NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

November 14, 2017

Group Chairman's Factual Report

AIR TRAFFIC CONTROL

CEN16FA286

Table Of Contents

A. ACCIDENT

Location: Sugar Land, TX
Date: July 26, 2016
Time: 1510 central daylight time (CDT)
2010 coordinated universal time (UTC)
Airplane: Options Flight 362, (OPT362), Embraer Executive Aircraft Model 505 (EMB505)

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C. SUMMARY

On July 26, 2016, at 1509 central daylight time, an Embraer EMB-505 airplane, N362FX, was substantially damaged during a runway excursion on landing at the Sugar Land Regional Airport (SGR), Sugar Land, Texas. The two pilots sustained minor injuries; the sole passenger was not injured. The airplane was registered to FlexJet LLC and operated by Flight Options LLC under the provisions of 14 *Code of Federal Regulations* (CFR) Part 135 as a corporate/executive flight. Visual meteorological conditions were reported at the airport; however, instrument meteorological conditions prevailed in the local area. The flight was operated on an instrument flight rules (IFR) flight plan. The flight originated from the Scottsdale Airport (SDL), Scottsdale, Arizona, at about 1029 mountain standard time.

The pilot-in-command reported that he flew an instrument landing system (ILS) approach to runway 35 (8,000 feet by 100 feet, concrete) and then transitioned to a visual approach. The approach and landing were normal; however, after touchdown the brakes seemed ineffective. He subsequently activated the emergency brake at which time the airplane started to slide. The airplane ultimately departed the end of the runway and encountered a small creek before coming to rest.

D. DETAILS OF THE INVESTIGATION

On Tuesday, August 2, 2016, the air traffic control (ATC) group convened at SGR and met with the SGR airport operations manager. The operations manager escorted the group on a tour of

the SGR airfield tour that included SGR runway 35 and the Automated Surface Observing System (ASOS). The group documented the runway 35 departure end, midfield, and approach end; while the NTSB Meteorology group chairman documented the ASOS equipment and location. The group conducted an inbrief with the acting air traffic manager (ATM), and then conducted a tour of the SGR airport traffic control tower (ATCT). The group documented tower weather equipment available to the air traffic controllers, reviewed controller records, ATC data and documents related to the accident, and conducted interviews[1] with the combined ground controller (GC) /controller in charge (CIC), and the local controller (LC).

On Wednesday, August 3, 2016, the group reconvened at the Houston (Terminal Radar Approach Control (TRACON) (I90), where they conducted an in brief with the I90 ATM. Others present at the in brief were the I90 staff support manager, I90 quality control manager, the event investigation manager, and a member of the Central Service Area (CSA) quality control group (QCG). The ATC group was given a tour of the I90 operational areas; reviewed a replay of the accident on a Standard terminal automation replacement system (STARS) display; reviewed controller records, ATC data and documents; and conducted interviews with the front line manager (FLM), and the Lakeside sector controller.

On Thursday August 4, 2016, the group completed the field notes and onsite portion of the investigation.

E. FACTUAL INFORMATION

1.0 History of Flight

OPT362 entered the Houston terminal area and was vectored by the I90 Lakeside controller for the ILS Runway 35 approach at SGR. As the flight proceeded southeast bound, the Lakeside controller issued a weather advisory to the pilot of OPT362, stating there was "heavy to extreme precipitation southeast quadrant of the Sugarland airport and it is sitting about a mile east of the extended centerline," and reported it as stationary.

When OPT362 was west of SGR, and being vectored to the southeast, the Lakeside controller contacted the SGR ATCT controller and requested they obtain a "ride report" on final from the aircraft that had just landed runway 35 at SGR. The SGR controller informed the Lakeside controller that the pilot of that aircraft stated, "ah it was fine just a couple cracks of lightning but that is about it." The Lakeside controller informed the pilot of OPT362 that there were no complaints on the "ride." The pilot acknowledged the report. At 1501:40, the Lakeside controller informed the pilot of OPT362 that there was an area of light precipitation ahead of the aircraft, which extended past SGR.

At 1505:32 the Lakeside controller cleared the pilot of OPT362 for the ILS runway 35 approach and transferred communications to the SGR ATCT.

At 1507:02, the pilot of OPT362 contacted the SGR ATCT local controller and reported on the "runway 35 approach." The SGR local controller cleared the pilot of OPT362 to land and

[1] All interviews are included in Attachment 1 - Interview Summaries.

issued the wind as, “winds have shifted again, now 150 at 011, ah your discretion, west looks a whole lot better, clearer than the east, but just keep me advised.” The pilot of OPT362 acknowledged the clearance.

The SGR local controller continued had also been talking to an Army National Guard helicopter (G72231), inbound to SGR from the north on an opposite direction course, runway 17, to OPT362.

At 1507:44, the SGR local controller transmitted “ExecJet362 [sic], it is gusting a little bit now, ah, 150 at 14, gust 20.” The local controller had mistakenly stated Execjet362 instead of Options362. There was no reply from the pilot of OPT362.

At 1508:17, the pilot of G72231 reported they had the approach end of runway 17 in sight and requested a special visual flight rules (SVFR) clearance to SGR. The SGR local controller instructed the pilot of G72231 to proceed to the parallel taxiway and to use caution because there was outbound traffic (N3ZC) taxiing to runway 17.. The pilot of G72231 reported the taxiing traffic in sight and told the local controller they would proceed direct to the ramp. The local controller issued the wind as 150° at 10, gust 16, and informed G72231 there was Phenom traffic [OPT362] on a 1 mile final opposite direction.

At 1509:40, the pilot of G72231 informed the SGR local controller they would be sidestepping to the right of runway 17 to avoid the “fixed wing traffic.” The local controller responded “ok, and Guard copter 231, side step to the right of the, ah, runway there, right of the runway, traffic on short final [runway] 35 opposite direction traffic.” The pilot of G72231 acknowledged.

At 1510:14, the SGR local controller instructed the pilot of G72231 to turn left direct the terminal ramp.

At 1510:16, the pilot of OPT362 transmitted “end of runway, [unintelligible], break fail.” There were no further transmissions from the pilot of OPT362.

At 1510:33, the pilot of N3ZC holding short of runway 17 asked the SGR ground controller if they saw the aircraft go off the end of the runway. The ground controller did not reply.

At 1510:46, the pilot of N3ZC again asked the local controller if they had seen the aircraft depart the runway. The SGR ground controller responded they had seen it and were “getting everything going.” The SGR ATCT personnel activated the primary crash phone and completed the accident notification checklist.

There were no further transmissions pertaining to the accident.

2.0 Radar Data

In general, two types of radar are used to provide position and track information for aircraft cruising at high altitudes between airport terminal airspaces, and for those operating at low altitude and speeds within terminal airspaces.

Air Route Surveillance Radars (ARSRs) are long range (250 nautical mile) radars used to track aircraft cruising between terminal airspaces. ARSR antennas rotate at 5 to 6 RPM, resulting in a radar return every 10 to 12 seconds; there is no weather data associated with the radar return. Airport Surveillance Radars (ASRs) are short range (60 nautical mile) radars used to provide air traffic control services in terminal areas. ASR antennas rotate at 13 to 14 RPM, resulting in a radar return every 4.6 to 5 seconds. The ASR can detect precipitation and displaying it as six levels of precipitation on the controllers display or the tower display workstation (TDW. The weather data is updated every 60 seconds.

A radar detects the position of an object by broadcasting an electronic signal that is reflected by the object and returned to the radar antenna. These reflected signals are called *primary returns.* Knowing the speed of the radar signal and the time interval between when the signal was broadcast and when it was returned, the distance, or range, from the radar antenna to the reflecting object can be determined. Knowing the direction, the radar antenna was pointing when the signal was broadcast, the direction (or bearing, or azimuth) from the radar to the object can be determined. Range and azimuth from the radar to the object define the object's position.

To improve the consistency and reliability of radar returns, aircraft are equipped with transponders that sense beacon interrogator signals broadcast from radar sites, and in turn broadcast a response signal. Even if the radar site is unable to sense a weak reflected primary return, it will sense the response signal broadcast by the transponder and be able to determine the aircraft position. The response signal can also contain additional information, such as the identifying "beacon code" for the aircraft, and the aircraft's pressure altitude (also called "Mode C" altitude). Transponder signals received by the radar site are called secondary returns. OPT362 was assigned a beacon code of 0733.

Radar data for this report was obtained from the Federal Aviation Administration (FAA) Houston Terminal Radar Approach Control (I90 TRACON) airport surveillance radars (ASR). I90 utilizes a fusion of area radars and displays the primary targets with secondary radar information onto the air traffic controllers radar display or TDW. The I90 plot playback (PPB) data was useable, of good quality, and was part of the standard terminal automation replacement system (STARS).

Radar data indicated OPT 362 was vectored by I90 air traffic control from the northwest to the southeast toward SGR for the ILS runway 35 approach (figure 1[2]). South of SGR, the aircraft was turned northbound to fly the ILS runway 35 (figure 2). While being vectored to the southeast, the I90 air traffic controller provided weather to the pilot as "heavy to extreme precipitation southeast quadrant Sugarland airport" as depicted from the ASR weather channel onto the STARS display. The depicted weather included level 4 precipitation to the right of the final approach course and level 2 and 3 precipitation along the final approach course and over SGR (see figure 3).

3.0 Weather Information

The ASOS weather reporting station at SGR reported the 1506 CDT weather as:

[2] All figures are included in Attachment 2 - Figures.

1506 CDT - SPECI KSGR 262006Z 13008KT 3SM +TSRA BR FEW007 BKN013 OVC037 24/23 A2994 RMK AO2 LTG DSNT E AND W AND NW P0027 T02440228 $=

The 1506 UTC Sugar Land weather, wind 130 at 8 knots, 3 statute miles, thunderstorms and heavy rain, few clouds at 700', broken ceiling 1,300', overcast 3,700', temperature 24, dew point 23, and the altimeter 29.94. Remarks: Automated weather station with precipitation discriminator, lightning distant east, west, and northwest, 1-hourly precipitation 0.27 inches, temperature 24.4, dew point 22.8, maintenance is needed on the system.

The SGR ASOS reported that between 1506 and 1517 CDT, 0.70 inches of rain fell on the ASOS sensor located just west of runway 35 and south of the air traffic control tower.

For further weather information, please see the NTSB Weather Group Chairman's factual report.

4.0 Limited Aviation Weather Reporting Station (LAWRS)

FAA JO 7230.8B, *Limited Aviation Weather Reporting Stations* (LAWRS), provides guidance to air traffic controllers in the performance of weather reporting activities. It identifies the requirements, training, and priorities for controllers to follow as they observe and report weather in accordance with FAA Order JO 7900.5D, *Surface Weather Observing*[3]

1. Wesley Loveday, Certificate #128380 dated September 2, 2009
2. Curtis Endsley, Certificate #128104 dated August 20, 2012

5.0 ATC Procedures

FAA JO 7110.65W, *Air Traffic Control*, prescribes "air traffic control procedures and phraseology for use by persons providing air traffic control services." The air traffic controllers qualified to provide ATC services are required to be familiar with the provisions of this order and to "exercise their best judgment if they encounter situations that are not covered by it."

Air traffic controllers were required to provide weather information to pilots. The requirements were contained in FAA order 7110.65W, chapter 2, "General Control", section 6 "Weather Information," which stated [in part]:

> **2−6−1. FAMILIARIZATION**
> Become familiar with pertinent weather information when coming on duty and stay aware of current weather information needed to perform ATC duties.
>
> **2−6−3. PIREP INFORMATION**
>
> Significant PIREP information includes reports of strong frontal activity, squall lines, thunderstorms, light to severe icing, wind shear and turbulence (including clear air turbulence) of moderate or greater intensity, volcanic eruptions and volcanic ash clouds,

[3] See attachment 3 for LAWRS certificates.

detection of sulfur gases (SO2 or H2S) in the cabin, and other conditions pertinent to flight safety.

a. Solicit PIREPs when requested or when one of the following conditions exists or is forecast for your area of jurisdiction:

1. Ceilings at or below 5,000 feet. These PIREPs must include cloud base/top reports when feasible.

TERMINAL. Ensure that at least one descent/climbout PIREP, including cloud base/s, top/s, and other related phenomena, is obtained each hour.

EN ROUTE. When providing approach control services, the requirements stated in TERMINAL above apply.

2. Visibility (surface or aloft) at or less than 5 miles.
3. Thunderstorms and related phenomena.
4. Turbulence of moderate degree or greater.
5. Icing of light degree or greater.
6. Wind shear.
7. Volcanic ash clouds.
NOTE−
Pilots may forward PIREPs regarding volcanic activity using the format described in the Volcanic Activity Reporting Form (VAR) as depicted in the AIM, Appendix 2.
8. Detection of sulfur gases (SO2 or H2S), associated with volcanic activity, in the cabin.
9. *TERMINAL.* Braking Action Advisories are in effect.
REFERENCE−
FAAO JO 7110.65, Para 3−3−5, Braking Action Advisories.
P/CG Term− Braking Action Advisories.

b. Record with the PIREPs:

1. Time.
2. Aircraft position.
3. Type aircraft.
4. Altitude.
5. When the PIREP involves icing include:
(a) Icing type and intensity.
(b) Air temperature in which icing is occurring.

c. Obtain PIREPs directly from the pilot, or if the PIREP has been requested by another facility, you may instruct the pilot to deliver it directly to that facility.

PHRASEOLOGY− *REQUEST/SAY FLIGHT CONDITIONS.*

d. Handle PIREPs as follows:

1. Relay pertinent PIREP information to concerned aircraft in a timely manner.

2. *EN ROUTE*. Relay all operationally significant PIREPs to the facility weather coordinator.

3. *TERMINAL*. Relay all operationally significant PIREPs to:

(a) The appropriate intrafacility positions.

(b) The FSS serving the area in which the report was obtained.

NOTE− *The FSS is responsible for long line dissemination.*

(c) Other concerned terminal or en route ATC facilities, including non−FAA facilities.

(d) Use the word *gain* and/or *loss* when describing to pilots the effects of wind shear on airspeed.

2−6−6. REPORTING WEATHER CONDITIONS

a. When the prevailing visibility at the usual point of observation, or at the tower level, is less than 4 miles, tower personnel must take prevailing visibility observations and apply the observations as follows:

1. Use the lower of the two observations (tower or surface) for aircraft operations.

2. Forward tower visibility observations to the weather observer.

3. Notify the weather observer when the tower observes the prevailing visibility decrease to less than 4 miles or increase to 4 miles or more.

b. Forward current weather changes to the appropriate control facility as follows:

1. When the official weather changes to a condition which is below 1,000−foot ceiling or below the highest circling minimum, whichever is greater, or less than 3 miles visibility, and when it improves to a condition which is better than those above.

2. Changes which are classified as special weather observations during the time that weather conditions are below 1,000−foot ceiling or the highest circling minimum, whichever is greater, or less than 3 miles visibility.

c. Towers at airports where military turbo-jet en route descents are routinely conducted must also report the conditions to the ARTCC even if it is not the controlling facility.

d. If the receiving facility informs you that weather reports are not required for a specific time period, discontinue the reports. The time period specified should not exceed the duration of the receiving controller’s tour of duty.

2−6−7. DISSEMINATING WEATHER INFORMATION

TERMINAL. Observed elements of weather information must be disseminated as follows:

a. General weather information, such as “large breaks in the overcast,” “visibility lowering to the south,” or similar statements which do not include specific values, and any elements derived directly from instruments, pilots, or radar may be transmitted to pilots or other ATC facilities without consulting the weather reporting station.

b. Specific values, such as ceiling and visibility, may be transmitted if obtained by one of the following means:

1. You are properly certificated and acting as official weather observer for the elements being reported.

NOTE *− USAF controllers do not serve as official weather observers.*

2. You have obtained the information from the official observer for the elements being reported.

3. The weather report was composed or verified by the weather station.

4. The information is obtained from an official Automated Weather Observation System (AWOS) or an Automated Surface Observation System (ASOS).

c. Differences between weather elements observed from the tower and those reported by the weather station must be reported to the official observer for the element concerned.

F. LIST OF ATTACHMENTS

Attachment 1 Interview Summaries
Attachment 2 Graphics
Attachment 3 LAWRS Certificates

Submitted by:

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