

# AIRCRAFT ACCIDENT FINAL REPORT

Landed short of runway

M-05608/AIG-16 N558RS Piper PA 46 (Malibu Mirage) Egilsstaðir Airport Iceland September 11, 2008



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## Synopsis

The pilot of N558RS (Piper PA46) had planned to conduct a ferry flight from the USA to Finland via Canada, Greenland and Iceland. When landing at Egilsstaðir Airport (Iceland) the weather was considerably worse than forecasted. During final approach the pilot decided to perform a go-around due to low visibility. The decision was however made too late and the aircraft hit the ground approximately 700 meters short of the runway. The pilot managed to evacuate the aircraft safely and no fire ignited.

The Icelandic Aircraft Accident Investigation Board (IAAIB) conducted an investigation to the accident and concluded that the cause of the accident was that the pilot did not follow his instruments in IMC conditions and his late decision to goaround. According to the pilot's comments, fatigue as well as lack of experience on this aircraft type, were contributing factors to the accident.

Two recommendations were made.

## **1** Factual information

Location:	Egilsstaðir Airport (BIEG). Short of RWY 04.		
Date:	September 11 <sup>th</sup> , 2008.		
Time <sup>1</sup> :	22:12.		
Type of flight:	Ferry flight.		
Persons on board:	1.		
Injuries:	None.		
Nature of damage:	Aircraft damaged beyond economic repair.		
Short description:	Aircraft hit the ground approximately 700 meters short of RWY 04.		
Owner:	Private.		
Operator:	N/A.		
Weather:	010°/10 knots, visibility +10 Km, FEW001 SCT030 BKN060, 9°C, QNH 993.		
Meteorological conditions:	Instrument Meteorological Conditions (IMC).		
Flight rules:	Instrument Flight Rules (IFR).		

<sup>&</sup>lt;sup>1</sup> All times in this report are UTC (Coordinated Universal Time)

#### 1.1 History of the flight

On September 11<sup>th</sup> 2008 at 11:16 (08:16 local time Goose Bay), the pilot of N558RS took off from Goose Bay Airport, Canada (CYYR), for a ferry flight to Egilsstadir Airport, Iceland (BIEG). En-route he made a one hour refueling stop at Narsarsuaq Airport, Greenland (BGBW). The purpose of the trip was to ferry the aircraft from the USA to Finland.

The day prior to the accident, the pilot of this flight had traveled within the USA and landed in Goose Bay at 01:39 (22:39 local time).

When overhead Reykjavik Airport (BIRK), the pilot received updated weather information that indicated considerably worse weather at BIEG than forecasted. Later, after contacting AFIS<sup>2</sup> at BIEG, the pilot determined that the weather would most probably be above IFR minima and planned an ILS approach for runway 04. When the aircraft was 55 Nm (approximately 25 minutes flight) from BIEG, the pilot received information from AFIS that the clouds were scattered at 3.000 feet and broken at 6.000 feet. The runway was "clear" but a fog was "low drifting" in the vicinity of the airport. In the fog, the visibility was down to 200 meters. The pilot copied this information and prepared for a missed approach in case the fog would affect the visibility for landing.

During the approach, the pilot had RWY 04 in sight as well as the PAPI lights and, according to the pilot's statement, he anticipated a visual approach and landing. The pilot had selected the gear down, flaps 20<sup>3</sup> and the landing lights were turned on. When he got closer to RWY 04 the visibility got shrouded and the pilot was not sure if he still had the PAPI lights in sight. He did however believe that he would be able to land. The pilot stated that he continued the approach in accordance with his image of the runway but when he realized that he was aiming short of RWY 04 he decided to initiate a go-around. Less than two seconds later the aircraft hit the ground, short of the runway.

The pilot contacted the radio operator in BIEG AFIS and stated that he had landed short of the runway but was able to evacuate the aircraft safely.

<sup>&</sup>lt;sup>2</sup> Aerodrome Flight Information Service.

<sup>&</sup>lt;sup>3</sup> There are three possible selections of flaps, 10°, 20° and 36°. The pilot chose to use flaps 20° as a preparation for possible go-around.

#### 1.2 Injuries to persons

None.

#### 1.3 Damage to aircraft

The landing gear broke off. The wing attachments fractured partially and the fuselage crumbled. All the propeller blades broke off. When inspecting the aircraft from the inside, damage could be found to the structural frame. It was evaluated that the aircraft was damaged beyond economical repair, see Figure 1.



Figure 1: The damage to the aircraft was evaluated to be beyond economical repair

#### 1.4 Other damage

None.

### 1.5 Personnel information

Commander				
Age, sex:	55 year old, male.			
License:	Holder of a commercial license issued by the FAA on the 8 <sup>th</sup> of February 2005. The license was valid.			
Medical certificate:	Second class, valid. vision.	Must wear glasses for distance		
Ratings:	Commercial Pilot.			
Experience⁴:	Total all types: Total on type: Last 90 days: Last 24 hours:	3.300 hrs.   16 hrs.   85 hrs.   11.		
Previous rest period:	09:37 hours.			

The pilot's ferry flying experience was approximately 80 ferry flights. The pilot had landed at BIEG four times prior to the accident. His last time at BIEG was approximately one month prior to the accident when he made a missed approach due to fog. At that time he diverted to Akureyri Airport (BIAR) where he landed safely.

<sup>&</sup>lt;sup>4</sup> Incl. this flight

## 1.6 Aircraft information

Aircraft		
Туре:	Piper PA 46-350P Malibu Mirage.	
Registration:	N558RS.	
Year of manufacture:	1998.	
Serial number:	4636172.	
Type certificate number:	A25SD.	
Certificate of Airworthiness:	Issued 22 <sup>nd</sup> of September 1998.	
Engine manufacturer:	Lycoming.	
Engine serial number:	L-10016-61A.	
Propeller manufacturer:	Hartzell.	
Propeller serial number:	HK 260A.	

#### 1.7 Meteorological information

On the day of the accident, northeasterly winds were prevailing over Iceland most of the day. A warm front passed over the country from the southeast with rain and drizzle at BIEG, but when the front passed over the eastern part of Iceland (after 18 UTC) the precipitation stopped and winds aloft turned southeasterly. According to observations the air was humid behind the frontal zone. Based on those observations the assumption can be made that low clouds and visibility were widespread in large areas of east-Iceland, at least in the eastern coastal areas. Most of the 'in-land' weather stations are automatic, but without visibility or cloud sensors. Therefore no suitable data is available from these weather stations to give a clear and precise description of the ceiling and visibility conditions at the time of the accident.

Below is a description of the hourly measured weather at BIEG, from 16:00 to midnight.

Time	Wind	Visibility	Weather	Clouds	T/TD	QNH
16:00	01006KT	8000	PAD7		11/08	00003
10.00	01000101	8000	NADZ	1 E 1013 BR11020 O 10040	11/00	0995
17:00	01007KT	9999	-RADZ	FEW006 BKN025 OVC040	11/08	Q0992
18:00	36006KT	9999	-RADZ	FEW008 BKN025 BKN045	10/08	Q0992
19:00	36004KT	9999		FEW006 BKN035 BKN060	10/08	Q0992
20:00	01005KT	9999		SCT005 BKN035 BKN060	10/08	Q0993
21:00	36005KT	7000	BR	BKN002 BKN020 OVC048	09/07	Q0993
22:00	01010KT	9999		FEW001 SCT030 BKN060	09/07	Q0993
23:00	01008KT	2000		FEW002 SCT020 BKN060	08/07	Q0993
00:00	01007KT	9999		SCT002 BKN030 BKN040	08/07	Q0993

A significant decrease in visibility was recorded at 23:00 UTC, but otherwise, the visibility was sufficient for operations at the aerodrome. No SPECI's were issued in regard to significant decrease in visibility or ceiling around the time of the accident. The fog did not cover the airstrip.

#### 1.8 Aids to navigation

The pilot followed the Instrument approach chart for Egilsstadir Airport, ILS RWY 04, published by Jeppesen. On this chart, it is noted that a minor GP fluctuation may occur between 2.5 and 3.5 DME see Figure 2. The pilot did not notice any fluctuation on the ILS. The pilot used the following chart for the approach to BIEG.



Figure 2: Jeppesen approach chart

The pilot intercepted the LLZ around 16 Nm from RWY 04 and followed the glide slope down to 1 Nm prior to RWY 04. The following figure shows the recorded flight path from the handheld GPS that was on board the aircraft. From the information it was possible to calculate the descent rate as approximately 820 feet pr. minute for the last 1.150 feet. According to Figure 2, at a ground speed of 100 kts, his descent rate should have been 538 ft/min.



#### Figure 3: Calculated decent rate on the approach.

During the initial stage of the approach the pilot had the runway and PAPI lights in sight. On short final he realized that he no longer had RWY 04 in sight and decided to perform a go-around. However this decision was made too late and the aircraft hit a river bank and came to a rest on a grassy area, 0.5 NM short of RWY 04.

By looking at the GPS information of the pilot's handheld GPS vs. the glide slope (GS) information on the published Instrument approach chart, the aircraft was approximately 300' below the GS when the aircraft passed the FAF (3.700'). At 9 DME the aircraft went above the GS and remained above it until 1 DME. At that time the aircraft descended below the GS until it hit the ground.



Figure 4: Glide path of the aircraft (N558RS) vs. glide slope (from the App. Chart).

#### 1.9 Communications

The communication between the aircraft and the AFIS operator at the destination airport was clear and normal prior to the accident. The pilot received information of fog in the area and expected the approach to be difficult. However it was not possible to locate the fog patches precisely since it was dark and not measured on the airport weather meter. The pilot informed the AFIS that he would give the approach a try and would be ready to make a "go-around". During the approach, the AFIS operator observed the aircraft approach profile as normal until it entered the fog. When the aircraft emerged out of the fog it was however at a lower altitude than he expected. The AFIS operator then called the aircraft with a "Pull-Up" command. At the same moment the aircraft hit the ground, approximately 0.5 NM short of the runway. The pilot does not remember hearing this command from the AFIS operator but it can be heard on the recording of the communications. The following figure shows the view from the tower in the direction of the approach and the accident site.



Figure 5: The view from the tower

#### **1.10** Aerodrome information

The airfield at Egilsstadir (BIEG) is located near a small town in mountainous area, where lights in the vicinity are limited. There is one runway at BIEG, RWY 04/22. The RWY is 1.850 meters long and 45 meters wide. There is a river parallel to the RWY with a bend in front of RWY 04, see Figure 6.

BIEG is equipped with the following lights:

- Threshold lights (Flashing white)
- PAPI lights
- Runway edge lights
- Runway end light



Figure 6: Egilsstadir area. The black line shows the GPS track of the aircraft.

#### 1.11 Flight recorders

N/A.

#### **1.12 Wreckage and impact information**

Just prior to impact the pilot had stopped the descent and pitched the aircraft up in order to perform a go-around. The aircraft hit the ground at a shallow angle and with its wings level. The landing gear struck the riverbank. The aircraft skidded forward approximately 20 meters on its belly before coming to a stop, see Figure 1.



Figure 7: The arrow shows where the aircraft hit the bank

#### 1.13 Medical and pathological information

According to the pilot's medical certificate, the pilot had to wear corrective lenses for distant vision. The pilot had passed his last examination a little more than two months prior to the accident (2. July 2008). The pilot did wear his corrective lenses during the approach to BIEG.

#### 1.14 Fire

No fire ignited.

#### 1.15 Survival aspects

The pilot was wearing the aircrafts standard, three point seat belts. He was able to open the door and evacuated the aircraft without injury.

#### 1.16 Tests and research

The approach for RWY 04 passes over the river "Lagarfljot". According to the statement of the AFIS operator the fog was located around the area where the picture below is taken. Due to the fog in the area, this might have given the pilot a false image of the runway.



Figure 8: Lagarfjót river in front of RWY 04

#### 1.17 Organizational and management information

The pilot was not the owner of the aircraft. His task was to ferry the aircraft from the USA to Finland. In co-ordination with the owner, the pilot got five hours of training prior to the trip in order to get familiar with the aircraft. This was a requirement from the insurance company.

#### 1.18 Additional information

At the time of the accident the position of the moon was about 5° above the horizon and the illumination was close to 87%. The moon was located behind the aircraft during the approach.

### 1.19 Useful or effective investigation techniques

N/A.

## 2 Analysis

## 2.1 The possible effect of Lagarfljot to the weather factor

The river "Lagarfljot" runs along the aerodrome. Several thermometers are situated in the river, according to the Hydrolocical institute<sup>5</sup>. The water temperature at Lagarfellsbru between 19:00 and 23:00 UTC on the 11th of September is found in the table beneath.

19:00	20:00	21:00	22:00	23:00
7,80 °C	7,70 °C	7,75 °C	7,80 °C	7,70 °C

Nearby rivers can often have an impact on local weather conditions at aerodromes, often by increasing the frequency of fog. The circumstances in this case are in many aspects not favorable for the formation of fog over rivers or lakes (such events are most often related to a large air-water temperature difference). In this case, the effect of the river could first and foremost stem from the river being a:

- Moisture source.
  - Adding water vapor to already humid air near the surface and thereby increasing the humidity to saturation levels (METAR observations at BIEG yield low clouds patches at 100-200 feet); and
- Cooling source.
  - The water was colder than the air above (varying from 1-3±C), so slight cooling from beneath could have lead to increased saturation of the already humid near-surface air.

The difference between the air and water temperatures was minor.

<sup>&</sup>lt;sup>5</sup> Vatnamælingar

#### 2.2 Flight path

During the approach, the AFIS operator (located in the airport tower) observed the aircraft's landing lights. He evaluated the profile to be normal before the aircraft entered the "fog bank" located in front of the runway. When the AFIS operator noticed the lights of the aircraft again, when it emerged from the fog, he realized that the aircraft was lower than expected. He advised the pilot to pull-up, but then realized that the aircraft had hit the ground.

#### 2.3 Human factors

The pilot is familiar with this type of operation, i.e. ferry flying aircraft overseas. At the time of the accident, his experience was about 80 ferry flights between the USA and Europe including 25 with a stop in Iceland and in four of them he landed at BIEG. About one month prior to the accident, the pilot performed a missed approach at BIEG due to low visibility and diverted to another airport.

At the day of the accident, the pilot had woken up at 09:00 (06:00, local time), after a minor rest period<sup>6</sup>. After about six hours sleep, he flew close to 10 hours plus one hour fuel stop in Greenland. The intended landing at BIEG was in the evening (22:12), in dark, where fog patches were affecting the approach. The airfield is located next to a small town in a mountainous area where lights are limited.

Since the approach and landing are generally recognized as the most critical phases of flight, visual illusions are potentially more dangerous than at other times. The pilot was likely fatigued during this phase of flight and the weather conditions (fog patches) influenced his visibility.

The aircraft's glide path was above the instrument approach chart's (LLZ/GP) until the aircraft entered a fog patch approximately 2 NM from the displaced threshold. When the aircraft entered the fog, the rate of descent increased resulting in the aircraft hitting the ground short of the runway. Entering a fog layer can create the illusion of a pitch-up attitude that may cause a pilot to respond with a nose-down correction, which steepens the approach path.<sup>7</sup>

 $<sup>\</sup>frac{6}{2}$  Prior landing was made at Goose Bay at 01:39 (22:39, local time).

<sup>&</sup>lt;sup>7</sup> Flight Safety Foundation (FSF), "FSF ALAR Briefing Note 5.3 -Visual Illusions," Flight safety Digest, November 2000

## 3 Conclusions

When the pilot was approaching RWY 04, he had been informed of fog patches in the area. The weather was marginal, i.e. perfect visibility to begin with during the initial approach to the runway and then suddenly very low visibility. Since the pilot had the runway in sight initially, he transitioned to visual approach and his focus was on the runway instead on his instruments. This was before the aircraft entered the fog located in front of the runway and above the river. As the aircraft entered the fog, the pilot lost sight of the runway and the aircraft's rate of descent increased resulting in the aircraft hitting the ground short of RWY 04.

IAAIB concludes that, as the aircraft entered the fog patch, the pilot responded to his illusion of a pitch-up attitude with a nose-down input, resulting in the aircraft hitting the ground short of the runway.

#### 3.1 Findings as to causes and contributing factors

- Illusion when entering fog patch at night
- During the approach, the pilot transitioned from IFR to VFR too early
- The pilot had minimum rest hours and was tired
- The initial weather report did not give accurate information of the visibility

#### 3.2 Findings as to risk

• The pilot lacked experience on this type of aircraft

#### 3.3 Other findings

• None

## 4 Safety recommendations and action taken

#### 4.1 Safety recommendation

- 1. IAAIB places emphasis on proper IFR approaches in Instrument Meteorological Conditions (IMC).
- 2. IAAIB places emphasis on proper rest period before all flights. In this respect, IAAIB recommends that the ICAA, in co-ordination with the Canadian and Danish authorities, inform ferry flight pilots of the importance of proper rest prior to long ferry flights.

Reykjavík November 30<sup>th</sup> 2012 Aircraft Accident Investigation Board Iceland

## 5 Appendices

#### 5.1 Appendix 1: Approach path





Profile from 3.000 feet to landing



Profile from 1.400 feet to landing





