

Fox Todd

To: Eick Donald
Cc: Fox Todd
Subject: RE: CEN14FA230 - Northglenn, CO Weather

Mr. Eick,

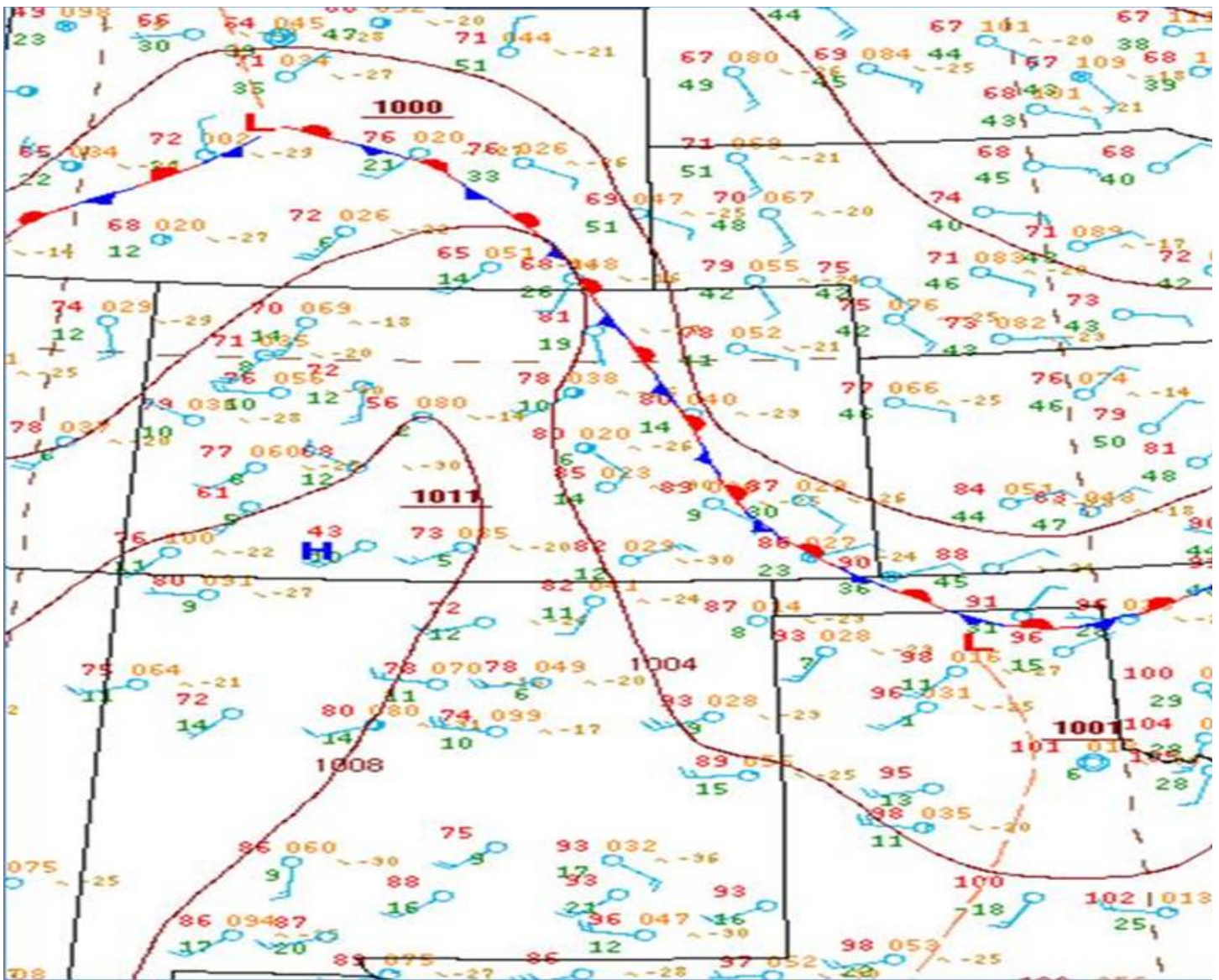
Thank you again for your support of this on-going investigation. I will include this meteorological information with the public docket materials.

Sincerely,
Andrew Todd Fox
NTSB, Air Safety Investigator

From: Eick Donald
Sent: Tuesday, May 06, 2014 3:53 PM
To: Fox Todd
Cc: Misencik Paul; Koschig Betty
Subject: CEN14FA230 - Northglenn, CO Weather

Weather conditions over the Denver, Colorado area on May 5, 2014 – CEN14FA230

Synoptic conditions – The NWS Surface Analysis Chart for 1500 MDT on May 5, 2014 is included below. The chart depicted a low pressure system at 1000-hectopascals (hPa) over Wyoming along a frontal wave with a stationary front extending south-southeast across eastern Colorado into the Oklahoma and Texas panhandles, where a second low pressure system was located at 1001-hPa. A high pressure system at 1011-hPa was over southwest Colorado. The resultant pressure systems resulted in a general southerly wind flow over eastern Colorado.



The NWS regional radar mosaic indicated no significant weather echoes over the Denver, Colorado area surrounding the period.

Observations - Rocky Mountain Metropolitan Airport (KBJC), Denver, CO was located approximately 5 miles west of the accident site at an elevation of 5,673 feet and a magnetic variation of 11° East. The airport had an Automated Weather Observation System (AWOS) which reported the following conditions:

METAR KBJC 051946Z 12008KT 50SM SCT120 BKN200 25/M08 A2987=
METAR KBJC 052047Z 16010G15KT 40SM SCT120 BKN250 26/M08 A2984=
Accident 2144Z
METAR KBJC 052146Z MISSING
 METAR KBJC 052248Z 20005KT 50SM SCT120 BKN200 27/M08 A2978=
 METAR KBJC 052346Z 34003KT 50SM SCT120 BKN200 26/M10 A2977=

The Terminal Aerodrome Forecast or TAF issued for the period was as follows:

TAF KBJC 051729Z 0518/0618 VRB04KT P6SM FEW140 BKN200
 FM052000 16010KT P6SM FEW140 BKN200
 FM060200 25010KT P6SM FEW140 BKN200
 FM061000 23008KT P6SM SCT200

FM061400 22007KT P6SM FEW140 BKN200=

Erie Municipal Airport (KEIK), Erie, CO, was located approximately 8 miles northwest from the accident site at an elevation of 5130 feet. The airport had an AWOS and reported the following conditions:

METAR KEIK 051856Z AUTO 15007KT 130V200 10SM CLR 26/M08 A2986 RMK AO2 T02571076=
METAR KEIK 051916Z AUTO 15008KT 10SM CLR 26/M11 A2985 RMK AO2 T02551114=
METAR KEIK 051936Z AUTO 12008KT 110V170 10SM CLR 26/M11 A2984 RMK AO2 T02581113=
METAR KEIK 051956Z AUTO 14004KT 10SM CLR 26/M09 A2983 RMK AO2 T02631086=
METAR KEIK 052016Z AUTO 10005KT 10SM CLR 27/M09 A2982 RMK AO2 T02701095=
METAR KEIK 052036Z AUTO 20009KT 10SM CLR 27/M10 A2981 RMK AO2 T02691096=
METAR KEIK 052056Z AUTO 15013G17KT 10SM CLR 27/M09 A2980 RMK AO2 T02651093=
METAR KEIK 052116Z AUTO 11005KT 10SM CLR 26/M10 A2979 RMK AO2 T02641097=
METAR KEIK 052136Z AUTO 17010G20KT 10SM CLR 27/M10 A2978 RMK AO2 T02671098=

Accident 2144Z

METAR KEIK 052156Z AUTO 15003KT 10SM CLR 27/M09 A2977 RMK AO2 T02711095=
METAR KEIK 052216Z AUTO 21004KT 10SM CLR 28/M11 A2975 RMK AO2 T02751107=

No TAFs are issued for the station.

Denver International Airport (KDEN) was located approximately 16 miles east of the accident site at an elevation of 5,434 feet. The airport had an Automated Surface Observation System (ASOS) and was augmented by NWS certified observer. The following conditions were reported surrounding the period:

METAR KDEN 051853Z 18006KT 10SM FEW120 SCT150 BKN240 24/M10 A2989 RMK AO2 SLP051 T02441100=
METAR KDEN 051953Z 20013G17KT 10SM FEW120 SCT150 BKN240 26/M13 A2986 RMK AO2 SLP031 T02561128=
METAR KDEN 052053Z 20008G17KT 10SM FEW120 SCT150 BKN240 26/M12 A2983 RMK AO2 SLP022 T02611122 58023=

Accident 2144Z

METAR KDEN 052153Z 20015G26KT 10SM FEW080 SCT150 BKN250 28/M13 A2979 RMK AO2 PK WND 21026/2148 SLP015 T02781133=

METAR KDEN 052253Z 23015G20KT 10SM FEW080 SCT150 BKN250 27/M15 A2975 RMK AO2 SLP004 T02721150=
METAR KDEN 052353Z 20012G20KT 10SM FEW080 SCT150 BKN250 27/M13 A2974 RMK AO2 SLP998 T02721133 10283 20239 56026=

TAF AMD KDEN 052001Z 0520/0624 20013KT P6SM SCT140 BKN200

FM052200 15010KT P6SM FEW140 BKN200

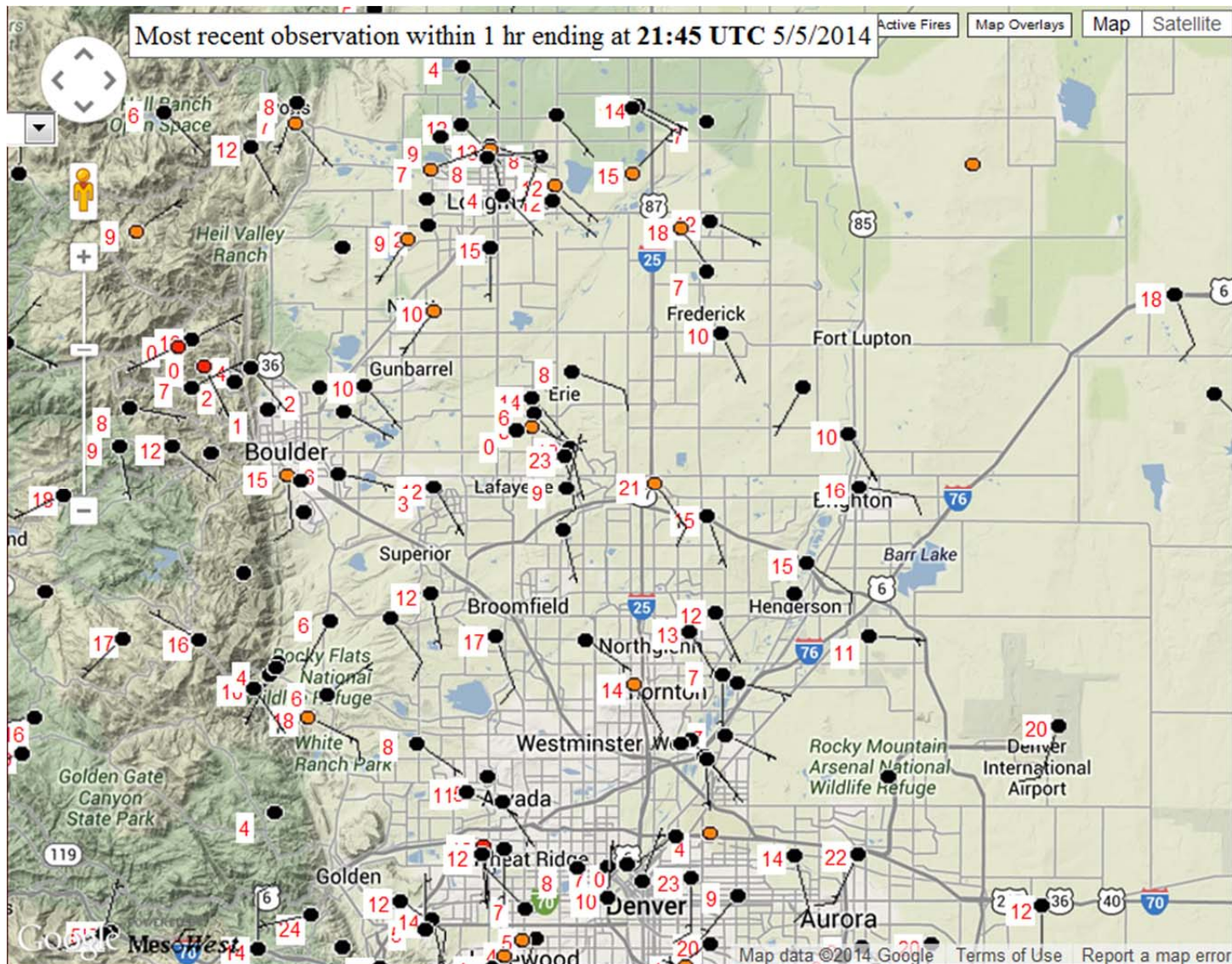
FM060200 20010KT P6SM FEW140 BKN200

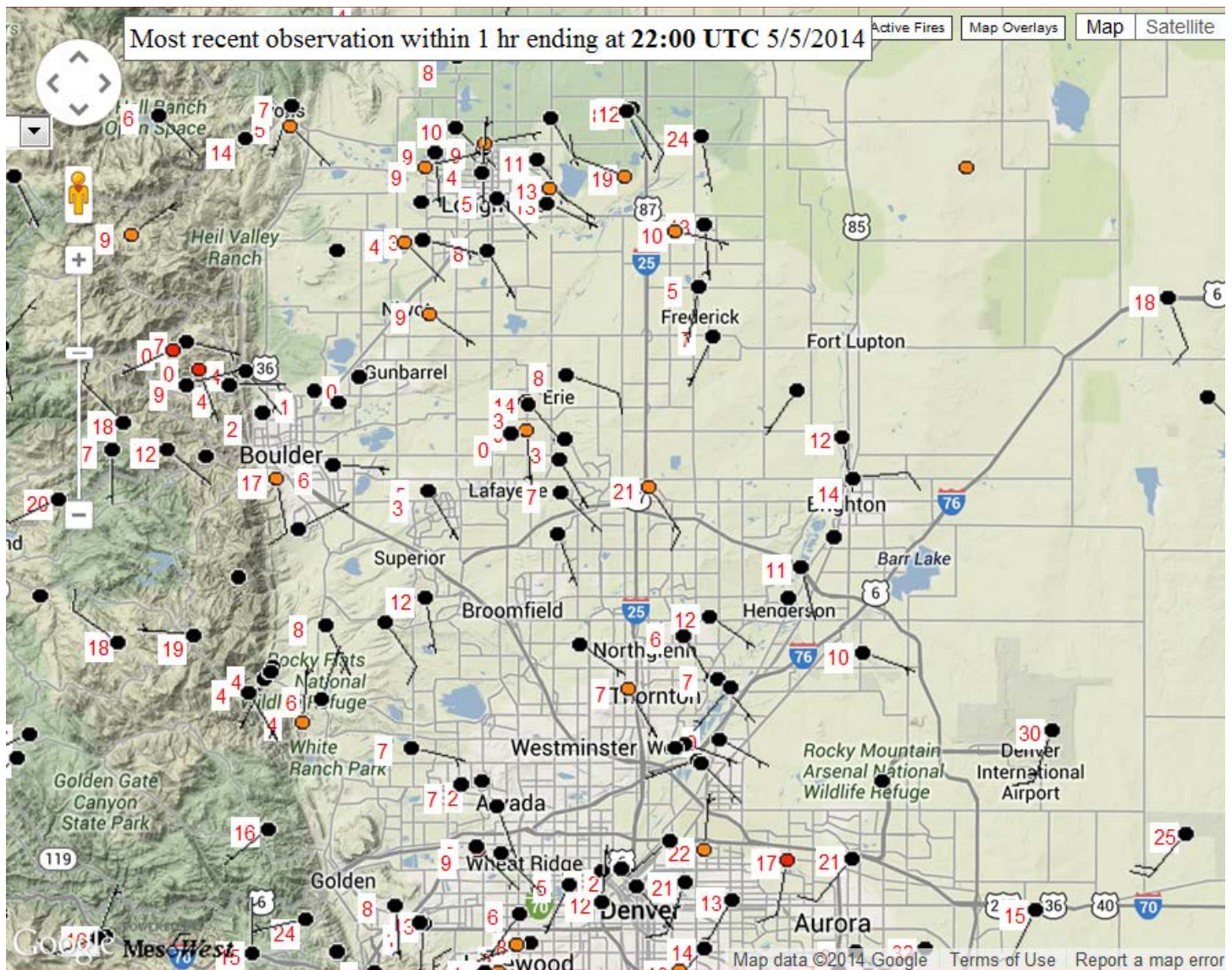
FM061000 22010KT P6SM SCT200

FM061500 24008KT P6SM FEW140 BKN200

FM062000 20007KT P6SM FEW140 BKN200=

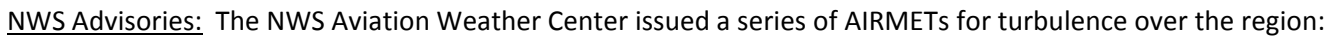
MesoWest – a plot of remote observations for the period with peak gusts is included below. Peak winds of 20 to 30 knots reported over the Denver area from the south.





Sounding – The Denver upper air sounding for 1800 MDT (0000Z) is attached. The sounding depicted a dry low-level environment with relative humidity's below 10% below 18,000 feet, and the precipitable water content of 0.16 inches. The wind profile indicated surface wind from the west at 10 knots with wind speeds rapidly increasing above the surface with little change in direction with height. The mean 0-6 kilometer or 18,000 feet wind was from 235° 29 knots, with the maximum wind from 250° at 51 knots at 32,000 feet. The wind profile supported mountain wave activity with a wave near 10,000 feet with the potential for strong up/downdrafts and moderate and greater turbulence.

GOES-15 visible satellite image at 1545 MDT (2145Z) is also attached and depicted high clouds over the area with a band of cumulus clouds further south of the area.



There were no Severe Weather Alerts (AWW), Convective SIGMETs (WST), SIGMETs (WS), or Center Weather Advisories (CWA), and the Denver Center Weather Service Unit (CWSU) issued no other advisories or warnings surrounding the period for the Denver airspace.

358 PM MDT MON MAY 5 2014

.SHORT TERM...(THIS EVENING THROUGH TUESDAY)

ISSUED AT 357 PM MDT MON MAY 5 2014

UPPER LEVEL RIDGE CURRENTLY OVER THE AREA WITH SOUTHWEST FLOW ALOFT. SATELLITE SHOWING A STEADY STREAM OF HIGH LEVEL MOISTURE ACROSS NORTHERN COLORADO. STILL FAIRLY DECENT WAVE CLOUD ALONG URBAN CORRIDOR BUT SHOWING SIGNS OF DISSIPATING. WINDS HAVE BEEN FAIRLY LIGHT...THOUGH STILL A BIT GUSTY OVER THE HIGHER MOUNTAINS WITH SOME GUSTS TO 35 MPH. FOR TONIGHT...RIDGE SHIFTS EAST AS UPPER TROUGH MOVES INTO THE GREAT BASIN. SOUTHWEST FLOW ALOFT WILL BEGIN TO INCREASE AHEAD OF THE TROUGH. CROSS SECTIONS INDICATE A BIT OF A DECREASE IN THE HIGH LEVEL MOISTURE OVERNIGHT. LATEST SYNTHETIC SATELLITE IMAGERY SHOWING THIS TREND AS WELL...WITH A DECREASE IN THE WAVE CLOUD. ON TUESDAY...THE UPPER TROUGH WILL BE OVER THE GREAT BASIN WITH MODERATE SOUTHWEST FLOW ALOFT OVER THE CFWA. HIGH LEVEL MOISTURE INCREASES AGAIN DURING THE MORNING WITH THE HINTS OF ANOTHER WAVE CLOUD ALONG THE URBAN CORRIDOR AS SHOWN BY THE SYNTHETIC SATELLITE IMAGERY. MODELS SHOW SOUTHERLY SURFACE FLOW ACROSS THE PLAINS DURING THE AFTERNOON WITH A DEVELOPING SURFACE LOW IN THE NEBRASKA PANHANDLE. SURFACE GRADIENT FAIRLY WEAK WITH WINDS A BIT MORE SOUTHEASTERLY OVER THE FAR NORTHEAST CORNER WHICH MAY HELP INCREASE LOW LEVEL MOISTURE THERE. CAPE VALUES INCREASE TO AROUND 700 J/KG OVER THE FAR NORTHEAST CORNER WITH A BIT OF SHEAR. WILL INTRODUCE ISOLATED THUNDERSTORMS TO THE NORTHEAST CORNER AFTER 21Z. OTHERWISE...DRY CONDITIONS TO PREVAIL. WINDS TO BE BECOME A BIT GUSTY ACROSS LINCOLN COUNTY DURING THE AFTERNOON WITH FAIRLY LOW HUMIDITY. IT IS POSSIBLE CRITICAL FIRE WEATHER CONDITIONS WILL OCCUR FOR A FEW HOURS LATE IN THE DAY. WILL HOLD OFF ON ANY FIRE WEATHER HILITES FOR LINCOLN COUNTY AT THIS TIME.

.LONG TERM...(TUESDAY NIGHT THROUGH MONDAY)

ISSUED AT 357 PM MDT MON MAY 5 2014

MAIN CONCERN WILL BE THE TRACK AND INTENSITY OF THE UPPER LEVEL TROF AS IT MOVES OUT OF THE GREAT BASIN AND INTO THE NORTHERN HIGH PLAINS ON LATE WEDNESDAY AND THURSDAY. THE MODELS ARE CONSISTENT THROUGH TUESDAY NIGHT WITH THE MAIN LOW OVER THE SOUTHERN GREAT BASIN. INCONSISTENCIES THEN DEVELOP ON WEDNESDAY AND WEDNESDAY NIGHT AS MODELS DIVERGE IN THEIR SOLUTIONS. THE NAM IS THE FARTHEST SOUTH OVER CENTRAL COLORADO WEDNESDAY NIGHT WITH THE LOW WHILE THE GFS IS FURTHER NORTH WITH THE LOW INTO THE NEBRASKA PAN HANDLE. THE EUROPEAN IS INITIALLY SLOWER IN MOVING OUT THE TROF. BASED ON THE NAM SCENARIO...THERE IS THE POTENTIAL FOR SEVERE STORMS ON WEDNESDAY AFTERNOON AS INITIAL FRONTAL BOUNDARY APPEARS TO STALL OVER THE PALMER DIVIDE BEFORE LIFTING NORTH A BIT WEDNESDAY AFTERNOON. THIS WILL RESULT IN A FOCUS FOR STORMS ALONG THE STATIONARY BOUNDARY. NAM SURFACE BASED CAPES ARE 1000-1500J/KG WITH SUFFICIENT SHEAR FOR A FEW SEVERE STORMS. GFS A BIT SLOWER WITH THE COLD FRONT SO FOCUS FOR STORMS COULD BE FURTHER NORTH.

OVERALL...BEST CHANCE OF PRECIP WITH THIS STORM WILL LIKELY BE OVER NORTHERN SECTIONS OF THE CWA AS THE GENERAL TRACK OF THE STORM WILL SEND IT INTO THE DAKOTAS BY LATE THURSDAY. TEMPERATURES WILL BE COOLER ON WEDNESDAY AND MORE SO ON THURSDAY AS THE TROF MOVES NORTHEAST OF COLORADO. FOR FRIDAY AND THE WEEKEND THE FLOW ALOFT SHIFTS NORTHWEST AS SEVERAL DISTURBANCES BRUSH NORTHERN COLORADO THROUGH THE PERIOD. THIS WILL KEEP TEMPERATURES NEAR SEASONABLE NORMALS WITH AT LEAST A SLIGHT CHANCE OF SHOWERS AND STORMS EACH DAY.

&&

.AVIATION...(FOR THE TAFS THROUGH 00Z TUESDAY LATE AFTERNOON)

ISSUED AT 357 PM MDT MON MAY 5 2014

SOUTHERLY WINDS ONGOING AT AREA AIRPORTS WITH SOME GUSTS AROUND 25 KTS AT KDEN AND KAPA. WINDS TO DECREASE THIS EVENING WITH DRAINAGE DEVELOPING BY 04Z. WAVE CLOUD TO CONTINUE TO DISSIPATE WITH CEILINGS REMAINING ABOVE 12000 FEET AGL. SOUTHWEST WINDS TO

PREVAIL TUESDAY...WITH SPEEDS AROUND 10 KTS. POTENTIAL FOR
ANOTHER WAVE CLOUD DEVELOPING AFTER 15Z...CEILINGS SHOULD REMAIN
ABOVE 12000 FEET AGL.
&&
.BOU WATCHES/WARNINGS/ADVISORIES...
NONE.

Summary – mountain wave conditions existed at altitude over the area. The low-level surface winds were from the south at 5 to 10 knots with gusts from 20 to 30 knots in the area at the time of the accident. There was a veering to a west-southwesterly wind within a 1,000 feet with speeds in excess of 23 knots.

The Density altitude was estimated at 8475 feet, based on elevation 5673 feet, 27° F, altimeter 29.79, and a 6% relative humidity. The 1800 MDT sounding also supported a density altitude in excess of 8,000 feet at the surface.

Advise if additional information is needed.

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