



National Transportation Safety Board Aviation Accident Final Report

Location:	Kansas City, MO	Accident Number:	CHI05FA059
Date & Time:	01/28/2005, 2217 CST	Registration:	N911AE
Aircraft:	Learjet 35A	Aircraft Damage:	Substantial
Defining Event:		Injuries:	2 None
Flight Conducted Under:	Part 91: General Aviation - Business		

Analysis

The Learjet 35A received substantial damage on impact with airport property and terrain during a landing overrun on runway 19 (7,002 feet by 150 feet, grooved asphalt) at Charles B. Wheeler Downtown Airport (MKC), Kansas City, Missouri. The airplane was operated by a commercial operator as a positioning flight to Kansas City International Airport (MCI), Kansas City, Missouri, with a filed alternate destination of Lincoln Airport (LNK), Lincoln, Nebraska. Night instrument meteorological conditions prevailed at the time of the accident. LNK was a certificated airport with a snow removal plan and was served by runway 17R (12,901 feet by 200 feet, grooved asphalt and concrete). The flight was en route to MCI to pick up passengers and continue on as an on-demand charter but diverted to MKC following the closure of MCI. MCI was closed due to a McDonnell Douglas MD83 sliding off a taxiway during an after landing taxi on contaminated runway/taxiway conditions. MKC held a limited airport certificate that did not have a snow removal plan and was served by runway 19. Following a precision approach and landing on runway 19 at MKC, the Learjet 35A slid off the departure end of the runway and impacted airport property and terrain. The Learjet 35A was operated with inoperative thrust reversers as per the airplane's minimum equipment list at the time of the accident. About 1:05 hours before the accident, runway 19 Tapley values were recorded as 21-22-22 with 1/2 inch of wet snow. About 17 minutes before the accident, MKC began snow removal operations. About 7 minutes before the accident, the MKC air traffic control tower (TWR) instructed the snow removal vehicles to clear the runway for inbound traffic. TWR was advised by airport personnel that runway 19 was plowed and surface conditions were 1/4 inch of snow of snow; friction values were not taken or reported. While inbound, the Learjet 35A requested any braking action reports from TWR. The first airplane to land was a Cessna 210 Centurion, and the pilot reported braking action to the TWR as "moderate", which was then transmitted by TWR as "fair" from a Centurion in response to the Learjet 35A's query. The Cessna 210 Centurion pilot did not use brakes during landing and did not indicate this to TWR during his braking action report. The Aeronautical Information Manual states that no correlation has been established between MU values and the descriptive terms "good," "fair," and "nil" used in braking action reports. The Airport Winter Safety and Operations advisory circular (AC) states that "pilot braking action reports oftentimes have been found to vary significantly, even when reported on the same frozen contaminant surface conditions." The AC

also states, "It is generally accepted that friction surveys will be reliable as long as the depth of snow does not exceed 1 inch (2.5 cm) and/or depth of wet snow/slush does not exceed 1/8 inch (3mm). The Learjet 35A flightcrew calculated a landing distance 5,400 feet. Two of the cockpit voice recording channels, which normally contain the pilot and copilot audio panel information, were blank.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The contaminated runway conditions during landing. Contributing factors were the operation of the airplane without thrust reversers, flight to the planned alternate airport not performed by the flightcrew, and the insufficient runway information. Additional factors were the airport property and terrain that the airplane impacted.

Findings

Occurrence #1: OVERRUN

Phase of Operation: LANDING - ROLL

Findings

1. (F) THRUST REVERSER - INOPERATIVE
2. (F) FLIGHT TO DESTINATION ALTERNATE - NOT PERFORMED - FLIGHTCREW
3. (F) INFORMATION INSUFFICIENT - FLIGHTCREW
4. (C) AIRPORT FACILITIES, RUNWAY/LANDING AREA CONDITION - OTHER
5. OTHER SYSTEM - INOPERATIVE

Occurrence #2: ON GROUND/WATER COLLISION WITH OBJECT

Phase of Operation: LANDING - ROLL

Findings

6. (F) OBJECT - ANTENNA
7. (F) OBJECT - FENCE
8. (F) OBJECT - OTHER

Occurrence #3: ON GROUND/WATER ENCOUNTER WITH TERRAIN/WATER

Phase of Operation: LANDING - ROLL

Factual Information

HISTORY OF FLIGHT

On January 28, 2005, at 2217 Central Standard Time (CST), a Learjet 35A, N911AE, operated by Business Aviation Management Group Inc. (d.b.a. Million Air), overran runway 19 during landing rollout at Charles B. Wheeler Downtown Airport (MKC), Kansas City, Missouri. The airplane received substantial damage when it impacted airport property and terrain. Night instrument meteorological and contaminated runway conditions prevailed at the time of the accident. The Title 14 Code of Federal Regulations (CFR) Part 91 positioning flight was operating on an instrument rules flight plan with a filed alternate destination of Lincoln Airport (LNK), Lincoln, Nebraska. The pilot and copilot were uninjured. The flight originated from Salt Lake City International Airport (SLC), Salt Lake City, Utah, at 1905 Mountain Standard Time, and was en route to Kansas City International Airport (MCI), Kansas City, Missouri, when it diverted to MKC.

The positioning flight was to pick up five passengers at MCI for a return Title 14 CFR Part 135 flight to SLC. At 2102 CST, the Learjet 35A was on approach to MCI when a McDonnell Douglas MD83 slid off runway 19L at taxiway E during an after landing taxi resulting in the closure of MCI for approximately 90 minutes. The Learjet 35A then diverted to MKC.

A Federal Aviation Administration (FAA) partial transcript of transmissions from MKC Air Traffic Control Tower (TWR), N911AE, FLX745 (Cessna 210 Centurion), Airport Vehicles (ARPT) 5, 10, 24, 26, and MCI Approach Control (APP) follows.

2206:50 CST; TWR; and ah airport five

2206:59 CST; ARPT 5; airport five

2207:01 CST; TWR; airport five why don't you guys ahead ah start to ah exiting on runway one nine and all vehicles please report clear traffic on nine mile final

2207:03 CST; ARPT 5; airport five we copy

2207:10 CST; TWR; look like I am going to have three right in a row inbound and I'll get you guys going again

2207:12 CST; ARPT 24; airport twenty four is clear

2207:33 CST; FLX745; downtown tower flight express seven forty five on the I L S for one nine

2207:33 CST; ARPT 5; airport five is clear

2207:35 CST; TWR; flight express seven forty five downtown tower continue inbound at the present time I do have plows on the runway they will be exiting here shortly

2207:36 CST; FLX 745; ah roger flight express seven forty five

2207:37 CST; TWR; o k ah I had a couple of you are stepping on each other I know that twenty four is clear, twenty five is clear who else

2207:38 CST; ARPT 26; airport twenty six

2207:39 CST; ARPT 10; airport ten is clear

2207:41 CST; ARPT 5; airport five is clear

2207:47 CST; TWR; roger understand all vehicles are clear of the runway thank you hold short of runway one niner for landing traffic you can proceed onto runway three two one just remain clear of the intersection to runway one

2208:02 CST; TWR; flight express seven forty five is cleared to land on runway one niner and r v r is ah better than six thousand five hundred the runway has been plowed fifty feet either side of the centerline

2208:09 CST; FLX745; roger cleared to land flight express seven forty five understand they just plowed the runway

2208:24 CST; TWR; affirmative and once your down just ah I'd appreciate any pilot reports you can give me regarding ice and [braking] action

2208:30 CST; FLX745; roger flight express seven forty five

2208:41 CST; TWR; approach downtown

2208:43 CST; APP; approach

2208:45 CST; TWR; hey our runway one niner has been plowed fifty feet ah either side of the centerline

2208:46 CST; APP; o k

2208:47 CST; TWR; but I don't have a [braking] action yet

2208:48 CST; APP; alright t t

2208:49 CST; TWR; d x

2211:12 CST; FLX745; ah tower the ride down was pretty good there's quite a bit of fog right before you get to the runway though

2211:20 CST; TWR; roger thanks

2211:22 CST; FLX745; icing was just a trace of rime

2211:23 CST; TWR; roger thanks

2211:32 CST; N911AE; downtown tower lear jet one one alpha echo at two thousand six hundred on the I L S one niner

2211:38 CST; TWR; lear niner one one alpha echo downtown tower runway one niner cleared to land centurion ahead reported a trace of rime on the decent runway has been plowed fifty feet either side of the centerline

2211:48 CST; N911AE; o k ah cleared to land runway one niner and any [braking] reports

2212:00 CST; TWR; one alpha echo I am sorry I was on another frequency say again

2212:03 CST; N911AE; ah any [braking] reports on runway one niner one alpha echo

2212:06 CST; TWR; I'll have it for you in just a second

2212:07 CST; N911AE; thank you

2212:21 CST; TWR; flight express seven forty five how's the [braking] action

2212:22 CST; FLX745; ah we are just slipping just a little bit it's pretty good I'd say it's moderate to ah (unintelligible)

2212:27 CST; TWR; understand that breaking action is fair

2212:29 CST; FLX745; ah yea I'd call it fair

2212:35 CST; TWR; o k use caution down from there it hasn't been touched at all foxtrot looks like it's been plowed proceed into the ramp this frequency good night

2212:37 CST; FLX745; roger we'll stay with you flight express seven forty five

2212:43 CST; MKLC TWR; lear one alpha echo centurion that just landed reported [braking] action fair and I'd appreciate a [braking] action report from you also

2214:48 CST; N911AE; will do one alpha echo

2217:45 CST; TWR; lear one alpha echo tower

2217:48 CST; N911AE; o k we are all right

2217:49 CST; MKC TWR; o k are you off the runway sir

2217:51 CST; N911AE; we are

2218:04 CST; TWR; one alpha echo understand you are on your way to the ramp I don't have you in sight sir

2218:09 CST; N911AE; one alpha echo off the end of the runway pass the localizer

2218:14 CST; TWR; o k understand you are off the end of the runway

2218:18 CST; N911AE; we have departed the end of the runway through the perimeter fence

The copilot stated that following the closure of MCI, APP indicated at least a one-hour holding time was to be expected and numerous aircraft were diverting to Omaha. The copilot asked APP if MKC was available and was issued a clearance to MKC. He obtained Automated Terminal Information Service (ATIS) Echo, which reported a visibility of 1/2 statute mile (sm) with light snow and freezing fog. He told APP that MKC was below approach minimums and requested clearance to their alternate, LNK. After turning to a direct route to LNK, APP reported ATIS information Foxtrot as: 1 1/4 sm visibility in light snow and mist; sky condition as few at 1,000 feet above ground level (agl) and scattered at 1,800 feet agl with instrument landing system (ILS) 19 approach in use. They were then cleared to MKC.

The copilot stated that he heard TWR talking to an aircraft that just landed regarding braking action. The copilot stated TWR then reported braking action to the Learjet 35A as fair but did not specify the aircraft type that reported the braking action. The copilot stated that the approach was flown "stabilized" with a speed of REF + 30 until flaps were selected, then REF + 10 for the remainder of the approach, slowing to REF + 5 over the fence. The glideslope was followed to touchdown, about 1,000 feet from the threshold. The touchdown was made to the right. The deceleration appeared "normal" as brakes were applied, until 1,500 - 2,000 feet from the departure end of the runway when the speed appeared to "stabilize" about 20-30 knots. The copilot stated that he called for maximum braking and they both noted the brakes were "ineffective" at slowing the airplane and they knew that they would not stop by the end of the runway.

The pilot of FLX745 stated that he was cleared for approach and heard TWR asking the snow

removal crew to get clear of the runway. As he broke out of the clouds, he could see the runway was not completely cleared; however, it was cleared enough to make a landing. As he neared the runway, he heard the Learjet 35A pilot asking for a braking action report, and TWR said to the Learjet 35A, "as soon as the Centurion lands, I will give you one." His landing was "normal," but he didn't use brakes until just prior to turning off runway 19 at taxiway D. He taxied with additional power to get through deeper snow on the taxiway because it had not been plowed. He taxied onto runway F, which was plowed, and completed his taxi to the ramp at hanger 8. As he was unloading cargo from the airplane, the pilot of FLX75 noticed that the Learjet 35A missed the high-speed turn off to the left of runway 19 and continued at a very high rate of speed until he heard a "thud" when the Learjet 35A impacted the airport fence.

The MKC assistant manager stated that he reported for work at 2130 CST with the intention to relieve the airport manager at 2300 CST.

About 2150 CST, the assistant airport manager contacted TWR to begin snow removal operations. TWR said that they could start with runway 01 as a Hawker was in the final stage of preflight in hangar 1. There was approximately 1 1/2 - 2 inches of wet snow on all surfaces. After a few passes plowing runway 01-19, about 50 feet of the runway 01-19 was plowed on either side of the centerline.

About 2205 CST, TWR called to clear the runway for the Hawker's departure. The Hawker departed from runway 01 without incident. After the Hawker's departure, snow removal was resumed and another 15 feet on either side of runway 01-19 centerline was cleared for a total of 130 feet.

About 2210 CST, TWR called to clear the runway for an arrival of a Cessna 210 Centurion. The assistant airport manager, who was also assisting in the snow removal operations, notified TWR that the runway was plowed 130 feet wide and the condition was 1/4 inch wet snow. The Cessna 210 Centurion landed and reported that the braking action was fair. TWR requested that the snow plowing equipment continue holding for another arrival. The assistant manager was holding on runway 19 ILS hold short marking, and the two snowplow trucks were on the [south] end of the taxiway G. It was foggy and the assistant manager was facing west while waiting for the Learjet 35A to land.

About 2215 CST, the Learjet 35A broke out of the fog, and the assistant airport manager noticed that the Learjet 35A was too high. The assistant manager continued monitoring the short final approach until the Learjet 35A crossed the runway 19 threshold. The assistant manager estimated that it appeared as if the Learjet 35A was still airborne beyond taxiway F before it disappeared in the fog.

About 2230 CST, a Notice to Airman (NOTAM) was issued closing MKC until further notice.

The MKC manager stated that he remained on duty at MKC throughout the afternoon and evening monitoring weather, IDS-4, Intellicast and Meteorologix radar depictions, weather briefings from National Weather Service Pleasant Hill, and MCI runway surface sensors.

At 1930 CST, MKC security completed a runway braking action test using a Tapley mechanical decelerometer; all runway 01-19 readings were above 40. The runways were wet with no measurable accumulation.

About 2000 CST, light snow with trace accumulation was observed at MKC.

At 2013 CST, an airport field condition NOTAM was issued. Runway 01-19 Tapley Mu values

were reported as above 40 with wet snow on the runway. TWR was updated with a surface condition report and Mu values. IDS-4 was updated with a field condition report.

At 2030 CST, the MKC snow crew was called in.

At 2105 CST, MKC security completed a runway braking action test using a Tapley mechanical decelerometer. Runway 19 Mu values were reported as 21-22-22 with 1/2 inch wet snow on the runway.

At 2120 CST, an airport field condition report NOTAM was issued. Runway 19 Mu values were reported as 21-22-22 with 1/2 inch wet snow on the runway. TWR was updated with a surface condition report, Mu values, and was told "braking action was overall poor although this later information does not meet the criteria for NOTAM reporting purposes." IDS-4 was updated with a field condition report.

At 2200 CST, snow removal commenced on runway 01 with two plow trucks under the direction of the assistant manager.

About 2210 CST, TWR instructed snow removal personnel and equipment to clear runway 01-19 for two arrivals. The assistant manager advised TWR over ground radio that runway 01-19 was plowed full-length 130 feet wide down the centerline and reported surface conditions as 1/4 inch wet snow on the runway. The assistant manager also observed, but did not report, the pavement surface temperature appeared to be above freezing.

Shortly after clearing the runway, the assistant manager observed the first aircraft arrival, a Cessna 210 Centurion, land on runway 19. The assistant airport manager was momentarily off frequency and did not hear a braking action report but was told later that it was fair.

About 2215 CST, a Learjet broke out of the cloud base and made its approach to runway 19. The MKC assistant manager was holding short at the runway 19 ILS hold line and did not see the airplane touch down as he lost view of it in the darkness, snow, and fog. The assistant manager estimated that the airplane was still airborne south of taxiway F when he lost sight of it. The assistant manager then heard on ground frequency that the airplane ran off the departure end of runway 19. He advised TWR over ground radio that the MKC was closed and went to the scene.

Winds were reported as calm with 3/4 sm visibility and air temperature of 31 degrees Fahrenheit (F). MCI was reporting an air temperature of 31 degrees F with runway surface sensors reading 32.3 degrees F.

The airplane departed the runway roughly on centerline, traversed the gravel runway safety area, impacted the west side of the ILS localizer antenna array, impacted the chain link perimeter fence dragging approximately 180 feet of fence with it, crossed Lou Holland Drive, penetrated the steel guard rail on the south side of the road, and came to rest on the north slope of a flood levee within a few feet of one of the nonstandard approach lights for runway 01.

AIRCRAFT INFORMATION

The 1977 Gates Learjet Corporation LR-35A, serial number 109, was certified under Title 14 CFR Part 25, Airworthiness Standards: Transport Category Airplanes. The airplane was registered to Keystone Aviation (d.b.a. Million Air) on September 13, 2000, and was listed under the operator's air carrier certificate.

The Weight and Balance/Equipment Change List for the airplane dated March 11, 2004,

indicates a new empty weight and balance of 10,004.8 lbs and a gross weight of 18,300 lbs. On-scene cockpit documentation by the FAA revealed that the fuel totalizer indicated 3,285 lbs of fuel consumed from SLC to MKC. The operator reported the airplane had 6,200 lbs of fuel when it departed SLC.

The thrust reverser system was listed as inoperative on the minimum equipment list (MEL) as a "category C" item. According to the MEL, a category C item "shall be repaired within three (3) consecutive calendar days (72 hours), excluding the day the malfunction was recorded in the aircraft maintenance record/logbook."

The Discrepancy Item Master List shows an entry dated January 19, 2005, and an expiration date of January 28, 2005, listing the thrust reverser system. A letter by the Million Air Director of Maintenance, dated January 27, 2005, to the FAA's Salt Lake City Flight Standards District Office (FSDO), states that the expiration date of the thrust reverser MEL item was made due to "the test equipment needed to effect the repairs are currently unavailable and in the process of being made available to us. The new time for the completion of required repairs and expiration of the MEL will be Feb 7, 2005."

The Learjet 35A/36A Flight Manual contains an addendum for Learjet 35/35A/36/36A with Century Wing that contains wet/contaminated runway data. All contaminated runway landing performance data is based upon the following performance conditions:

- No tailwind component
- The runway gradient must be between -1.0% and +2.0%
- Flaps -40 degrees
- Anti-skid - On

Contaminated runway distance is calculated by multiplying the actual landing distance (dry runway), determined from the landing distance chart, by the appropriate contaminated landing distance factor.

Contaminated runway landing distance factors are provided for the following contaminants with associated maximum depths.

Standing Water (0.75 in (19.1 mm))

Slush; 0.88 in (22.4 mm)

Loose Snow; 1.50 in (38.1 mm)

Compacted Snow; no value given

Wet Ice; no value given

Landing Distance Factors (Landing data for compacted snow and wet ice only valid for 40 degrees F (4.4 degrees Celsius (C)) and below.

Wet: 1.4

Standing Water: 2.2

Slush: 2.2

Loose Snow: 2.2

Compacted Snow: 1.7

Wet Ice: 3.9

METEOROLOGICAL INFORMATION

The National Transportation Safety Board (NTSB) Meteorological Factual Report, available in the docket of this report, states the following.

The Kansas City (KC) National Weather Service (NWS) office issues intra-government forecast discussion at regular intervals. The forecast discussion is issued at regular intervals. The forecast discussion issued at 2145 CST, in part, follows:

Band of heavy snow continues to work northward...but has slowed over the last hour over northern portions of the KC metro area. Reports of around 2 inches or so have fallen around Leavenworth and Platte City. A secondary band of moderate to heavy snow has spread into southern portion of the KC metro area...and will continue to lift northwestward. Can see storm total accumulation across northern metro northward toward St. Joseph reaching the 3-4 inch range. Further east reports indicate roads have become very slick across portions of eastern CWA from freezing rain which fell early this evening. Expect 1-2 inches of snow overtop of this layer through the overnight hours. Have gone ahead and issued winter WX advisory for areas within band of moderate to heavy snow through 6 am.

Snowfall totals for January 28 were obtained from the KC NWS. Snow accumulation data were unavailable from MCI and the following cooperative stations; Kansas City Watts Mill, Central Overland Park, Bonner Springs, and Independence. Snowfall totals are not recorded at MKC. The snowfall total at MCI was 2.0 inches, Central Overland Park had 3.0 inches, and Bonner Springs had 3.1 inches.

Surface weather observations from MCI and MKC indicated that the liquid equivalent precipitation amounts measured from the Automated Surface Observing Systems (ASOSs) at MCI and MKC for January 28 were 0.23 and 0.21.

In addition, the MCI and MKC observations showed that approximately 0.21 and 0.16 inches liquid equivalent precipitation had fallen at the time of the accident.

At 2102 CST, when the MD83 slid off a taxiway at MCI, a total of 0.04 inches of liquid equivalent precipitation was recorded at the MCI ASOS.

The MCI ASOS, located 329 degrees at 12 nautical miles (nm) from MKC recorded at 1953, wind 140 degrees at 5 knots; surface visibility 2 sm; light snow and mist; overcast 2,800 feet agl; temperature -01 degrees C; dew point -03 degrees C; altimeter setting 30.19 inches of mercury.

The LNK ASOS recorded no precipitation from 0754 to 2354. The LNK ASOS recorded at 2154, wind 170 degrees at 6 knots; surface visibility 10 sm; overcast 11,000 feet agl; temperature -02 degrees C; dew point -03 degrees C; altimeter setting 30.16 inches of mercury.

The MKC ASOS recorded at 2218, wind calm, surface visibility 3/4 sm; light snow and mist; sky condition few at 800 feet agl, broken 1,600 feet agl, overcast 3,200 feet agl; temperature -01 degrees C; dew point -02 degrees C; altimeter setting 30.19 inches of mercury.

AIRPORT INFORMATION

The Airport/Facility Directory (AFD) listed MKC with an airport elevation of 759 feet mean

seal level (msl) and served by runway 01-19 (7,002 feet by 150 feet, grooved asphalt) and runway 03-21 (5,050 feet by 150 feet, grooved asphalt). Runway 19 was equipped with a medium intensity approach lighting system, sequenced flashers, 4-box visual approach slope indicator (VASI) on the left side of the runway, and an ILS with a 3-degree glide path. According to the AFD, the airport's "ARFF Index Ltd." indicates that MKC holds a limited airport certificate under Title 14 CFR Part 139.

MKC's initial date of airport certification was September 15, 1988, and was revised on October 15, 2001. Following this revision, the airport received FAA approval of its airport certification specifications on December 7, 2001. The airport does not possess a snow and ice removal plan. According to the FAA coordinator from the FAA's Kansas City FSDO, the airport manager stated that they "try to follow" procedures in advisory circular (AC) 150/5200-30A, Airport Winter Safety and Operations.

LNK, located 315 degrees at 132.3 nm from MCI, was listed in the AFD with an airport elevation of 1,219 feet msl and served by runway 17R-35L (12,901 feet by 200 feet, grooved asphalt and concrete), runway 14-32 (8,649 feet by 150 feet, grooved asphalt and concrete) and runway 17L-35R (5,400 feet by 100 feet, asphalt, concrete, and aggregate seal friction coat). Runway 17R-35L was equipped with high intensity runway lights, a 4-box VASI on the left side of the runway, and an ILS with a 3-degree glide path. The AFD indicates that LNK holds an airport certificate under Title 14 CFR Part 139 with a snow removal plan.

The LNK airport field conditions on January 28, 2005, were reported as "normal" for all runways.

FLIGHT RECORDERS

The airplane was not equipped with a flight data recorder.

The airplane was equipped with a Universal CVR-30A, cockpit voice recorder (CVR), serial number 70110, which was read out by the NTSB Recorder Laboratory. The exterior of the CVR showed no evidence of structural damage. The interior of the recorder and the memory module sustained no apparent heat or impact damage. The recording consisted of only one channel of fair quality audio information. Two other channels, which normally contain the pilot and copilot audio panel information, were blank and the fourth was not used on this recording.

The transcript of the CVR recording is available in the docket of this report.

WRECKAGE AND IMPACT INFORMATION

On-scene cockpit documentation by the FAA revealed that the anti-skid switch was in the on position and the flaps were in the 40-degree position.

Inspection of the main landing gear revealed that one of the four tires was flat and that none of the tires exhibited flattened areas consistent with skidding. The three inflated tire pressures were recorded as 138 pounds per square inch (psi), 143 psi, and 156 psi at an outside air temperature of approximately 34 degrees F.

TESTS AND RESEARCH

Radar data plots show that the airplane was within the lateral and vertical limits of the ILS to the last recorded radar return, which was 1,450 feet msl and 2.1 nm from the glideslope antenna.

Landing distance information for aircraft certified under 14 CFR Part 25 is not based upon use of reversers.

According to Fundamentals of Aircraft Design (Nicholai 1984), "Thrust reversers on jet aircraft provide significant ground deceleration force with high reliability and little additional maintenance with repeated application... A jet turbofan engine with thrust reversers is capable of providing up to approximately 40% of the rated takeoff thrust for braking purposes."

The Aeronautical Information Manual, Runway Friction Reports and Advisories, 4-3-9(b), (f), (g), states:

"MU (friction) values range from 0 to 100 where zero is the lowest friction value and 100 is the maximum friction value obtainable. For frozen contaminants on runway surfaces, a MU value of 40 or less is the level when the aircraft braking performance starts to deteriorate and directional control begins to be less responsive. The lower the MU value, the less effective braking performance becomes and the more difficult directional control becomes.

Pilots should use MU information with other knowledge including aircraft performance characteristic, type, and weight, previous experience, wind condition, and aircraft tire type (i.e., bias ply vs. radial constructed) to determine runway suitability.

No correlation has been established between MU values and the descriptive terms "good," "fair," "poor," and "nil" used in braking action reports."

AC 150/5200-30A states, "Pilot braking action reports oftentimes have been found to vary significantly, even when reported on the same frozen contaminant surface conditions." The AC also states, "It is generally accepted that friction surveys will be reliable as long as the depth of dry snow does not exceed 1 inch (2.5 cm), and/or depth of wet snow/slush does not exceed 1/8 inch (3 mm)."

ADDITIONAL INFORMATION

The FAA and Business Aviation Management Group Inc. (d.b.a. Million Air) were parties to the investigation.

Pilot Information

Certificate:	Airline Transport	Age:	54, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 1	Last FAA Medical Exam:	11/01/2004
Occupational Pilot:		Last Flight Review or Equivalent:	01/01/2005
Flight Time:	5127 hours (Total, all aircraft), 1236 hours (Total, this make and model), 3886 hours (Pilot In Command, all aircraft), 99 hours (Last 90 days, all aircraft), 50 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Co-Pilot Information

Certificate:	Airline Transport; Flight Instructor	Age:	38, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	Airplane Single-engine	Toxicology Performed:	No
Medical Certification:	Class 1	Last FAA Medical Exam:	12/01/2004
Occupational Pilot:		Last Flight Review or Equivalent:	01/01/2005
Flight Time:	4301 hours (Total, all aircraft), 482 hours (Total, this make and model), 3621 hours (Pilot In Command, all aircraft), 76 hours (Last 90 days, all aircraft), 38 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Learjet	Registration:	N911AE
Model/Series:	35A	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Transport	Serial Number:	109
Landing Gear Type:	Retractable - Tricycle	Seats:	10
Date/Type of Last Inspection:	10/01/2004, AAIP	Certified Max Gross Wt.:	18300 lbs
Time Since Last Inspection:	102.4 Hours	Engines:	2 Turbo Fan
Airframe Total Time:	11138.9 Hours at time of accident	Engine Manufacturer:	Allied Signal
ELT:	Installed, not activated	Engine Model/Series:	TFE 731-2-2B
Registered Owner:	Keystone Aviation LLC	Rated Power:	3500 lbs
Operator:	Business Aviation Management Group Inc	Operating Certificate(s) Held:	On-demand Air Taxi (135)
Operator Does Business As:	Million Air	Operator Designator Code:	B8MA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument Conditions	Condition of Light:	Night
Observation Facility, Elevation:	MKC, 746 ft msl	Distance from Accident Site:	
Observation Time:	2218 CST	Direction from Accident Site:	
Lowest Cloud Condition:	Few / 800 ft agl	Visibility	0.75 Miles
Lowest Ceiling:	Broken / 1600 ft agl	Visibility (RVR):	
Wind Speed/Gusts:	/	Turbulence Type Forecast/Actual:	/
Wind Direction:		Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.19 inches Hg	Temperature/Dew Point:	-1 °C / -2 °C
Precipitation and Obscuration:	Light - No Obscuration		
Departure Point:	Salt Lake City, UT (SLC)	Type of Flight Plan Filed:	IFR
Destination:	Kansas City, MO (MKC)	Type of Clearance:	IFR
Departure Time:	1905 MST	Type of Airspace:	

Airport Information

Airport:	Charles B. Wheeler Downtown (MKC)	Runway Surface Type:	Asphalt; Snow
Airport Elevation:		Runway Surface Condition:	Snow
Runway Used:	19	IFR Approach:	ILS
Runway Length/Width:	7002 ft / 150 ft	VFR Approach/Landing:	Full Stop

Wreckage and Impact Information

Crew Injuries:	2 None	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 None	Latitude, Longitude:	39.123056, -94.592778

Administrative Information

Investigator In Charge (IIC):	Mitchell F Gallo	Report Date:	02/26/2007
Additional Participating Persons:	Steve Davis; Federal Aviation Administration; Kansas City, MO Kenny Hepner; Million Air; Salt Lake City, UT		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ .		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

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