showed the airplane cross the ridgeline north of Pearl Peak at an altitude of 11,635 ft at a ground speed of 176 knots; the airplane then turned southeast of Pearl Peak as it descended and its ground speed decreased before the track ended.

After an initial search for the airplane at local airports was unsuccessful, the Federal Aviation Administration (FAA) issued an Alert Notice (ALNOT) and the wreckage was located by air on January 19, 2018. The accident site was found near the end of the radar track, on the east side of Pearl Peak, at an elevation of 10,090 ft msl. (see figure 1).

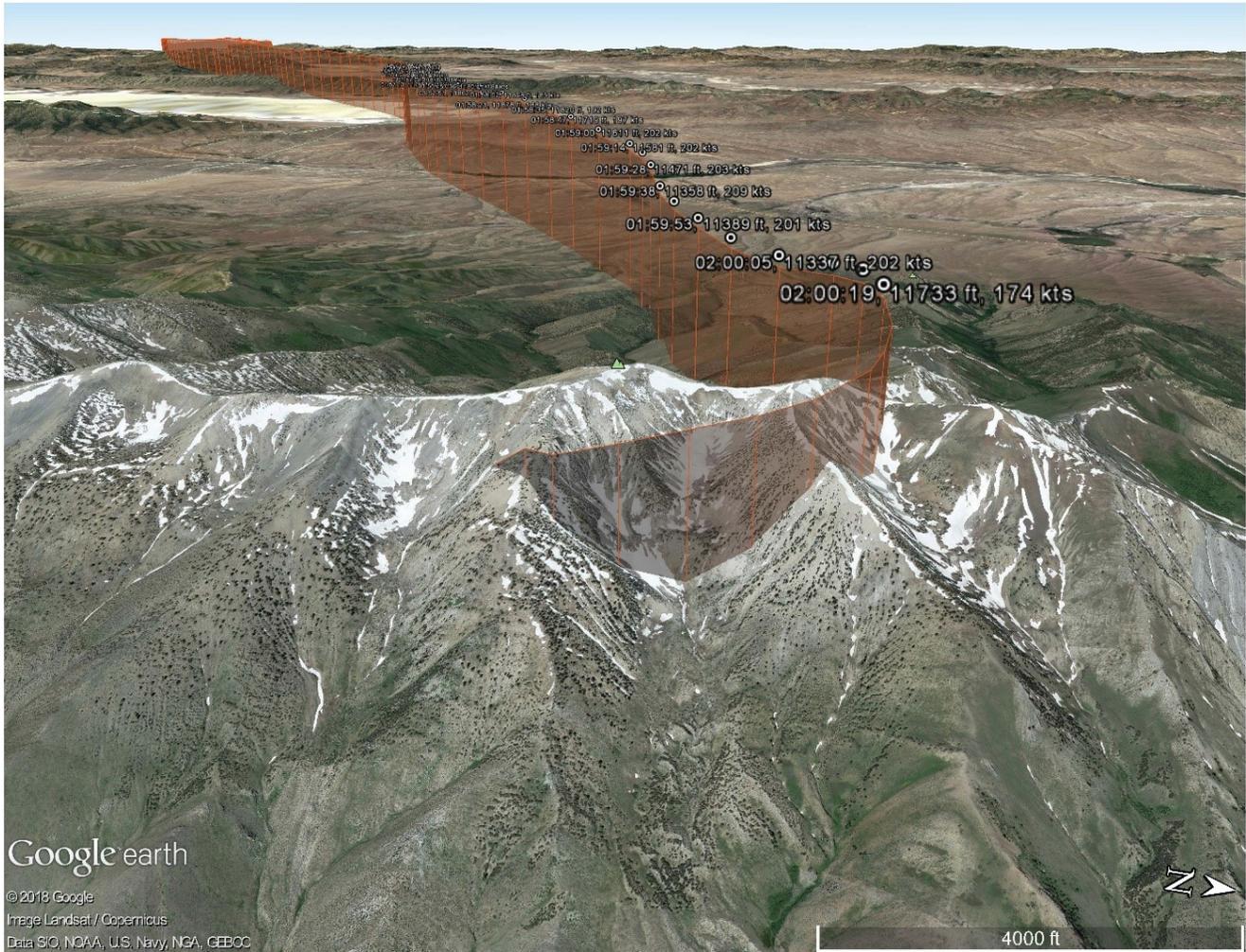


Figure 1. GPS flight track, west view

## PERSONNEL INFORMATION

The pilot, age 26, held a commercial pilot certificate with ratings for airplane single- and multi-engine land and instrument airplane. His most recent second-class FAA medical certificate was issued in May 2017.

The pilot's logbook indicated 643.6 total hours of flight experience as of January 10, 2018. His most recent flight review on July 21, 2017, in a PA-23-250. He had accumulated 230 hours in the PA-23-250 airplane in the 6 months before the accident. During those 6 months, the pilot mostly flew in the midwest and northeast United States, with the exception of the last two recorded local flights, which originated from MCC. The pilot had flown 15.5 hours in actual instrument conditions in the previous 6 months.

## METEOROLOGICAL INFORMATION

Although the pilot filed a flight plan, a search of multiple official archived weather briefing sources revealed that he did not request an official weather briefing. During the accident flight

the pilot received portions of the recorded weather at EKO from the controller just before the accident. The information included winds from 030° at 3 knots, 10 statute miles visibility or greater, few clouds at 9,000 ft above ground level, temperature 5° C, dew point -1° C, and an altimeter setting of 30.12 inches of mercury. EKO was located about 42 miles north of the accident site at an elevation of 5,139 ft msl.

AIRMET Zulu and Tango advisories were valid for the accident site at the accident time. They reported moderate icing conditions between the freezing level and 20,000 ft msl, and identified the freezing level as between the surface and 9,000 ft. AIRMET Tango warned of moderate turbulence below 18,000 ft msl.

A winds and temperatures aloft forecast for Battle Mountain, Nevada, which was about 80 miles to the west of the accident site was issued at 1202 and valid through 1900. The forecast indicated wind at 9,000 ft msl from 250° at 23 knots; at 12,000 ft msl from 240° at 32 knots; and at 18,000 ft from 250° at 42 knots.

GOES-16 Nighttime Microphysics satellite imagery was consistent with mid-level water clouds and thick mid-level water or ice clouds typically associated with an icing hazard above the accident site around that time of the accident.

ZLC CWSU issued several weather products as supplemental aviation information on the day of the accident and posted this to social media channels throughout the day of the accident, urging pilots to obtain a detailed weather briefing before flight.

An NTSB weather study indicated, before impacting terrain, the airplane was in an area of downdrafts with a magnitude between 800 and 1,200 fpm with increasing downdraft magnitude near and east of the mountain. West of the mountain the airplane would have been in an area of updrafts with magnitudes of 300 to 600 fpm.

According to the Astronomical Applications Department at the United States Naval Observatory, sunset was at 1636, the end of civil twilight was at 1706, and moonset was at 1303.

## WRECKAGE AND IMPACT INFORMATION

The initial identification and assessment of the airplane was conducted by Ruby Mountain Helicopter Skiing organization on January 21, 2018. Due to weather and snowpack, the site was not accessible until most of the snowpack had melted.

On June 15, 2018, examination of the accident site revealed that the airplane came to rest on steep, sparsely wooded terrain and was destroyed by impact forces. The wreckage, including all major structural airplane components and primary flight controls, was contained within a debris field about 325 ft long and oriented on a magnetic heading of about 213°. (see figure 2)

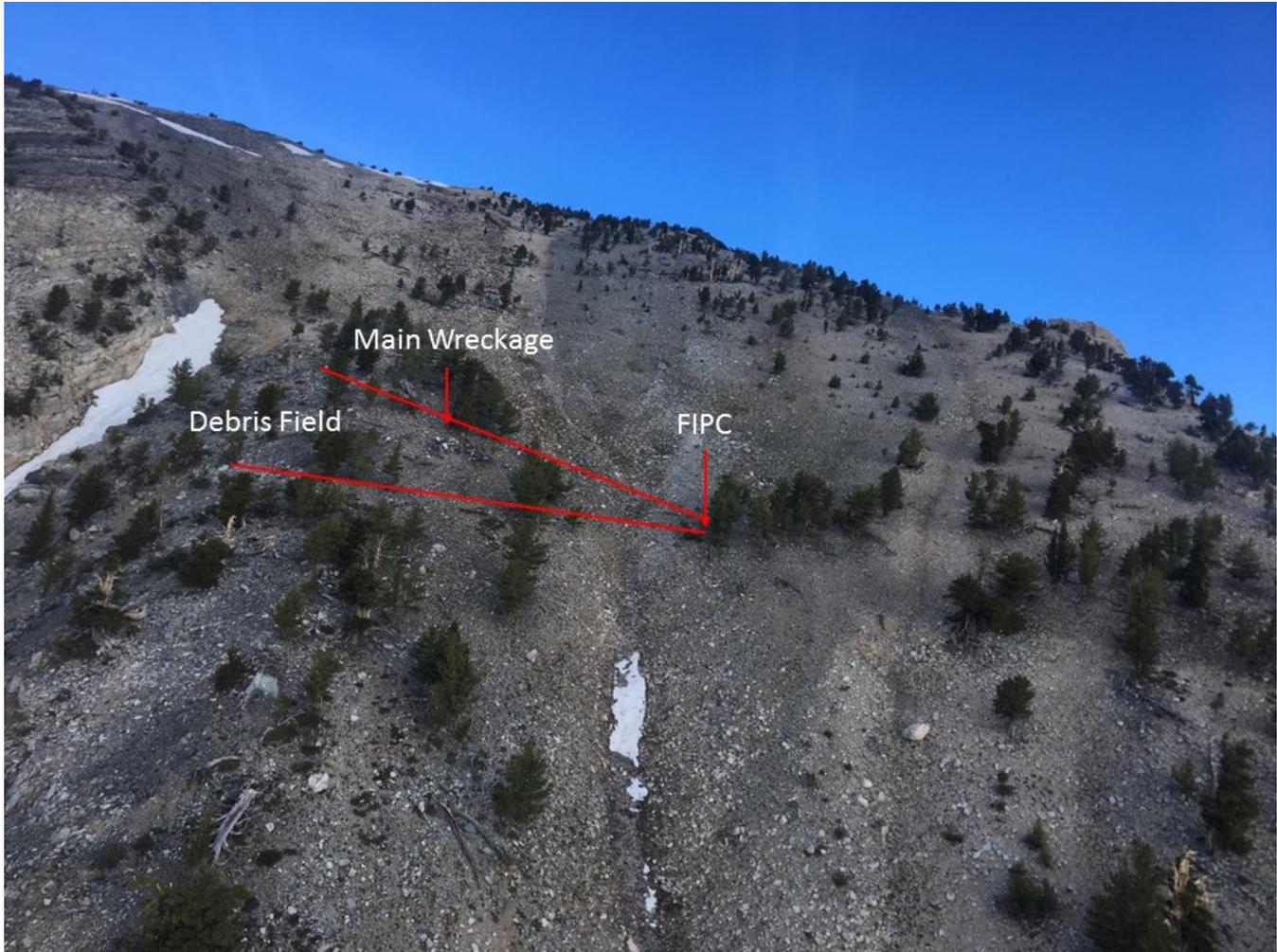


Figure 2-Aerial View of the Accident Site

## MEDICAL AND PATHOLOGICAL INFORMATION

The Washoe County Regional Medical Examiner's Office, Reno, Nevada, performed an autopsy on the pilot. The cause of death was noted as blunt force trauma.

Toxicology testing was not performed.

## ADDITIONAL INFORMATION

### Airplane Performance

The gross weight of the airplane at the time of the accident was not determined. According to the Owner's Handbook, the airplane's service ceiling (the altitude where the maximum rate of climb is 100 ft per minute (fpm) was about 19,800 ft density altitude at a gross weight of 5,200 lbs, and was about 21,000 ft density altitude at a gross weight of 4,800 lbs. The stall speed in the clean configuration at maximum gross weight was 66 knots calibrated airspeed (KCAS) or 76 knots indicated airspeed (KIAS).

Review of the Owner's Handbook climb performance charts indicated that the rate of climb at a weight of 4,800 lbs. was about 900 fpm at 10,000 ft msl and about 650 fpm at 12,000 ft msl. At a gross weight of 5,200 lbs. the rate of climb was about 790 fpm at 10,000 ft msl and about 550 fpm at 12,000 ft msl.

FAA Aviation Safety Program Publication (FAA-P-8740-60), Tips on Mountain Flying, states that, "mountain flying...is very unforgiving of poor training and planning," and that it is "essential" for pilots to receive training in mountain flying operations. The publication described several performance factors related to operation at high density altitudes, including decreased rate of climb performance and increased true airspeed for a given indicated airspeed.

The publication also described weather hazards and other considerations associated with mountain flying:

### *Ridge and Pass Crossing*

*On most mountain flights, you will need to cross at least one ridge or pass. Experienced pilots recommend crossing a ridge or pass at the ridge elevation plus at least 1,000 feet. If the winds at mountain top level are above 20 knots, increase that to 2,000 feet. Plan to be at that altitude at least three miles before reaching the ridge and stay at that altitude until at least three miles past it. This clearance zone will give you a reasonable safety zone to avoid the most severe turbulence and down drafts in windy conditions.*

*When you actually cross a ridge, you should do so at a 45° angle to the ridge. This allows you to turn away from the ridge quicker if you encounter a severe downdraft or turbulence. Once you have crossed the ridge, turn directly away from it at a 90° angle to get away from the most likely area of turbulence quickly. Plan your crossing to give yourself the ability to turn toward lower terrain quickly if necessary.*

The Aeronautical Information Manual (AC 00-57), Section 5, Potential Flight Hazards, described the phenomenon known as mountain wave:

*Mountain waves occur when air is being blown over a mountain range or even the ridge of a sharp bluff area. As the air hits the upwind side of the range, it starts to climb, thus creating what is generally a smooth updraft which turns into a turbulent downdraft as the air passes the crest of the ridge...*

*Pilots from flatland areas should understand a few things about mountain waves in order to stay out of trouble. When approaching a mountain range from the upwind side (generally the west), there will usually be a smooth updraft; therefore, it is not quite as dangerous an area as the lee of the range. From the leeward side, it is always a good idea to add an extra thousand feet or so of altitude because downdrafts can exceed the climb capability of the aircraft. Never expect an updraft when approaching a mountain chain from the leeward. Always be prepared to cope with a downdraft and turbulence.*

*When approaching a mountain ridge from the downwind side, it is recommended that the ridge be approached at approximately a 45 degree angle to the horizontal direction of the*

ridge. This permits a safer retreat from the ridge with less stress on the aircraft should severe turbulence and downdraft be experienced. If severe turbulence is encountered, simultaneously reduce power and adjust pitch until aircraft approaches maneuvering speed, then adjust power and trim to maintain maneuvering speed and fly away from the turbulent area.

FAA Advisory Circular 00-57, Hazardous Mountain Winds and Their Visual Indicators, stated that:

*Aircraft that engage in low-level flight operations over mountainous terrain in the presence of strong winds (20 kt or greater at ridge level) can expect to encounter moderate or greater turbulence, strong up- and downdrafts, and very strong rotor and shear zones. This is particularly true for general aviation aircraft.*

## History of Flight

<b>Enroute</b>	VFR encounter with IMC Turbulence encounter (Defining event)
<b>Maneuvering</b>	Collision with terr/obj (non-CFIT)

## Pilot Information

<b>Certificate:</b>	Commercial	<b>Age:</b>	26, Male
<b>Airplane Rating(s):</b>	Multi-engine Land; Single-engine Land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 2 Without Waivers/Limitations	<b>Last FAA Medical Exam:</b>	05/31/2017
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	04/13/2017
<b>Flight Time:</b>	643 hours (Total, all aircraft), 232 hours (Total, this make and model), 127 hours (Last 90 days, all aircraft), 10 hours (Last 30 days, all aircraft)		

## Aircraft and Owner/Operator Information

Aircraft Make:	PIPER	Registration:	N54857
Model/Series:	PA 23-250 250	Aircraft Category:	Airplane
Year of Manufacture:	1975	Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	27-7554157
Landing Gear Type:	Retractable - Tricycle	Seats:	3
Date/Type of Last Inspection:	01/07/2018, 100 Hour	Certified Max Gross Wt.:	5200 lbs
Time Since Last Inspection:		Engines:	2 Reciprocating
Airframe Total Time:	17259 Hours as of last inspection	Engine Manufacturer:	LYCOMING
ELT:	C91 installed, not activated	Engine Model/Series:	I0-540 SER
Registered Owner:	Mach Tuck, LLC	Rated Power:	250 hp
Operator:	Air America Flight Center	Operating Certificate(s) Held:	None

## Meteorological Information and Flight Plan

Conditions at Accident Site:	Unknown	Condition of Light:	Night
Observation Facility, Elevation:	KEKO, 5074 ft msl	Distance from Accident Site:	31 Nautical Miles
Observation Time:	0156 UTC	Direction from Accident Site:	327°
Lowest Cloud Condition:	Few / 9000 ft agl	Visibility	10 Miles
Lowest Ceiling:		Visibility (RVR):	
Wind Speed/Gusts:	3 knots /	Turbulence Type Forecast/Actual:	/ Unknown
Wind Direction:	30°	Turbulence Severity Forecast/Actual:	/ Unknown
Altimeter Setting:	30.12 inches Hg	Temperature/Dew Point:	5°C / -1°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Sacramento, CA (KMCC)	Type of Flight Plan Filed:	VFR
Destination:	Salt Lake City, UT (KSLC)	Type of Clearance:	VFR; VFR Flight Following
Departure Time:	1500 PST	Type of Airspace:	Class E

## Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	N/A	Aircraft Fire:	On-Ground
Ground Injuries:	N/A	Aircraft Explosion:	Unknown
Total Injuries:	1 Fatal	Latitude, Longitude:	40.231389, -115.533333 (est)

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Andrew L Swick	<b>Report Date:</b>	05/19/2020
<b>Additional Participating Persons:</b>	Lee Oscar; FAA-FSDO; Reno, NV Jonathon Hirsch; Piper Aircraft, Inc.; Wichita, KS Mark W Platt; Lycoming Engines; Phoenix, AZ Scott Birch; NOAA/NWS; Unknown, UN		
<b>Publish Date:</b>	05/19/2020		
<b>Note:</b>	The NTSB traveled to the scene of this accident.		
<b>Investigation Docket:</b>	<a href="http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=96615">http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=96615</a>		

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The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).