



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

February 9, 2016

Group Chairman's Factual Report

AIR TRAFFIC CONTROL

CEN15FA311

A. AIRCRAFT ACCIDENT

Location: Oshkosh, Wisconsin
Date: July 22, 2015
Time: 0743 central daylight time / 1243 coordinated universal time
Airplane: N4BP, Piper PA-46-310P Malibu

B. AIR TRAFFIC CONTROL GROUP

Mr. Scott Dunham
National Transportation Safety Board
Washington, DC

Ms. Mary Olson
Federal Aviation Administration (FAA)
Minneapolis, Minnesota

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National Air Traffic Controllers Association (NATCA)
Atlanta, Georgia

C. SUMMARY

On July 22, 2015, about 0744 central daylight time, a Piper PA-46-310P single-engine airplane, N4BP, sustained substantial damage when it impacted runway 27 (6,179 ft by 150 ft, concrete) while landing at the Wittman Regional Airport (OSH), Oshkosh, Wisconsin. The pilot and two passengers sustained serious injuries and two passengers sustained minor injuries. The airplane was registered to DLM Holding Group LLC and operated by the pilot under the provisions of the 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed at the time of the accident and no flight plan was filed. The flight departed the Southwest Michigan Regional Airport (BEH), Benton Harbor, Michigan, about 0730 eastern daylight time.

The pilot reported that he departed BEH and overflew Kenosha, Burlington, Hartford, Ripon, and Fisk, Wisconsin. He then proceeded to fly the Fisk arrival procedures for runway 27 which were in use per the notice to airmen (NOTAM) for the EAA AirVenture 2015 air show at OSH. The pilot reported that he entered the right downwind leg for runway 27 at 1,800 ft and started to descend while maintaining 90 kts airspeed. He reported that he was instructed by air traffic control (ATC) to turn onto the base leg abeam the runway numbers and to land on the green dot (located about 2,500 ft from the runway 27 displaced threshold.) After he started the base turn, he observed a twin-engine airplane taxi onto runway 27 and start its takeoff roll. The pilot reported that ATC instructed him to continue the approach and land on the orange dot (located about 1,000 ft from the runway 27 displaced threshold) instead of the green dot. The pilot continued the approach and, about 250 to 300 ft above ground level, pulled back on the power which resulted in the airplane entering a stall. The pilot attempted to recover by adding full power, but the airplane impacted the runway in a right wing, nose down attitude.

D. DETAILS OF THE INVESTIGATION

The air traffic control group convened on June 26, 2015, at Oshkosh Airport Traffic Control Tower (OSH ATCT) to review communications, examine local facility procedures and documentation, and interview the Federal Aviation Administration (FAA) controllers involved in providing services to N4BP during the accident sequence. The facility management provided an

initial briefing on the accident, including facts known to date and an explanation of the special procedures and staffing in effect during the Experimental Aircraft Association's AirVenture event. The group collected documentation of pilot and controller procedures and interviewed three Oshkosh controllers: the North Local Control (NLC) communicator, the NLC front-line manager (FLM), and the Itinerant Mobile (IM) team lead, who had overall responsibility for ATC departure operations on runway 27. The group then conducted an outbrief with the facility management team and district manager and completed the on-scene investigation.

N4BP was a visual flight rules (VFR) aircraft following the Fisk arrival to runway 27, a procedure that was published in the 2015 AirVenture Notice to Airmen issued for use by pilots flying to the event. (Figure 1.) The aircraft was initially sequenced by controllers at Fisk, an observation point located off the airport, and was then cleared to land by the North Local Control (NLC) team located in the tower. The team consisted of five controllers: two spotters, one communicator, a team leader, and an FLM overseeing the operation. At the time of the accident, the NLC team was responsible for issuing landing clearances on runway 27.

Because runway 27 was in use, a separate IM control team was working from a Mobile Operations Communications Workstation (MOOCOW) located at the intersection of runway 27 and taxiway A. The IM team was responsible for clearing aircraft for takeoff on runway 27 and consisted of four controllers: an aircraft communicator (AC), one spotter/coordinator, and two "crossers" who work directly with aircraft holding for departure on the taxiway. Communication between the IM and NLC teams was conducted via portable FM (frequency modulation) radios used by the MOOCOW AC and the NLC FLM, although coordination was kept to a minimum. The IM team was responsible for ensuring separation between arrivals and departures by monitoring the inbound pattern traffic and releasing departures when there was sufficient time to do so before the next aircraft landed.

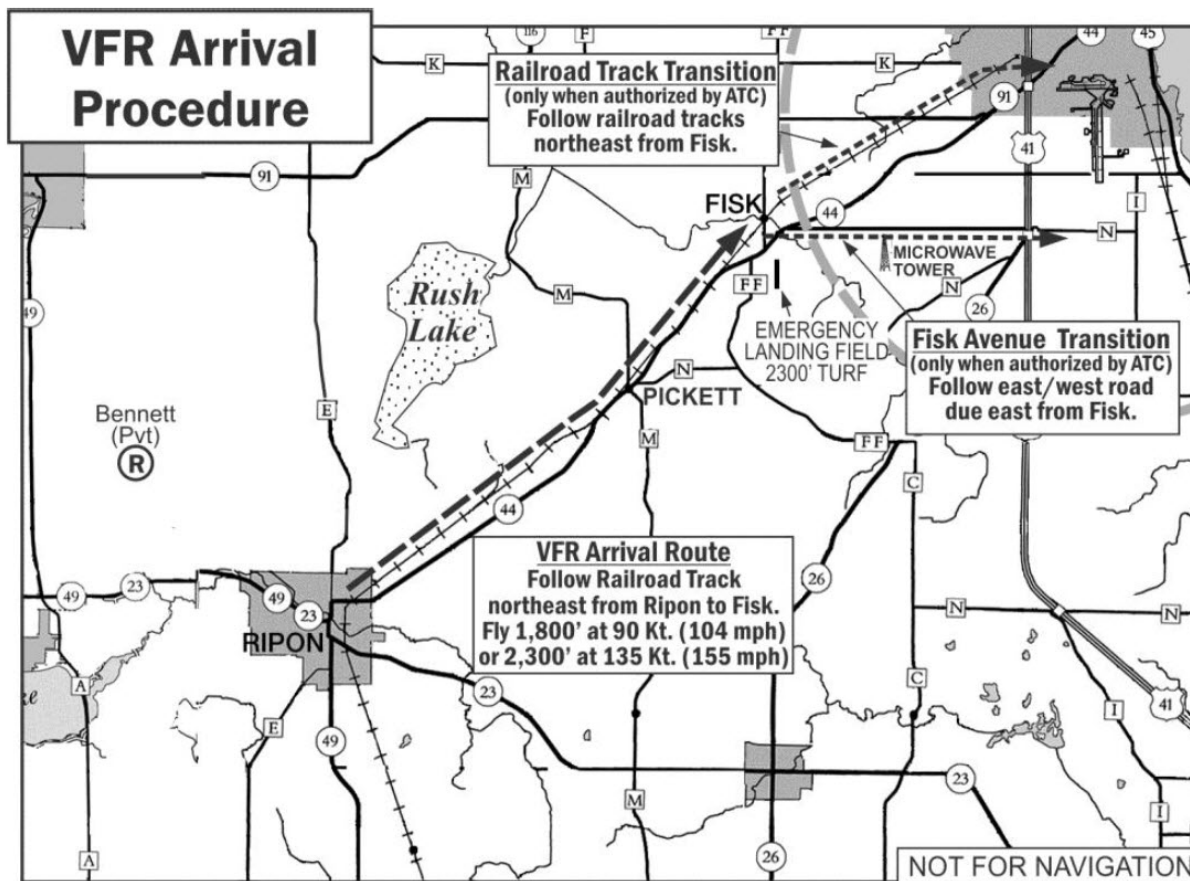


Figure 1 – Fisk Arrival graphic as shown in the 2015 AirVenture Notice to Airmen.

1.0 History of Flight

The pilot reported to the NTSB investigator in charge that he departed from the Southwest Michigan Regional Airport (BEH), Benton Harbor, Michigan, about 0730 eastern daylight time, and overflew Kenosha, Burlington, Hartford, Ripon, and Fisk, Wisconsin. He then proceeded to fly the Fisk arrival procedures for runway 27 published in the EAA AirVenture 2015 NOTAM. The pilot reported that he entered the right downwind leg for runway 27 at 1,800 feet and started to descend while maintaining 90 knots airspeed. He reported that he was instructed by air traffic control (ATC) to turn onto the base leg abeam the runway numbers and to land on the green dot (located about 2,500 feet from the runway 27 displaced threshold.) After he started the base turn, he observed a twin-engine airplane taxi onto runway 27 and start its takeoff roll. The pilot reported that ATC instructed him to continue the approach and land on the orange dot (located about 1,000 feet from the runway 27 displaced threshold) instead of the green dot. About 250 to 300 feet above ground level he pulled back on the power, which resulted in the airplane entering a stall. The pilot attempted to recover by adding full power, but the airplane struck the runway in a right wing, nose down attitude.

Witnesses reported seeing the airplane enter a steep angle of bank with the right wing down during the downwind to base turn. The right wing hit the runway, causing an explosion and fire

with black smoke rising above the accident site. The right wing separated from the airplane and landed in the grass on the south side of the runway. The airplane skidded on its belly and came to rest on the left side of the runway about 250 feet from the initial impact point. The left wing was partially separated from the fuselage. A post-impact fire ensued on the separated right wing and under the partially separated left wing.

At 0740, the surface weather observation at OSH was: wind 250 degrees at 3 kts; visibility 10 miles; sky clear; temperature 19 degrees C; dew point 14 degrees C; altimeter 29.97 inches of mercury.

Instructions for the Fisk arrival contained in the AirVenture NOTAM direct pilots to minimize radio transmissions and not respond to ATC communications. Review of recorded transmissions from the NLC team and the IM team showed that at 0742:24, the NLC communicator instructed a Malibu on downwind for runway 27 to begin descent. At 0742:44, the Malibu pilot was told to, "...turn abeam the numbers, runway 27 green dot cleared to land."

Before and during the period N4BP was operating in the traffic pattern, the IM team was clearing departures for takeoff from runway 27. Between 0730 and 0743 there were about 22 departures. The last departure before the accident was "Cessna 44Q", cleared for takeoff at 0743:03. The IM communicator then continued, "44Q roll it around the corner – scoot!"

At 0743:11, the NLC communicator transmitted, "Malibu I've got somebody on the runway – keep it coming around keep it coming around cleared to land runway 27 orange dot, land as soon as you can."

At 0743:23, the IM communicator transmitted, "Don't turn your back – don't turn your back!" There were no further transmissions on the IM frequency.

The tower controllers notified airport firefighters to respond, extinguish the post-crash fire, and assist the aircraft's occupants.

2.0 Special Procedures for AirVenture

Because of the large number of aircraft arriving and departing from OSH during annual AirVenture events, the FAA published special flight procedures that established standard routes, speeds, and altitudes for pilot use, and additional modifications to standard separation rules for air traffic control use. The flight procedures for the 2015 event were contained in a Notice to Airmen (NOTAM) describing various ingress/egress procedures, airport configurations, runway markings, and communications protocols. The Fisk arrival flown by the pilot of N4BP was included in the 2015 NOTAM.

Air traffic control procedures for AirVenture 2015 were contained in the "2015 AirVenture ATC Training & Procedures Manual," which incorporated OSH ATCT standard operating procedures as well as letters of agreement and information about waivers in effect modifying the requirements of FAA order 7110.65, "Air Traffic Control," for the duration of the show. One of the waivers permitted controllers to apply reduced runway separation standards between arriving

aircraft. Under normal circumstances, controllers would be required to maintain at least 3000 feet of separation between a departing Cessna and an arriving Malibu using the same runway.

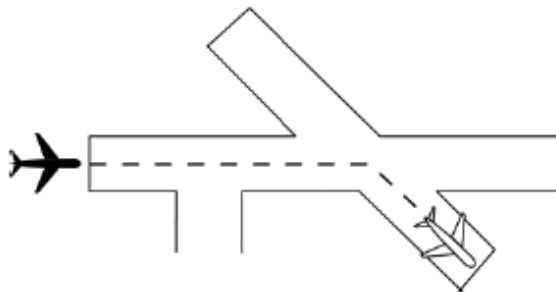
FAA order 7110.65, paragraph 3-10-3, “Same Runway Separation,” states in part:

a. Separate an arriving aircraft from another aircraft using the same runway by ensuring that the arriving aircraft does not cross the landing threshold until one of the following conditions exists...

1. The other aircraft has landed and is clear of the runway. (Figure 3-10-1) Between sunrise and sunset, if you can determine distances by reference to suitable landmarks and the other aircraft has landed, it need not be clear of the runway if the following minimum distance from the landing threshold exists:

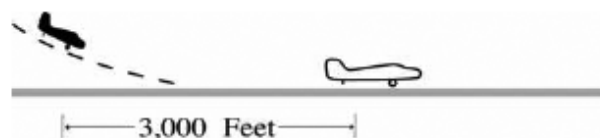
(a) When a Category I aircraft is landing behind a Category I or II- 3,000 feet. (See Figure 3-10-2.)

FIG 3-10-1
Same Runway Separation



(a) When a Category I aircraft is landing behind a Category I or II- 3,000 feet. (See [FIG 3-10-2](#).)

FIG 3-10-2
Same Runway Separation



According to the reduced runway separation standards authorized during AirVenture, the minimum required distance between N4BP and the departing Cessna aircraft would have been 1500 feet, constant or increasing, when N4BP reached the runway threshold. The FAA waiver issued to OSH ATCT for the 2015 event has been entered in the docket.

3.0 Radar Data

Radar data for this accident was obtained from Milwaukee Terminal Radar Approach Control (TRACON), and included targets from radar sites located at Horicon, Wisconsin (about 32 miles

south of OSH), Green Bay, Wisconsin (about 35 miles north of OSH), and automatic dependent surveillance targets recorded at Milwaukee TRACON.

To prevent possible overloading of area ATC radar systems and controller displays by large numbers of transponder targets, the AirVenture NOTAM requests that aircraft using the Fisk arrival procedure set transponders to standby. The accident pilot did so: consequently, no transponder targets for N4BP in the vicinity of OSH were detected. Primary targets observed on the Fisk arrival entering downwind to runway 27 and consistent in timing with transmissions made to N4BP are shown in figure 2.

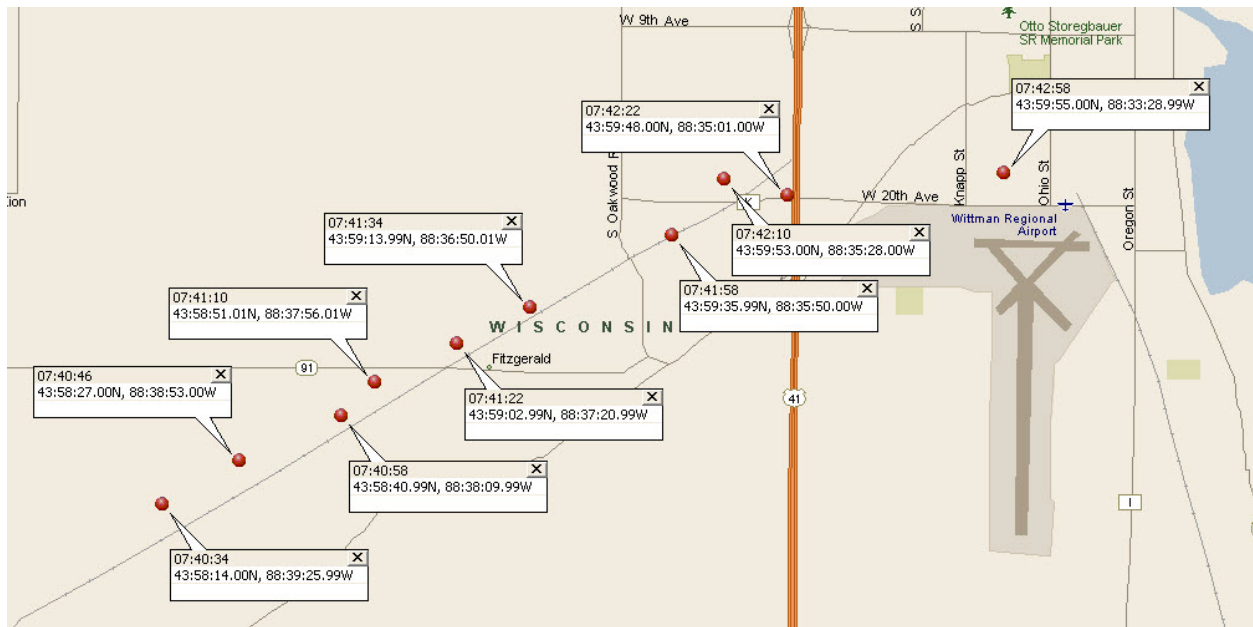


Figure 2: Primary radar targets from the Horicon radar site. The North Local communicator transmitted, “Malibu on downwind start your descent” at 0742:24, and at 0742:44 transmitted, “Turn abeam the numbers, runway 27 green dot cleared to land.”

4.0 Video Recording of the Accident

The pilot of a nearby aircraft preparing to depart was operating a video camera that recorded the accident sequence and provided the recording to the NTSB for analysis. An engineer from the Office of Research and Engineering created a video study and written report for the docket. Figure 3 is a graphic copied from the video study illustrating the relative positions of the accident aircraft and the preceding runway 27 departure.



Figure 3: Graphic from video study showing estimated relative positions of N4BP and the preceding runway 27 departure.

At time 13 s on the graphic, the east/west lateral distance between the two aircraft was about 1450 feet. The departure was accelerating down the runway for takeoff, although the aircraft's exact speed at that time could not be established from the video and is unknown. For the remainder of the flight, N4BP's ground track was mainly southbound and moved only 100 feet to the west during the next 4 seconds, the equivalent of about 15 kts toward the departing aircraft. To the extent that the departing aircraft's speed was at or above 15 kts after time 13 s, the minimum east/west distance (equivalent to runway separation) between the two aircraft ground positions can be estimated as 1450 feet and increasing.

From the video information available, the NTSB engineer performing the review was asked to calculate the possible separation results if the accident aircraft had successfully completed the turn to final. The following discussion was adopted from the video study:

The accident airplane was heading south seven seconds before it crashed on Runway 27. It crashed before completing its 90 degree turn to right to be heading west along the runway. Therefore, the following analysis is hypothetical. Rather than analyzing events that actually happened, it presents a kinematic analysis of what could have happened if the assumptions listed below were all correct.

Assumptions used in the following analysis:

- 1. At time 13 s (see Figure 3), the airplane started a constant-radius 90 degree right turn that would bring it to the centerline of Runway 27.*
- 2. The ground speed remained constant during the turn as it was at time 13 s*
- 3. Wind speed is not taken into account.*
- 4. Altitude is not taken into account.*

The required radius of the turn is $R=655$ ft (see Figure 3). The length of the $\frac{1}{4}$ circle trajectory is $(\pi/2)R=1029$ ft. The estimated speed at time 13 s was 109.7 ft/s. Therefore, the time required to complete the hypothetical $\frac{1}{4}$ circle turn is $1029/109.7=9.4$ seconds.

If the second airplane stayed at the location where it is shown in Figure 3, when the accident airplane completed its turn, the estimated distance between the airplanes would have been $2000-570-655=775$ ft. However, the second airplane was departing and moving west. To keep the separation between the airplanes at 1500 ft when the accident airplane completed the turn, during the 9.4 seconds the second airplane would have to move west at the average speed of $(1500-775)/9.4=77.1$ ft/s= 45.7 kts.

5.0 Personnel Interviews

Chuck Adams

IM Lead Controller, Monitor/Coordinator

Mr. Adams was assigned as the lead controller at the IM position near the intersection of taxiway A and runway 27. He began working for the FAA in 1988 at the Detroit TRACON, transferred to Saginaw ATCT in 1990, and then to Grand Forks ATCT in 1992. He was a veteran AirVenture controller, having worked the show from 2000 to about 2006, then again from 2010 to 2015. He had a current medical certificate and no other pilot or controller experience.

On the day of the accident, Mr. Adams was working at the IM MOOCOW as the monitor/coordinator, providing “communicator” training to another controller who was on his second year at AirVenture. The MOOCOW equipment was all functioning correctly, and staffing was normal. During the period leading up to the accident, Mr. Adams was talking on the frequency as an instructional demonstration for the communicator trainee. The objective was to teach the trainee to “work like it is busy.”¹ The entire team was responsible for monitoring inbound traffic, but the coordinator was responsible for maintaining the overall picture. The team was aware that a blue low-wing aircraft was entering right downwind for runway 27 because they were monitoring NLC radio traffic on a speaker. The IM team primarily relied on visual acquisition to detect arriving aircraft, but tower radio transmissions also provided awareness of incoming flights.

Mr. Adams was discussing voice quality with the communicator trainee between transmissions when they became aware of the inbound Malibu. The aircraft looked “normal” on downwind over the gravel pit, but the next time they saw it, the aircraft looked unusually low for a runway 27 arrival. The aircraft was west of the terminal building and had not yet started to turn right base. The next departure was holding short between 125 and 250 feet from the runway. Traffic was very light, and there were no other aircraft waiting to depart. The communicator cleared the departure for takeoff. Mr. Adams then saw that the Malibu was lower and “tighter” on base than he expected, so he went on frequency and told the Cessna pilot to hurry up. The Cessna pilot never stopped, and did expedite his takeoff as requested. The Malibu was over the terminal building and then turning toward the runway. By then, the departing Cessna was rolling and approaching or beyond the green dot on the runway. Mr. Adams restated that the Malibu came in over or near the terminal building, and looked unusually low even for landing at the orange dot.

Asked again where the Malibu was when the departure was cleared for takeoff, Mr. Adams stated that it was on downwind west of the terminal building, and had not turned base yet. To ensure spacing, Mr. Adams was on the radio encouraging the departure to go: the aircraft made a rolling takeoff and did not stop on the runway. Controllers try to use minimum spacing during AirVenture, and to expedite traffic to avoid go-arounds.

Because arriving aircraft were on the NLC frequency, the IM communicator could not directly instruct a pilot to go around. Should a go-around appear necessary, the IM team would contact the tower FLM via FM radio and the FLM would either override the tower frequency and send the aircraft around or ask the tower communicator to do so.

Mr. Adams said that while the Malibu was turning from downwind to base, it looked like the aircraft was making a continuous turn to final. Partway down the curving “base” leg, the aircraft briefly rolled wings level and was straight southbound. The aircraft was “very low” at that point. Mr. Adams said that the plane then overshot the final approach course and rolled into a very steep bank to try to line up with the runway. The wings looked almost perpendicular to the ground. He made the “don’t turn your back” radio transmission, which was directed at one of

¹ Controller training for OSH operations often includes an effort to teach trainees to use minimum required separation even during slower periods in order to develop skills that become critical during busy periods.

the spotters because the Malibu was in an unusual maneuver and the spotter needed to watch out for it.

Mr. Adams stated that he had no reluctance to call for a go-around if he perceived an unsafe situation. He gave examples such as landing aircraft lined up for the paved ditch next to the runway, or one aircraft above another instead of following. Beyond that, it was up to the pilots to determine whether to go around or continue to land. He could not provide an estimate of the number of go-arounds that occur during Oshkosh operations, but described them as an everyday occurrence.

As part of the training and certification process, AirVenture controllers rotate through and qualify on all control positions at Fisk and in the tower.

Grant Shinn

North Local FLM

Mr. Shinn began working for the FAA in 1988 at the Waterloo, Iowa, ATCT, transferring to the Department of Defense from 1988 to 1991, then returning to the FAA where he worked at Beaumont, Texas; Baton Rouge, Louisiana; New Orleans, Louisiana; Houston Intercontinental (IAH) tower and approach control, and Houston Hobby ATCT as a supervisor. He then returned to IAH as a staff specialist and supervisory traffic management specialist. Mr. Shinn also had Navy ATC service. He had worked at AirVenture for the past 7 years.

On the day of the accident, Mr. Shinn was supervising the NLC team, consisting of himself, a communicator, a team lead, and two spotters. It was a normal operation, with light traffic. When the Malibu entered the downwind, one of the spotters commented that the aircraft looked low. It was not quite midfield downwind, possibly more toward the departure end of runway 27 just inside the numbers for runway 9. The landing gear was down and the plane wasn't going unusually fast, but the aircraft was lower than a typical arrival of any type. The communicator cleared the Malibu to land. The spotter then asked, "Is that a crosser or a departure?" or something similar, referring to an aircraft taxiing onto runway 27. Mr. Shinn used the FM radio to ask the IM team if the aircraft was crossing the runway or departing. He believed that it was Mr. Adams who replied that it was departing. The departing aircraft was west of taxiway A, and the Malibu was starting to turn base approximately north of the runway 27 numbers. The pilot had been instructed to turn base abeam the numbers, and he did so.

Mr. Shinn said that he had no concerns about adequate spacing between the arriving Malibu and the departure – "it looked like it was going to work." The Malibu seemed to be making one continuous turn to final. The pilot had originally been cleared to land on the green dot. When the communicator issued the traffic information about the aircraft on the runway and changed the landing instructions, the aircraft rolled wings level and was heading straight southbound. The aircraft was approaching the final approach course, possibly off the end of runway 23. The aircraft was wings level for a couple of seconds, then rolled into a steep turn that looked like an 80 or 90 degree bank. From the tower it was hard to tell if the aircraft overshot the final. The right wing hit the ground, and looked like the whole aircraft "went off." The operations manager called the fire department. Mr. Shinn could not provide an estimate of the fire department response time.

Mr. Shinn said that the change in landing clearance from the green dot to the orange dot was not really necessary – there would have been enough spacing either way. He noted that changing landing spots is common at AirVenture. If there are a lot of departures waiting, the tower team will try to build holes to get them out. Which dot to choose for landings is a discretionary technique – there is no set standard. Mr. Shinn said that the number of times the landing spots are changed from the green dot to the orange dot depends on the operation: the busier the traffic, the more often there are changes.

Asked under what circumstances the tower team would instruct a pilot to go around, Mr. Shinn said that it would occur in the event of an unsafe situation, or if the 1500-foot minimum runway spacing interval was going to be violated if an aircraft continued to land. Anyone on the tower team can call for a go-around, as can the IM team via FM radio. Safety is first priority. Mr. Shinn said that he had the ability to send the aircraft around if he thought the operation was unsafe, but his judgment was that it was not necessary. This was a tragic event, and the first serious accident he had seen in his 31 year ATC career.

Glenn Krafcik

North Local Communicator

Mr. Krafcik began working for the FAA in 1982 at Cleveland Center. In 1990, he transferred to Cleveland ATCT where he has remained. He has a private pilot license, and has worked at AirVenture annually since 2010.

On the day of the accident, Mr. Krafcik was working the communicator position on the NLC team. It was a normal operation, with no unusual circumstances affecting operations. He first became aware of the Malibu as it followed the train tracks toward the downwind leg for runway 27. The aircraft's altitude and speed looked normal. He instructed the pilot to begin his descent, and the pilot did so. As the aircraft was approximately mid-field on downwind, Mr. Krafcik told the pilot to turn base abeam the numbers and land on the green dot.

As the Malibu was turning base, Mr. Krafcik noticed an aircraft on the runway and asked the FLM if he should send the Malibu around. Asked why he considered sending the aircraft around if the spacing was adequate, he said that it was the first thing he thought of but then the FLM told him there was plenty of space. Mr. Krafcik then decided to prevent any possible decrease in spacing by telling the pilot to land on the orange dot instead of the green dot. He was trying to ensure that the arriving aircraft didn't get on top of the departure. It is common to change landing spots – it happens "all day long." Any member of the control team could have called for a go-around, but no one did because it wasn't necessary. Minimum required separation was 1,500 feet on the runway, and Mr. Krafcik estimated that the aircraft had about 3,500 feet of separation. There wasn't anything abnormal about the handling: it was a standard operation for Oshkosh. He described it as a team effort, and said it worked well.

Mr. Krafcik said that he probably first cleared the pilot to land when the aircraft was approximately mid-field on downwind because that was his normal practice, but he did not specifically recall. He issued the change to the orange dot while the pilot was turning from downwind to base. Mr. Krafcik recalled no specific impression of unusual altitude or speed

issues. He was watching the departing aircraft on the runway, scanning back and forth between the arrival and the departure. He remembered seeing the bottom of the Malibu, and then saw it hit the ground. It looked like the aircraft was coming around on the wingtip.

There were no other discussions in the tower about spacing. The plan always changed as conditions required. Mr. Krafcik didn't recall much about the communications between the FLM and the IM team on the FM radio. He vaguely recalled hearing something, but no details. Asked if the spotters said anything about the aircraft on the runway, Mr. Krafcik said he thought he was the first to see it and he did not recall anything being said by the spotters. The fire department was immediately notified when the aircraft crashed. He could not remember who made the call. Asked about the fire response time, Mr. Krafcik said he had heard it was about 1.5 minutes.

Asked if he had any experience judging aircraft speed besides being a controller, Mr. Krafcik stated that he was a Navion pilot. As far as differences in handling based on aircraft types, he said that from an Arrow to a Malibu, single engine aircraft are pretty much all the same. Twins and jets are handled differently.

When clearing aircraft on to runway 27 for takeoff, controllers can clearly see spacing between arrivals and departures. The tower perspective is different from being out on the field. By the time the accident occurred, there was only one arrival and one departure.

Mr. Krafcik noted that it was normal practice to tell runway 27 arrivals to turn abeam the numbers and land on the green dot, and that it was common for them to "slop over" and overshoot the arrival end. Mr. Krafcik has flown the Fisk arrival himself three times, and said that right turns in a traffic pattern are not the norm; it's not as comfortable for pilots. Asked if the right downwind leg over the gravel pit was closer in than a normal downwind, he said that it depended on the type of aircraft. He could not think of any practices or procedures that needed changing.