

NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, D.C. 20594

November 7, 2008

Meteorology

Meteorological Factual Report
by James T. Skeen, Jr.

A. ACCIDENT

Location: Aurora, Illinois
Date: October 15, 2008
Time: 2358 Central Daylight Time
Aircraft: Bell 222, N992AA
NTSB Number: CEN09MA019

B. GROUP

Chairman: James T. Skeen, Jr.
Senior Meteorologist
National Transportation Safety Board
Washington, D.C.

Member: None

C. SUMMARY

On October 15, 2008, at 2358 central daylight time (CDT), a Bell 222 helicopter, operated by Air Angel's Inc., and piloted by a commercial pilot, was destroyed when it impacted a radio station tower and the ground in Aurora, Illinois. The medical transport flight was conducted under Title 14 Code of Federal Regulations Part 135, and was en route from the Valley West Hospital Heliport (OLL7), Sandwich, Illinois, to the Children's Memorial Hospital Heliport (40IS), Chicago, Illinois, when the accident occurred. All four occupants, including the pilot, a flight paramedic, a flight nurse, and the patient, were fatally injured. The flight originated about 10 minutes prior to the accident.

D. DETAILS OF INVESTIGATION

Notes: Unless noted, in the report all times are CDT based on the 24-hour clock. Unless noted, all heights are above mean sea level (msl). Heights in surface weather observations and terminal aerodrome forecasts are above ground level (agl). Unless noted, all directions refer to true north. Unless noted, all distances are in statute miles. Coordinated Universal Time (UTC) = CDT + 5 hours. UTC = Z.

1. Synoptic Situation

A Surface Analysis chart prepared by the National Weather Service (NWS) National Centers for Environmental Prediction (NCEP) for 0100 October 16 is shown in figure 1.

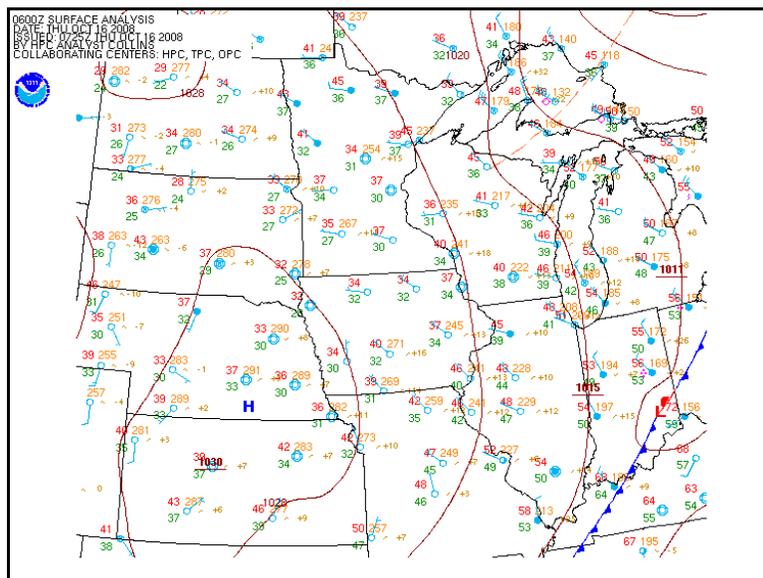


Figure 1. NWS Surface Analysis chart for 0100 CDT October 16

2. Surface Weather Observations

2. Surface weather observation sites surrounding the accident location are shown in figure

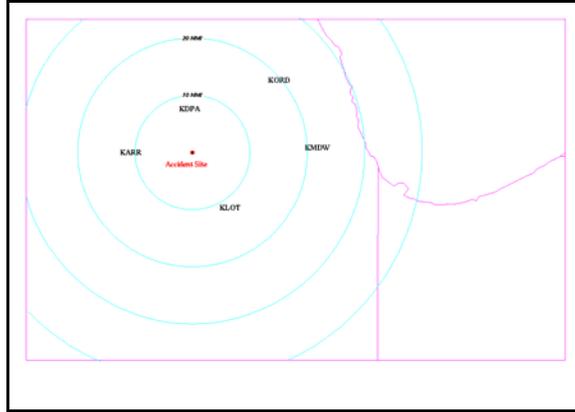


Figure 2. Surface weather observation locations

Aurora Municipal Airport (KARR), Chicago/Aurora, Illinois

field elevation 712 feet msl, located about 267 degrees at 11 nautical miles from the accident location, Automated Surface Observing System (ASOS)

```
KARR 160352Z AUTO 33009KT 10SM OVC033 10/07 A3014 RMK AO2 SLP207
T01000072=
KARR 160452Z AUTO 34005KT 9SM CLR 07/06 A3015 RMK AO2 SLP212 T00720056=
KARR 160552Z AUTO 30003KT 8SM CLR 06/05 A3016 RMK AO2 SLP216 60001
T00560050 10106 20056 401560056 51013=
```

Lewis University Airport (KLOT), Chicago/Romeo, Illinois

field elevation 679 feet msl, located about 146 degrees at 13 nautical miles from the accident location, Automated Weather Observation System-3 (AWOS-3)

```
KLOT 160345Z AUTO 32006KT 10SM SCT015 OVC031 11/09 A3011 RMK A02=
KLOT 160405Z AUTO 32005KT 10SM BKN015 OVC031 11/09 A3011 RMK A02=
KLOT 160425Z AUTO 32006KT 10SM SCT015 BKN021 OVC027 11/08 A3011 RMK A02=
KLOT 160445Z AUTO 34009G14KT 10SM BKN019 OVC024 11/08 A3012 RMK A02=
KLOT 160505Z AUTO 35010G16KT 10SM SCT019 OVC027 11/07 A3012 RMK A02=
```

Dupage Airport (KDPA), Chicago/West Chicago, Illinois

field elevation 759 feet msl, located about 356 degrees at 7 nautical miles from the accident location, ASOS

```
KDPA 160352Z 32007KT 10SM BKN016 OVC023 12/09 A3012 RMK AO2 SLP201
T01170089=
KDPA 160434Z 32011KT 10SM SCT021 10/06 A3013 RMK AO2=
KDPA 160452Z 33008KT 10SM CLR 09/05 A3014 RMK AO2 SLP207 T00940050=
KDPA 160552Z 30006KT 10SM CLR 07/04 A3015 RMK AO2 SLP211 60000 T00720044
10117 20072 401670072 51011=
```

Chicago Midway International Airport (KMDW), Chicago, Illinois

field elevation 620 feet msl, located about 088 degrees at 22 nautical miles from the accident location, ASOS

KMDW 160351Z 33009KT 10SM FEW015 OVC030 12/09 A3011 RMK AO2 SLP194
T01170094=
KMDW 160404Z 33011KT 10SM FEW015 OVC028 12/09 A3011 RMK AO2=
KMDW 160451Z 34010KT 10SM OVC028 11/08 A3012 RMK AO2 SLP198 T01110078=
KMDW 160551Z 33008KT 10SM BKN032 10/05 A3013 RMK AO2 SLP204 60002
T01000050 10117 20100 401780100 53010=

Chicago O’Hare International Airport (KORD), Chicago, Illinois

field elevation 672 feet msl, located about 052 degrees at 19 nautical miles from the accident location, ASOS

KORD 160351Z 33011G18KT 10SM FEW015 OVC028 11/08 A3012 RMK AO2 SLP199
T01110078=
KORD 160440Z 34010KT 10SM OVC031 10/06 A3013 RMK AO2=
KORD 160451Z 35011KT 10SM OVC033 10/05 A3013 RMK AO2 SLP203 T01000050=
KORD 160551Z 32006KT 10SM FEW030 09/05 A3014 RMK AO2 SLP208 60001
T00890050 10117 20089 401720089 53012=

3. Pilot Reports (PIREPs)

There were no archived PIREPs relevant to northern Illinois surrounding the accident time.

4. Winds and Temperatures Aloft Data

Upper Air Data

No upper air stations were located near the accident site.

Model Sounding

The NWS NCEP operates a series of numerical model analyses and forecasts. One of the operational systems is the North American Mesoscale (NAM) model. The NAM model data for October 16 were obtained from the National Oceanic and Atmospheric Administration (NOAA) Air Resources Laboratory (ARL) Internet site. Note: The data have a horizontal resolution of 12 kilometers.

Tables 1 and 2 show the ARL NAM text and relative humidity data for the accident location valid at 0100 Oct 16. Note: In table 1 the heights are depicted in meters (msl), and the wind speeds are depicted in meters per second (m/s).

Table 1. NAM sounding for 0100 CDT October 16

PRESS	HGT(MSL)	TEMP	DEW	PT	WND	DIR	WND	SPD
HPA	M	C	C		DEG		M/S	
E = Estimated Surface Height								

995.	214.	8.9	7.5	335.0	4.8
975.	384.	9.0	5.6	341.9	7.3
950.	599.	7.3	4.2	354.0	10.1
925.	818.	5.4	2.0	359.8	12.2
900.	1041.	3.4	1.3	0.5	12.2
875.	1269.	3.9	-2.8	349.8	8.6
850.	1506.	5.7	-3.3	311.3	7.3
825.	1750.	6.0	-2.7	289.2	9.0
800.	2002.	5.7	-4.0	275.2	10.6
775.	2261.	5.2	-6.5	270.8	11.9
750.	2528.	4.6	-8.0	270.1	12.2
725.	2804.	3.7	-8.5	268.9	12.4
700.	3088.	3.0	-8.8	264.7	13.9
650.	3685.	0.4	-16.0	265.7	15.6
600.	4323.	-2.6	-26.3	277.0	14.2
550.	5007.	-5.8	-31.4	280.4	15.2
500.	5746.	-11.6	-34.3	282.2	11.4

Table 2. NAM model relative humidity valid 0100 CDT October 16

```

=====Relative Humidity (RH)=====
      HGT      RH%
      214.     80.5
      384.     79.3
      599.     80.7
      818.     78.5
     1041.     86.6
     1269.     62.0
     1506.     52.6
     1750.     53.8
     2002.     50.1
     2261.     43.2
     2528.     40.0
     2804.     41.0
     3088.     42.0
     3685.     28.8
     4323.     15.0
     5007.     12.0
     5746.     14.2
     6542.     11.2
     7412.      9.4
     8373.      7.7
     9452.      6.1
    10690.      7.1
    12159.      8.0
    13989.      8.1
    16445.     12.8
    20607.      1.5

```

5. National Weather Service WSR-88D Data

The Chicago (146 degrees at 13 nautical miles), Illinois, Weather Surveillance Radar-1988, Doppler (KLOT WSR-88D) radar was the closest Doppler weather radar to the accident location.

Assuming standard refraction¹, radar beam height data for KLOT's lowest antenna elevation angle of 0.50 degree were determined. The calculations revealed that the approximate beam center was at 1,600 feet msl with a beam width of 1,300 feet.

KLOT WSR-88D Archive Level III² radar data were obtained from the National Climatic Data Center (NCDC) Hierarchical Data Storage System (HDSS) and displayed using the NCDC Java NEXRAD Viewer.

The KLOT 0.50-degree Base Reflectivity product for 2357:13 (0457:13 UTC) and the Velocity Azimuth Display (VAD) Wind Profile product 2311-0008 October 15-16 (0411-0508 UTC) are shown in figures 3 and 4, respectively. The accident location and regional airports are overlaid on figure 3. A color bar depicting possible radar reflectivity intensities is located on the right side of figure 3.

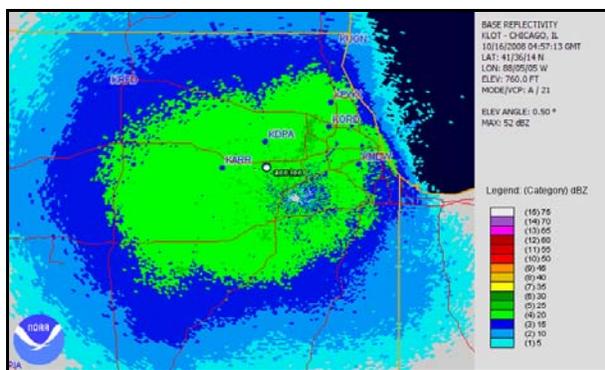


Figure 3. KLOT 0.50-degree Base Reflectivity product for 2357:17 CDT October 15

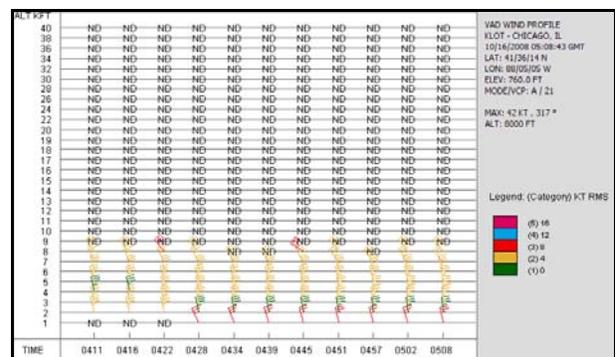


Figure 4. KLOT VAD Wind Profile product for 2311-0008 CDT October 15-16

6. Satellite Data

GOES-12 (Geostationary Operational Environmental Satellite-12) infrared (bands 2 and 4) digital data centered on the Aurora area were obtained through the NOAA's Comprehensive Large Array-data Stewardship System (CLASS) and displayed on a NTSB McIDAS-enabled PC.

Infrared (band 4) images for the nominal times of 2345 (0445 UTC) and 0015 (0515 UTC) are shown in figures 5 and 6, respectively.

¹ Refraction in the atmosphere when temperature and humidity distributions are approximately average.

² Level III data are the output of the Radar Product Generator (RPG).

Notes: The nominal resolution of the infrared images is 4 kilometers. The accident location and surrounding weather reporting stations are plotted on the images. The infrared temperature data (degrees Kelvin³) is color enhanced (see the color bar at the bottom of the image).

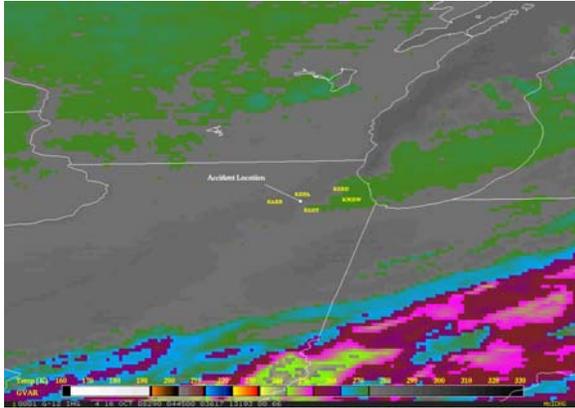


Figure 5. Band 4 infrared image for 2345 CDT October 15

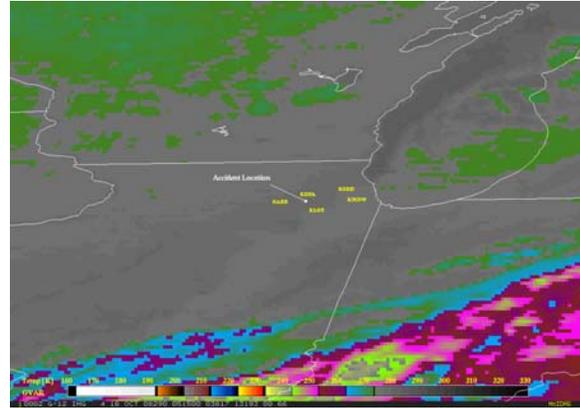


Figure 6. Band 4 infrared image for 0015 CDT October 16

McIDAS software was used to subtract band 4 radiative temperatures from band 2 radiative temperatures. See figures 7 and 8 for the 2345 and 0015 depictions.

Note: Research has shown that this subtraction technique is useful for depicting fog and low clouds. Temperature differences of +2 to +10 degrees C are shown as yellow to blue.

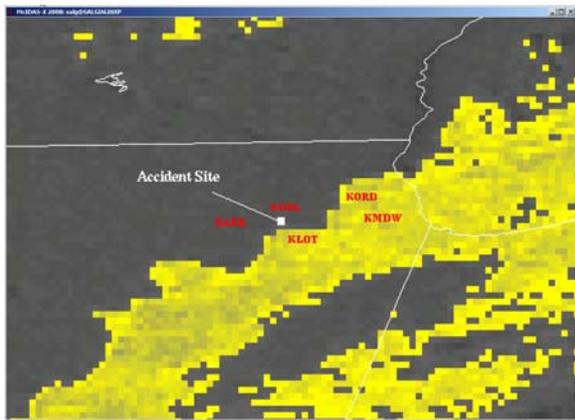


Figure 7. Band 2 – band 4 for 2345 CDT October 15

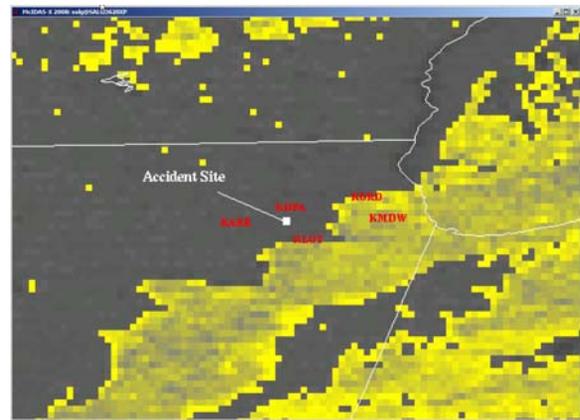


Figure 8. Band 2 – band 4 for 0015 CDT October 16

7. NWS Forecasts and Advisories

³ 273 degrees Kelvin = 0 degree Celsius

Aviation Area Forecast (FA)

A portion of the Aviation Area Forecast for the North Central (FA3) Area issued by the Aviation Weather Center (AWC) at Kansas City, Missouri, and valid during the period beginning 2045 (0145 UTC) follow:

FAUS43 KPCI 160145 2008290 0132
FA3W
CHIC FA 160145
SYNOPSIS AND VFR CLDS/WX
SYNOPSIS VALID UNTIL 162000
CLDS/WX VALID UNTIL 161400...OTLK VALID 161400-162000
ND SD NE KS MN IA MO WI LM LS MI LH IL IN KY
.
SEE AIRMET SIERRA FOR IFR CONDS AND MTN OBSCN.
TS IMPLY SEV OR GTR TURB SEV ICE LLWS AND IFR CONDS.
NON MSL HGTS DENOTED BY AGL OR CIG.
.
SYNOPSIS...LO PRES XTRM SERN MI WITH WRMFNT EWD AND CDFNT THRU
NWRN IN-E CNTRL IL-SERN MO-CNTRL AR BY 20Z CDFNT OVR ERN KY-ERN
TN. CDFNT OVR XTRM ERN UPR MI-WRN PTN LWR MI BY 09Z WL BE E OF
FA. HI PRES OVR NRN/CNTRL PLAINS SLOLY MOVG EWD.
.
.
.
IL
NWRN...AGL SCT-BKN025 TOP 150. 07Z AGL SCT040. OTLK...VFR.
NERN/W CNTRL...CIG OVC010-020 TOP FL180. OCNL -RA. 06Z CIG BKN025
TOP 150. 12Z AGL SCT040. OTLK...VFR.
E CNTRL/SWRN...CIG OVC010-020 TOP FL250. OCNL VIS 3-5SM -RA/BR.
WDLY SCT -TSRA. CB TOP FL350. 09Z E CNTRL CIG BKN020 TOP 120.
OTLK...E CNTRL VFR SWRN MVFR CIG 18Z VFR.
SERN...CIG BKN025 OVC040 TOP FL250. OCNL VIS 3-5SM SCT
-SHRA/TSRA. CB TOP FL370. OTLK...MVFR CIG 19Z VFR.
.
.....

In-Flight Advisories (AIRMETs)

Texts of In-Flight Advisories (AIRMETs SIERRA, TANGO, and ZULU) for North Central Area issued by the AWC valid during the period beginning 2145 (0245 UTC) follow:

SIERRA (IFR)

WAUS43 KPCI 160245 2008290 0257
WA3S
CHIS WA 160245
AIRMET SIERRA FOR IFR VALID UNTIL 160900
.
AIRMET IFR...KS MO LM MI LH IL IN KY
FROM 50NE ASP TO 50SW YVV TO 40ESE ECK TO FWA TO CVG TO 30W IIU
TO 60ENE DYR TO 20NE RZC TO 20SE OSW TO 40WSW COU TO 50WNW DEC
TO 20WSW ORD TO 50SSE TVC TO 50NE ASP
CIG BLW 010/VIS BLW 3SM PCPN/BR/FG. CONDS CONTG BYD 09Z THRU 15Z.
.

OTLK VALID 0900-1500Z...IFR MO MI LH IL IN KY
 BOUNDED BY 40SW YVV-20SE ECK-FWA-CVG-HNN-50WSW BKW-20SW LOZ-
 50ESE BWG-30NNE DYR-20NNE RZC-40W DEC-40N DEC-40SW YVV
 CIG BLW 010/VIS BLW 3SM PCPN/BR/FG. CONDS CONTG THRU 15Z.

.....

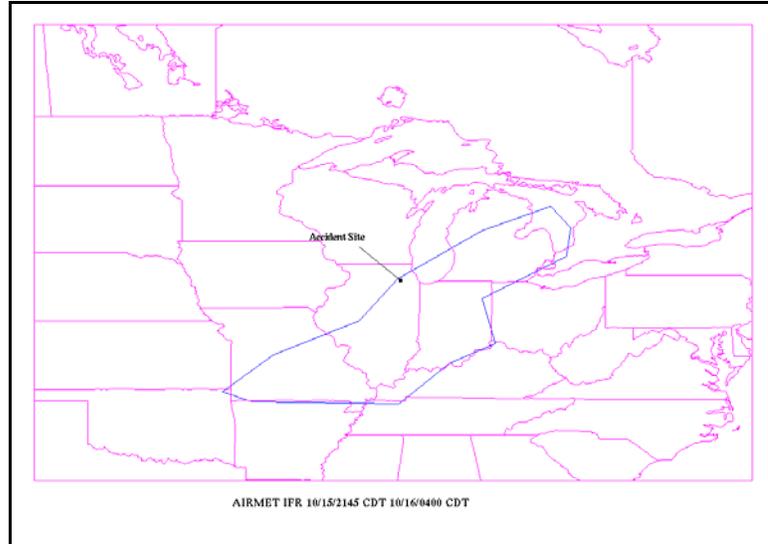


Figure 9. AIRMET SIERRA for IFR issued 2145 CDT October 15

TANGO (Turbulence)

WAUS43 KKCI 160245 2008290 0235
 WA3T
 CHIT WA 160245
 AIRMET TANGO FOR TURB VALID UNTIL 160900

.
 AIRMET TURB...SD NE KS MN IA MO WI LM LS MI LH IL IN
 FROM 50E YQT TO SSM TO YVV TO 30S DXO TO 30ESE STL TO 40ESE MCK
 TO 60NW ANW TO 50E YQT
 MOD TURB BTN FL240 AND FL400. CONDS CONTG BYD 09Z ENDG 12-15Z.

.....

ZULU (Icing)

WAUS43 KKCI 160245 2008290 0242
 WA3Z
 CHIZ WA 160245
 AIRMET ZULU FOR ICE AND FRZLVL VALID UNTIL 160900

.
 AIRMET ICE...MI LH IN
 FROM ASP TO 50SSW YVV TO 20SE ECK TO FWA TO 30S PMM TO 40W MBS TO
 ASP
 MOD ICE BTN FRZLVL AND FL210. FRZLVL 110-130. CONDS ENDG 06-09Z.

.
 OTLK VALID 0900-1500Z...ICE ND SD NE
 BOUNDED BY 50SSW ISN-40NE DIK-20NE PIR-ANW-50W RAP-50SSW ISN
 MOD ICE BTN 100 AND FL180. CONDS DVLPG 09-12Z. CONDS CONTG THRU
 15Z.

.
 FRZLVL...RANGING FROM SFC-150 ACRS AREA

MULT FRZLVL 040-100 BOUNDED BY SSM-20NE YVV-20NE MBS-20ENE
IOW-30ENE OVR-50ESE OBH-50SSW FSD-40SE MSP-SSM
SFC ALG 40SSW ISN-20SSE ISN-30ENE MOT-60NE MOT
040 ALG 100SE MLS-80SSW DIK-30NW DPR-50ESE ONL-50S RHI-50N
RHI-70NE SAW
080 ALG 20NNW BFF-70ENE BFF-30SW OBH-50NW PWE-40ESE OVR-60SW
BAE-30NW YVV
120 ALG 50SE LAA-80ESE GCK-20S FWA
.....

No SIGMETs (Convective or Non-convective) were valid for the accident location and time.

Terminal Aerodrome Forecasts (TAFs)

TAFs for KMDW, KORD, and KDPA valid during the periods beginning 2000 October 15 and 0000 October 16 follow:

KMDW 160103Z 160124 32009G16KT P6SM FEW010 SCT025 BKN035
TEMPO 0102 -SHRA BKN012
FM0300 32012G16KT P6SM SCT015 OVC025
FM0700 33009KT P6SM FEW025
FM1500 01008KT P6SM SCT040
FM2200 03009KT P6SM SCT035=

KORD 160103Z 160124 32009G16KT P6SM FEW008 SCT025 BKN035
TEMPO 0102 -SHRA BKN012
FM0300 32010KT P6SM SCT015 OVC025
FM0700 33009KT P6SM FEW025
FM1500 01008KT P6SM SCT040
FM2200 03009KT P6SM SCT035=

KORD 160446Z 160524 32010KT P6SM SCT015 OVC035
FM0700 33009KT P6SM FEW025
FM1500 01008KT P6SM SCT040
FM2200 03009KT P6SM SCT035=

KDPA 160104Z 160124 32009G16KT P6SM FEW008 SCT025 BKN035
TEMPO 0102 -SHRA BKN012
FM0300 32010KT P6SM SCT015 OVC025
FM0700 33009KT P6SM FEW025
FM1500 01008KT P6SM SCT040
FM2200 03009KT P6SM SCT035=

KDPA 160441Z 160524 32010KT P6SM SCT015 SCT021
FM0700 33009KT P6SM FEW025
FM1500 01008KT P6SM SCT040
FM2200 03009KT P6SM SCT035=

8. Astronomical Data

Astronomical data for the accident location for October 15, calculated using the U. S. Naval Observatory on-line calculator, is shown below.

U.S. Naval Observatory
Astronomical Applications Department

Sun and Moon Data for One Day

The following information is provided for Aurora, IL (longitude W88.2, latitude N41.8):

Wednesday
15 October 2008 Universal Time - 5h

SUN

Begin civil twilight	06:38
Sunrise	07:06
Sun transit	12:39
Sunset	18:11
End civil twilight	18:39

MOON

Moonrise	17:49 on preceding day
Moon transit	00:53
Moonset	08:10
Moonrise	18:20
Moonset	09:29 on following day

Phase of the Moon on 15 October: waning gibbous with 99% of the Moon's visible disk illuminated.

Full Moon on 14 October 2008 at 15:03 (Universal Time - 5h).

James T. Skeen, Jr.
Senior Meteorologist