Aviation Investigation Final Report

Location:	Medford, Oregon	**Incident Number:**	OPS18IA003
Date & Time:	December 24, 2017, 18:08 Local	**Registration:**	N162PQ
Aircraft:	BOMBARDIER INC CL600 2D24	**Aircraft Damage:**	None
Defining Event:	Navigation error	**Injuries:**	
Flight Conducted Under:	Part 121: Air carrier - Scheduled		

Analysis

After initial contact with the flight, the air traffic controller issued the pilots a clearance to cross the initial approach fix CEGAN at or above 7,800 feet and cleared the flight for the published instrument procedure. The published altitude for the instrument procedure was at or above 10,000 feet from CEGAN until BRKET while established on the arc. The flight crew accepted the ATC clearance, and descended from 12,000 feet to 7,800 feet while established on the arc. The minimum vectoring altitude (MVA) for the airspace containing the arc was 7,800 feet, however, just prior to BRKET the floor of the MVA raised to 8,700 feet. The MVA altitudes as depicted on the radar display are for air traffic control and are not available to flight crews. Interviews with the controller indicated there was an expectation that the pilot would not descend below the 10,000 feet as published despite being assigned the "at or above 7,800 feet" crossing restriction.

The controller introduced risk by assigning the lowest altitude in the MVA area containing the fix CEGAN (7,800 feet) and expecting the crew to stop their descent at the higher published altitude of 10,000 feet. There was no operational or procedural advantage gained by assigning the flight crew 7,800 feet when the controller expected the crew to stop at 10,000 feet. Had the controller issued the published altitude of 10,000 feet and issued the approach clearance, the incident likely would not have occurred because the crew could have descended to 10,000 feet and then descended according to the published procedure and not below the MVA for that segment.

In the incident sequence, the controller instructed the flight crew to cross the initial approach fix (IAF) CEGAN at 7,800 feet, and, the flight did not become established on the published procedure until after CEGAN when established on the arc. The controller was required to assign an altitude to maintain until being established on the procedure, in this case at or above 10,000 feet as published.

When the flight crew received the approach clearance that included a descent below the published altitude, they did not query the controller or stop the descent at the published altitude as required in accordance with 14 Code of Federal Regulations (CFR) Part 121.

As a result of the incident, the FAA initiated an education program with briefings and information graphics to the air traffic control workforce to emphasize MVA and MSAW conditions. The topics included the use of MVA maps, assignment of appropriate altitudes, ensuring correct altitudes are maintained, and a reminder to know approach procedures and appropriate altitudes.

During the incident investigation, it was determined that an antenna adjacent to the IAF BRKET was not depicted on the Jeppesen produced approach chart for the VOR DME C current on the day the incident. Jeppesen changed the approach chart to reflect the antennae and a new obstacle height of 7,614 feet. Additionally, Jeppesen conducted a review of the terrain surrounding the MFR airport to support produced navigation products.

Probable Cause and Findings

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

The incident was caused by the air traffic controller assigning an altitude below the published procedure altitude for the approach segment to be flown prior to the aircraft being established on a published portion of the approach. Contributing to the incident was the flight crew's failure to identify the appropriate altitude for the segment of the approach being flown and query the controller before subsequent decent below the published minimum altitude.

Findings

Personnel issues	Decision making/judgment - Flight crew
Personnel issues	Decision making/judgment - ATC personnel

Factual Information

History of Flight

Approach	Terrain avoidance alert
Approach	Air traffic event
Approach-IFR initial approach	Navigation error (Defining event)

On December 24, 2017 about 1808 PST, SkyWest Airlines Flight 3567 (SKW3567), a Bombardier CRJ9, registration N162PQ, operated below the minimum vectoring altitude (MVA) while conducting an instrument approach to the Rogue Valley International – Medford Airport (MFR), Medford, Oregon and initiated a climb after receiving an alert from the Enhanced Ground Proximity Warning System (EGPWS.) The crew and passengers were not injured and there was no damage to the airplane. SKYW3567 was operating under the provisions of 14 *Code of Federal Regulations (CFR)* Part 121 as a scheduled passenger flight from Salt Lake City International Airport (SLC), Salt Lake City, Utah to MFR and instrument meteorological conditions prevailed at the time.

History of Flight

At 1801:45, the Seattle Air Route Traffic Control Center (ZSE) sector 10 controller responsible for SKW3567 contacted the Eugene (EUG) Medford approach controller sector controller and advised that SKW3567 was direct to the fix CEGAN and was requesting the VOR/DME-C (VHF Omni-directional Range/Distance Measuring Equipment) approach with the arc into MFR. The Medford sector controller responded "perfect" and the sector 10 controller transferred control of the flight to the Medford controller before it entered EUG airspace.

At 1802:09, the pilot of SKW3567 contacted the Medford sector controller and reported "we are at one two thousand direct to CEGAN for the V-O-R D-M-E charlie."

At 1802:18, the Medford sector responded "SKW3567 Cascade approach cross CEGAN at or above seven thousand eight hundred cleared V-O-R D-M-E charlie approach via the arc."

At 1802:28, the pilot of SKW3567 responded "alright ah cross CEGAN at or above seven thousand eight hundred and we are cleared for the V-O-R D-M-E ah charlie at ah thirty five sixty seven."

At about 1803:07 the flight crossed the initial approach fix CEGAN at a mode C reported altitude of 11,800 feet above mean sea level (msl) and joined the 27 DME arc off the Rouge Valley VORTAC (VHF Omni-directional Range/Tactical Air Navigation)..

At 1804:59, the mode C altitude information indicated the flight descended below 10,000 feet while still established on the 27 DME arc.

At 1806:12, SKW3567 entered an 8,700-foot MVA area at a mode C reported altitude of 8,300 feet.

At 1806:28, the Medford sector controller instructed the pilot of SKW3567 to contact the Medford tower controller on frequency 119.4 MHz at the fix GOLLD. The crew read back the instructions.

At about 1808:08, SKW3567 turned right and joined the final approach course at the fix BRKET. The mode C reported an altitude of 7,800 feet.

At 1808:20, the pilot of SKW3567 contacted the Medford sector controller and reported "just ah confirm we've ah show an obstacle on the ah approach at ah seventy two twenty nine." Five seconds later the pilot of SKW3567 reported in a climb for a GPWS alert. The Medford sector controller asked the pilot to "say again". The pilot responded, "we got a terrain warning we are climbing". The Medford sector controller asked the pilot to say intentions. The pilot of SKW3567 responded "climbing to eleven". There was no reply by the air traffic controller.

At 1809:31, the pilot of SKW3567 requested the instrument landing system (ILS) runway 14 approach into MFR. The Medford sector controller responded by issuing vectors for the approach.

At 1810:04, the pilot of SKW3567 transmitted "approach SkyWest thirty five sixty seven we received a ah G-P-S or a excuse me a G-P-W-S which is one of our terrain warnings ah that ah comes up when ah we are too low and we just wanted to let you when we called you we wanted to let you know that we thought were ah too low for this sector and we wanted to confirm with you the altitude on the approach". The Medford sector controller responded, "stand by".

At 1811:06, the Medford sector controller transmitted "SkyWest thirty five sixty seven what I'm showing on my approach plate is after CEGAN one zero thousand on the arc until you are ah established inbound is that what you are showing". The pilot responded, "that's what we show we were assigned an altitude of seven thousand eight hundred for SkyWest ah thirty five sixty seven". The Medford sector controller responded, "SkyWest thirty five sixty seven roger that altitude was ah at or above seven thousand eight hundred until established". The pilot of SKW3567 responded "and when we were established on the arc, we were ah we were established on a lower altitude than ah". A different SKW3567 pilot transmitted that they would discuss it on the ground via a telephone.

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 rotations per minute (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 display it in six levels of precipitation on the controller's 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 that 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. SKW3567 was assigned a beacon code of 6040.

Radar data for this report was obtained from the Federal Aviation Administration (FAA) EUG ASR. The EUG plot playback (PPB) data was useable, of good quality, and was part of the STARS. Figure 1 illustrates the flight track of SKW3567 as the aircraft flew the VOR/DME-C instrument procedure into MFR. Figure 2 illustrates the location of SKW3567 as it descended below the 10,000-foot procedure altitude. Figure 3 illustrates the position of SKW3567 when the crew began their climb in response to the GPWS warning.

Figure 1 - Flight track of SKW3567 as the aircraft flew the VOR/DME-C instrument procedure into MFR.

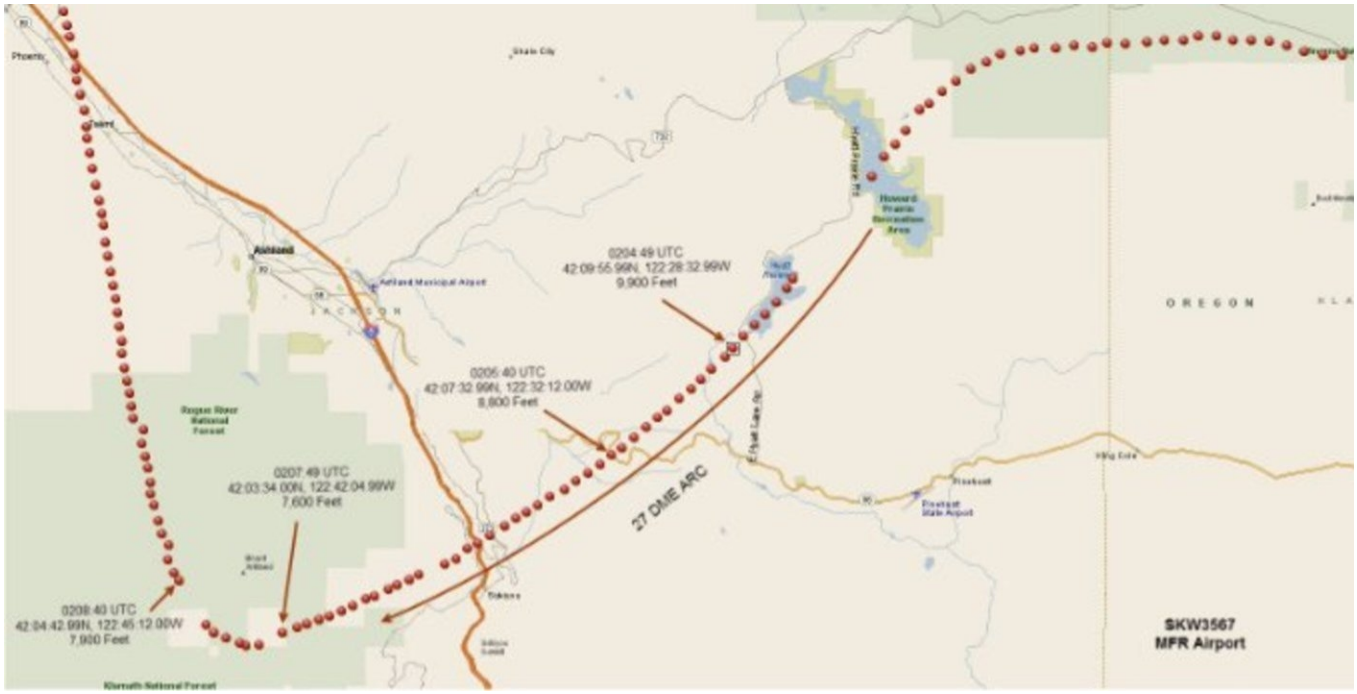

Figure 2 - The location of SKW3567 as it descended below the 10,000-foot procedure altitude.

Figure 3 - The position of SKW3567 when the crew began climbing the aircraft.

Weather Information

Airport weather observations for MFR were obtained from the National Weather Service. Airport weather information found in the Meteorological Aerodrome Report (METAR) for MFR originated from an Automated Surface Observing System (ASOS). The following METARs were issued for MFR for the time period surrounding the incident:

[1753 PST] METAR KMFR 250053Z 15004KT 10SM BKN 064 OVC090 06/03 A3015 RMK AO2 SLP218 T00560028=

[1853 PST] METAR KMFR 250153Z 0000KT 10SM OVC070 06/03 A3017 RMK AO2 SLP223 T00610028=

MFR Instrument Procedure

MFR was served by 9 instrument approach procedures, one of which was the VOR/DME-C. According to the FAA, an instrument approach procedure (IAP) is a "series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight rules conditions from the beginning of the initial approach to a landing or to a point from which a landing may be made visually". A VOR/DME-C approach uses a VHF Omni-directional Range (VOR) signal from a navigational aid (NAVAID), and, associated distance measuring equipment (DME) to identify the aircraft position while on the procedure. The incident flight was vectored and subsequently cleared for the VOR DME-C approach from the initial approach fix (IAF) CEGAN.

The VOR DME-C standard instrument approach procedure (SIAP) published an altitude of 10,000 feet for the segment of the approach from the IAF CEGAN while the aircraft was on a 27-mile DME arc to the IAF BRKET. The published altitude from BRKET to the fix SERTE was 8,500 feet. The published altitude from SERTE to the fix GOLLD was 7,400 feet. The published altitude to the fix HURLO was 5,800 feet. Figure 4 illustrates the published approach chart for the MFR VOR/DMA-C approach. The instrument procedure listed the airport elevation as 1,335 feet and a descent angle of 6.91 degrees.

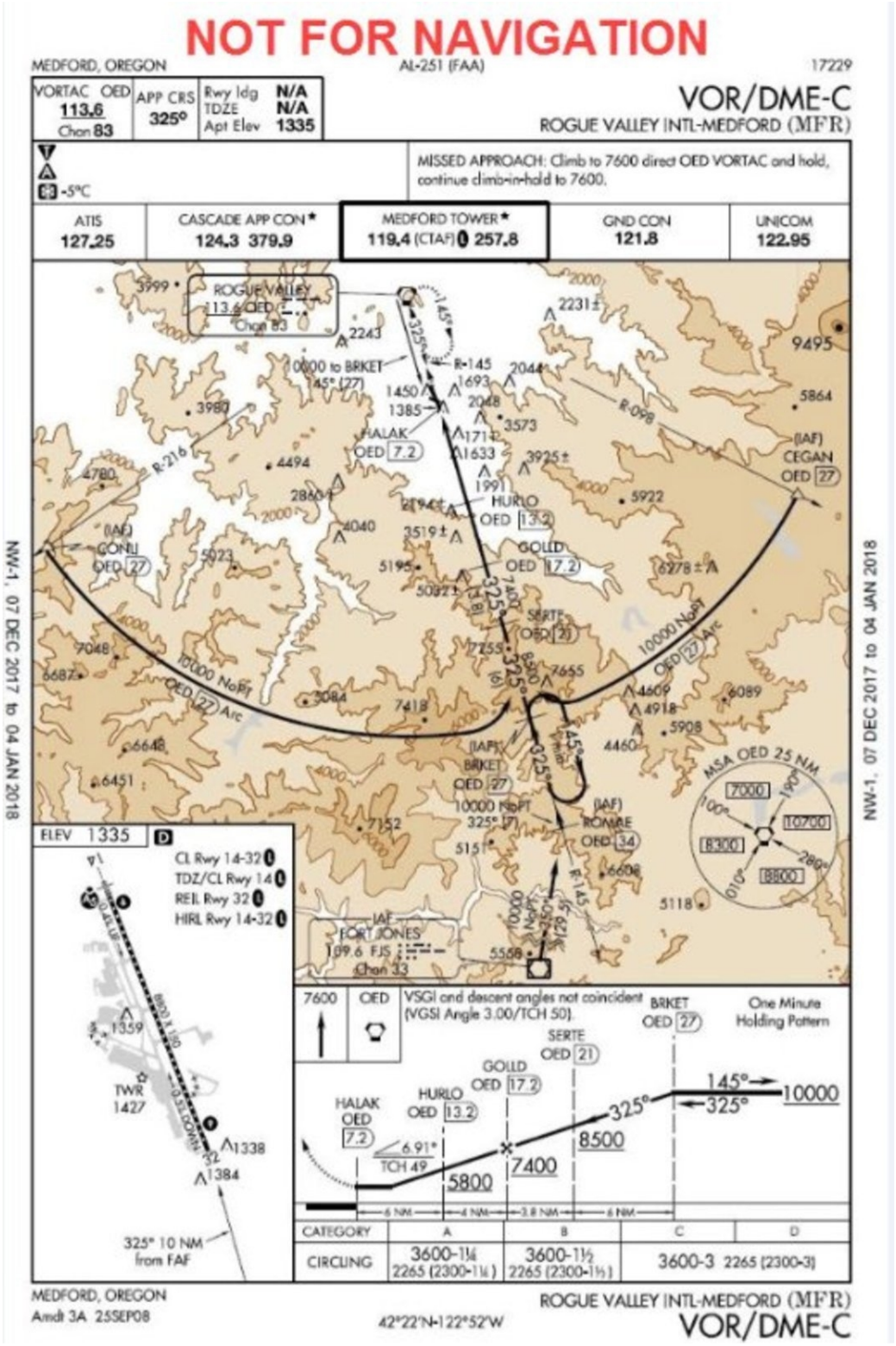

Figure 4 - The approach chart for the MFR VOR/DMA-C approach plate.

Minimum Vectoring Altitude

The FAA defines the MVA as "The lowest msl altitude at which an Instrument Flight Rules (IFR) aircraft may be vectored by a radar controller, except as otherwise authorized for radar approaches, departures, and missed approaches. The altitude meets IFR obstacle clearance criteria. It may be lower than the published minimum enroute altitude (MEA) along an airway or jet route (J-route) segment. It may be utilized for radar vectoring only upon the controller's determination that an adequate radar return is being received from the aircraft being controlled. Charts depicting minimum vectoring altitudes are normally available only to the controllers and not to pilots". The MVA in the airspace that contained the IAF CEGAN was 7,800 feet and the IAF BRKET was 8,700 feet (see figure 5).

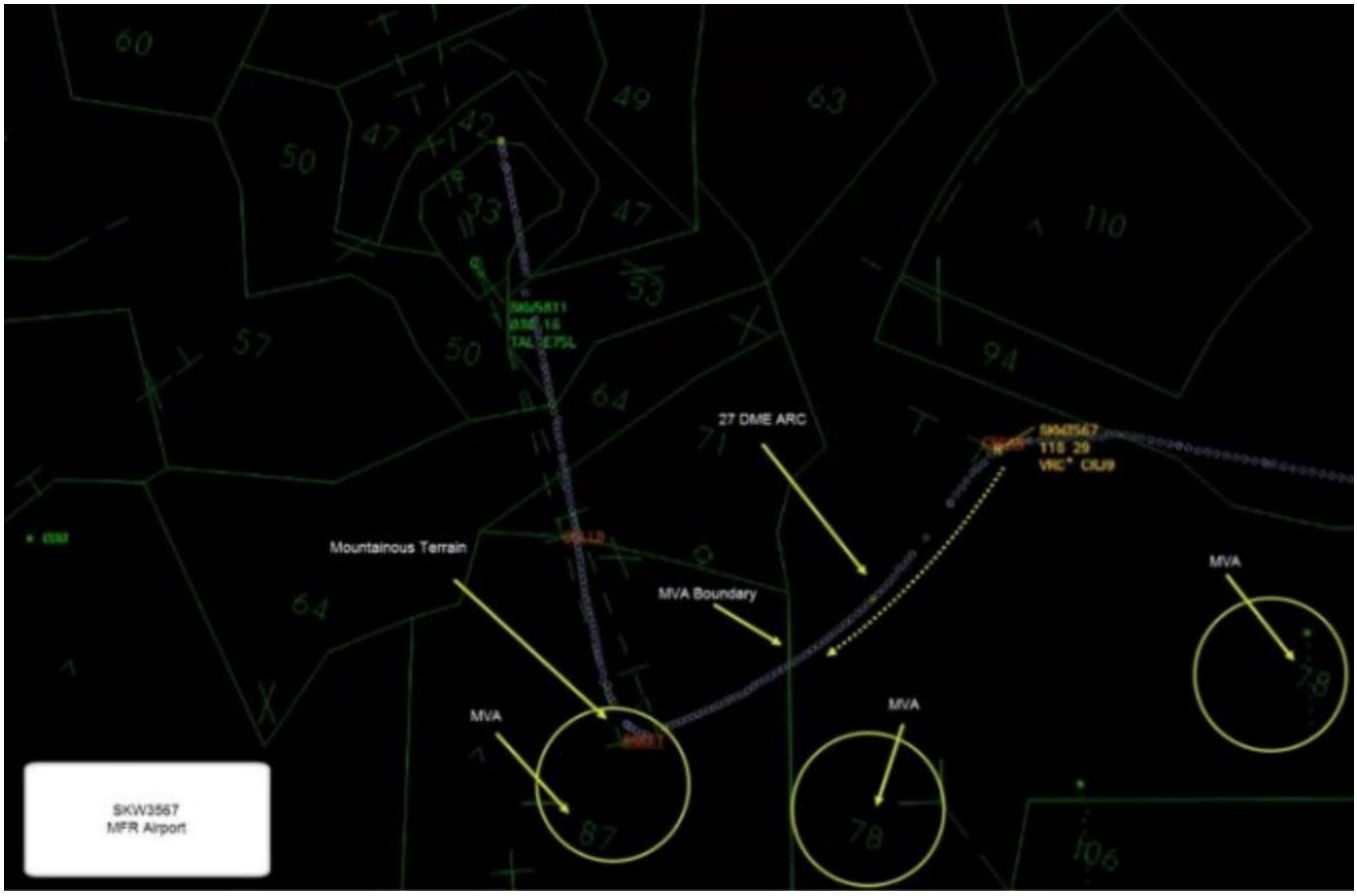

Figure 5 – Map showing MVA's and SKW3567 flight track.

Air Traffic Controller Information

Medford Sector, Cascade Approach Control

The Medford sector approach controller began working for the FAA in September 2007 reporting to the FAA training facility in Oklahoma City, Oklahoma. After successfully completing the tower training course in December 2007, he transferred to The Eastern Iowa Airport, Cedar Rapids, Iowa. In February 2014, he transferred to Spokane International Airport, Spokane, Washington. In March 2015 he transferred to Mahlon Sweet Field Airport (EUG), Eugene, Oregon. He was qualified on all operating positions in the facility and was designated as a controller in charge (CIC).

Operations Supervisor, Cascade Approach Control

The operations supervisor began working for the FAA August 17, 1997. She reported directly to Terre Haute Regional Airport ATCT and worked there until September 2004. She worked at Evansville Regional Airport ATCT from September 2004 until June 2016 when she began working at EUG.

East Sector, Cascade Approach Control

The east sector controller began working for the FAA in September of 2003 when she reported directly to Richard Lloyd Jones Jr Airport, Tulsa, Oklahoma. In October 2006, she reported to McLellan-Palomar Airport, Carlsbad, California, and in March 2014, she transferred to EUG. While at EUG, she attended the FAA's radar training facility at the FAA training facility in Oklahoma City in Oklahoma.

Staff Support Specialist, Cascade Approach Control

The staff support specialist began working for the FAA March 1987 when he reported to the Academy. He graduated the Academy June 1987 and reported to Long Beach, California (LGB). He left LGB in June 1991 and reported to EUG. He became a Staff Support Specialist in April 2007.

Air Traffic Manager, Cascade Approach Control

The air traffic manager began working for the FAA in May 2006 reporting to the FAA training facility in Oklahoma City Oklahoma. After successfully completing the initial training course in June 2006, he transferred to Fort Wayne International Airport (FWA), Fort Wayne, Indiana. While at FWA he became a front-line manager (FLM) and in December 2012 he transferred to Chicago Air Route Traffic Control Center (ZAU ARTCC) for duty as an FLM. In August 2017, he transferred to EUG as the air traffic manager.

Flight Crew Information

Documentation provided by SkyWest Airlines showed that the incident flight occurred on day 2 of a 4-day crew rotation. The first day of the rotation began with a report time of 1325 eastern standard time and included 3 flights with a 14-hour layover. The second day (day of the incident flight) began with a report time of 1145 MST deadheading on a flight from Glacier Park International Airport (, Kalispell, Montana to SLC and then the incident flight to MFR, where the crew was to have a 10-hour layover.

Captain

The captain was 30 years old and held an Airline Transport Pilot (ATP) certificate with a rating for airplane multiengine land and type ratings on the BE-1900, CL-65, and SF-340. He also held a commercial pilot certificate for airplane single-engine land. He held an FAA first-class medical certificate dated August 23, 2017, with a limitation of "must wear corrective lenses," which he reported he was wearing at the time of the incident. At the time of the incident he was based at Detroit-Wayne Metro International Airport (DTW), Detroit, Michigan.

According to the captain's interview summary, he had been hired at SkyWest Airlines on October 28, 2013. He had between 3,000 and 3,600 hours of flight experience in the CRJ, of which about 800-900 of those hours had been as a captain. He had upgraded to captain in August of 2016. He further stated that

he had about 2,200 to 2,500 hours of flight experience as a first officer. He had been based in Houston, Texas until he upgraded to captain.

First Officer

The FO was 23 years old; held an ATP certificate with type rating on the CL-65. He held a commercial pilot certificate for airplane single-engine land. He also held an FAA first-class medical certificate dated December 9, 2017, with a limitation of "must wear corrective lenses," which he reported he was wearing at the time of the incident. At the time of the incident he was based at DTW.

According to the first officer's interview he had been hired at SkyWest Airlines on January 16, 2017 and had been flying the CL-65 aircraft the entire time. He had accumulated about 2,100 hours of total flight experience and had about 500 hours of total flight experience in the CL-65.

He was the pilot flying for the incident flight.

DIRECTIVES

FAA JO 7110.65X

This order prescribes air traffic control procedures and phraseology for use by personnel providing air traffic control services. Controllers are required to be familiar with the provisions of this order that pertain to their operational responsibilities and to exercise their best judgment if they encounter situations not covered by it.

Chapter 2 Section 9 Automatic Terminal Information Service (ATIS) Procedures

FAA JO 7110.65X 2-9-2 *Operating Procedures* addressed ATIS procedures to be followed by air traffic controllers and stated [in part]:

Maintain an ATIS message that reflects the most current arrival and departure information.

b. When a pilot acknowledges that he/she has received the ATIS broadcast, controllers may omit those items contained in the broadcasts if they are current. Rapidly changing conditions will be issued by ATC, and the ATIS will contain the following:

EXAMPLE-

"Latest ceiling/visibility/altimeter/wind/ (other conditions) will be issued by approach control/tower."

c. Broadcast on all appropriate frequencies to advise aircraft of a change in the ATIS code/message.

d. Controllers must ensure that pilots receive the most current pertinent information. Ask the pilot to confirm receipt of the current ATIS information if the pilot does not initially state the appropriate ATIS code. Controllers must ensure that changes to pertinent operational information is provided after the initial confirmation of ATIS information is established. Issue the current weather, runway in use, approach information, and pertinent NOTAMs to pilots who are unable to receive the ATIS.

EXAMPLE-

"Verify you have information ALPHA."

"Information BRAVO now current, visibility three miles."

"Information CHARLIE now current, Ceiling 1500 Broken."

"Information CHARLIE now current, advise when you have CHARLIE."

Chapter 4 IFR Section 8 Approach Clearance Procedures

FAA JO 7110.65X addressed Approach Clearance procedures to be followed by air traffic controllers when issuing an approach clearance and stated [in part]:

Paragraph 4-8-1 Approach Clearance Procedures

FAA JO 7110.65X addresses the procedures to be used for vectoring an aircraft for a published instrument approach procedure and states [in part]:

a. Clear aircraft for "standard" or "special" instrument approach procedures only.

3. Standard instrument approach procedures (SIAP) must begin at an initial approach fix (IAF) or an intermediate fix (IF) if there is not an IAF.

b. For aircraft operating on unpublished routes, issue the approach clearance only after the aircraft is:

1. Established on a segment of a published route or instrument approach procedure, or

2. Assigned an altitude to maintain until the aircraft is established on a segment of a published route or instrument approach procedure.

EXAMPLE-

Aircraft 1 is cleared direct LEFTT. The MVA in the area is 3,000 feet, and the aircraft is at 4,000 feet. "Cross LEFTT at or above three thousand five hundred, cleared RNAV Runway One Eight Approach."

The MVA in the area is 3,000 feet and Aircraft 2 is at 3,000 feet. "Cleared direct LEFTT direct CENTR, maintain three thousand until CENTR, cleared straight-in RNAV Runway One Eight Approach."

NOTE-

1. *The altitude assigned must assure IFR obstruction clearance from the point at which the approach clearance is issued until established on a segment of a published route or instrument approach procedure.*

2. *If the altitude assignment is VFR-on-top, it is conceivable that the pilot may elect to remain high until arrival over the final approach fix which may require the pilot to circle to descend so as to cross the final approach fix at an altitude that would permit landing.*

3. *An aircraft is not established on an approach until at or above an altitude published on that segment of the approach.*

Chapter 5 Radar Section 9 Radar Arrivals

FAA JO 7110.65X addressed vectoring aircraft to intercept the approach procedure and provided directives to be followed by air traffic controllers and stated [in part]:

Paragraph 5-9-4 Arrival Instructions

FAA JO 7110.65X addresses the altitude assignment of an aircraft conducting a published instrument approach procedure and states [in part]:

Issue all of the following to an aircraft before it reaches the approach gate:

a. Position relative to a fix on the final approach course. If none is portrayed on the radar display or if none is prescribed in the procedure, issue position information relative to the navigation aid which provides final approach guidance or relative to the airport.

b. Vector to intercept the final approach course if required.

c. Approach clearance except when conducting a radar approach. Issue approach clearance only after the aircraft is:

1. Established on a segment of a published route or instrument approach procedure, or

2. Assigned an altitude to maintain until the aircraft is established on a segment of a published route or instrument approach procedure.

NOTE-

1. *The altitude assigned must assure IFR obstruction clearance from the point at which the approach clearance is issued until established on a segment of a published route or instrument approach procedure.*

Pilot/Controller Glossary

The Pilot Controller Glossary was compiled to promote a common understanding of the terms used in the ATC system. It includes those terms which are intended for pilot/controller communications. The FAA JO 7110.65X pilot controller glossary defines the term *Cross (fix) At or Above* and provides guidance to be used by air traffic controllers and states [in part]:

CROSS (FIX) AT OR ABOVE (ALTITUDE)- Used by ATC when an altitude restriction at a specified fix is required. It does not prohibit the aircraft from crossing the fix at a higher altitude than specified; however, the higher altitude may not be one that will violate a succeeding altitude restriction or altitude assignment.

14 CFR Part 121 Operating Requirements; Domestic, Flag, and Supplemental Operations

14 CFR Part 121 prescribes rules governing domestic, flag, and supplemental operations of each person who holds or is required to hold an Air Carrier Certificate or Operating Certificate. Subpart 659 addresses *Initial approach altitude: Domestic and supplemental operations* and states [in part]:

121.659 Initial approach altitude: Domestic and supplemental operations

14 CFR 121 addresses the domestic, flag, and supplemental operations of each person who holds or is required to hold an Air Carrier Certificate or Operating Certificate under part 119 of the chapter and states [in part]:

(a) Except as provided in paragraph (b) of this section, when making an initial approach to a radio navigation facility under IFR, no person may descend an aircraft below the pertinent minimum altitude for initial approach (as specified in the instrument approach procedure for that facility) until his arrival over that facility has been definitely established.

(b) When making an initial approach on a flight being conducted under § 121.657(d), no pilot may commence an instrument approach until his arrival over the radio facility has definitely been established. In making an instrument approach under these circumstances no person may descend an aircraft lower than 1,000 feet above the top of the lower cloud or the minimum altitude determined by the Administrator for that part of the IFR approach, whichever is lower.

SkyWest Airport Specific Guidance

SkyWest provided guidance that was company tailored and specific to MFR. The guidance was located on their 10-7 pages of the Jeppesen Approach Charts for MFR. The chart, dated June 16, 2017, was 3 pages in length and provided specific station frequency, noise abatement/curfew, and cold temperature airport information. It also listed the airport as a SAAT Level 3 airport which included the following information:

Surrounding Terrain and Obstructions <5 NM

Special A/C Performance Requirement

Special Issue SkyWest Approach Plates

Simple Special APP/Missed/Dep Proc

Frequent Mountain Wave Activity/Windshear

Frequent Misc Activity Notams

The guidance also provided a section called "EGPWS WARNINGS" which provided the following graphic for MFR:

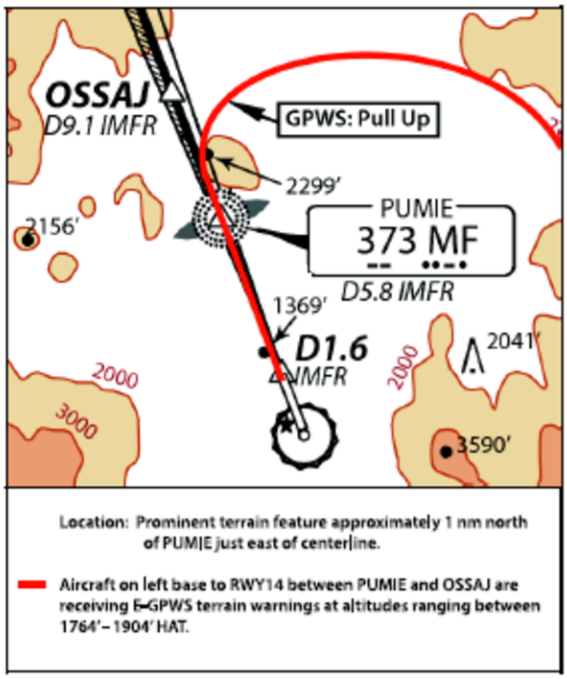

Figure 6: EGPWS WARNING from 10-7 Page

POST INCIDENT ACTIONS

As a result of this investigation, the FAA conducted a review of the general terrain map (GTM) bins that activate an MSAW alert on the controller display. It was discovered that there was an antenna in the bin near the course flown by SKW3567. The antenna was 113 feet tall and was not considered the controlling obstacle for that bin. A review by the FAA determined that only obstacles 200 feet or greater would be considered and the GTM bin was not raised.

To address MVA/MSAW issues examined in this incident, the FAA initiated an education program with briefings and information graphics to the air traffic control workforce to emphasize MVA and MSAW conditions. The topics included the use of MVA maps, assignment of appropriate altitudes, ensuring correct altitudes are maintained, and a reminder to know approach procedures and appropriate altitudes.

During the incident investigation, it was determined that an antenna adjacent to the IAF BRKET was not depicted on the Jeppesen produced approach chart for the VOR DME C current on the day the incident. Jeppesen changed the approach chart to reflect the antennae and a new obstacle height of 7,614 feet. Additionally, Jeppesen conducted a review of the terrain surrounding the MFR airport to support produced navigation products.

Information

Certificate:	**Age:**
Airplane Rating(s):	**Seat Occupied:**
Other Aircraft Rating(s):	**Restraint Used:**
Instrument Rating(s):	**Second Pilot Present:**
Instructor Rating(s):	**Toxicology Performed:**
Medical Certification:	**Last FAA Medical Exam:**
Occupational Pilot:	**Last Flight Review or Equivalent:**
Flight Time:	

Aircraft and Owner/Operator Information

Aircraft Make:	BOMBARDIER INC	**Registration:**	N162PQ
Model/Series:	CL600 2D24 900	**Aircraft Category:**	Airplane
Year of Manufacture:	2008	**Amateur Built:**	
Airworthiness Certificate:	Transport	**Serial Number:**	15162
Landing Gear Type:	Retractable - Tricycle	**Seats:**	80
Date/Type of Last Inspection:	December 22, 2017 Continuous airworthiness	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	2 Turbo jet
Airframe Total Time:	24912.5 Hrs as of last inspection	**Engine Manufacturer:**	GE
ELT:	C126 installed, not activated	**Engine Model/Series:**	CF34-8B5
Registered Owner:	DELTA AIR LINES INC	**Rated Power:**	14510 Lbs thrust
Operator:	SKYWEST AIRLINES INC	**Operating Certificate(s) Held:**	Flag carrier (121)
Operator Does Business As:	SKYWEST AIRLINES INC	**Operator Designator Code:**	SWIA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Dusk
Observation Facility, Elevation:	KMFR,1335 ft msl	**Distance from Accident Site:**	27 Nautical Miles
Observation Time:	01:53 Local	**Direction from Accident Site:**	360°
Lowest Cloud Condition:	Unknown	**Visibility**	10 miles
Lowest Ceiling:	Overcast / 7000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/ Unknown
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/ Unknown
Altimeter Setting:	30.17 inches Hg	**Temperature/Dew Point:**	6°C / 3°C
Precipitation and Obscuration:			
Departure Point:	Salt Lake City, UT (SLC)	**Type of Flight Plan Filed:**	IFR
Destination:	Medford, OR (MFR)	**Type of Clearance:**	IFR
Departure Time:	17:17 Local	**Type of Airspace:**	Class E

Airport Information

Airport:	Rogue Valley International MFR	**Runway Surface Type:**	Asphalt
Airport Elevation:	1335 ft msl	**Runway Surface Condition:**	Unknown
Runway Used:	32	**IFR Approach:**	VOR/DME
Runway Length/Width:	8800 ft / 150 ft	**VFR Approach/Landing:**	Go around

Wreckage and Impact Information

Crew Injuries:	N/A	**Aircraft Damage:**	None
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	N/A	**Latitude, Longitude:**	42.047222,-122.74361

Administrative Information

Investigator In Charge (IIC):	Olvis, Charles
Additional Participating Persons:	Eric West; FAA
Original Publish Date:	March 31, 2021
Last Revision Date:	
Investigation Class:	Class 3
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=96546