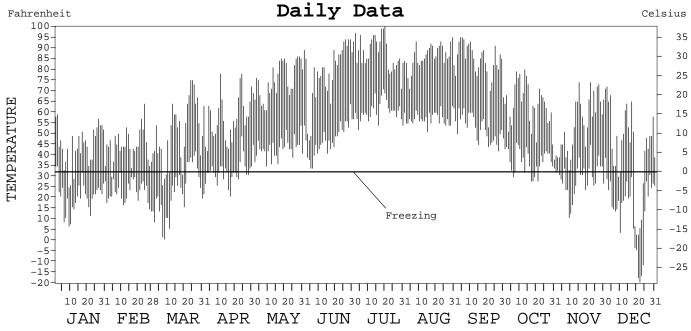
1998

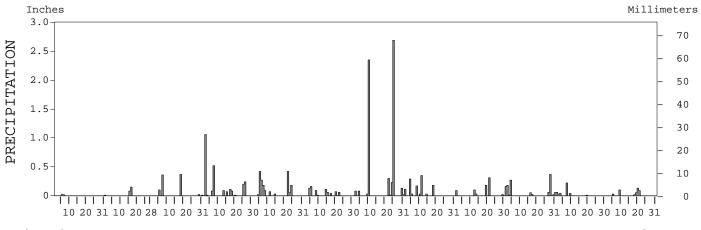
LOCAL CLIMATOLOGICAL DATA ANNUAL SUMMARY WITH COMPARATIVE DATA

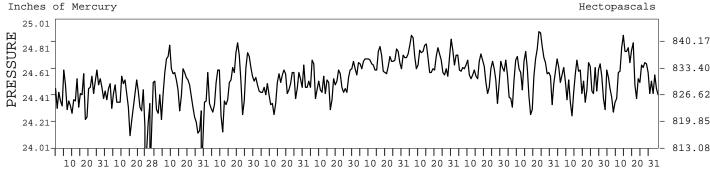


DENVER, COLORADO (DEN)

ISSN 0198-7690







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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL
ENVIRONMENTAL SATELLITE, DATA,
AND INFORMATION SERVICE

NATIONAL
CLIMATIC DATA CENTER
ASHEVILLE, NORTH CAROLINA

DIRECTOR
NATIONAL CLIMATIC DATA CENTER

METEOROLOGICAL DATA FOR 1998

DENVER, CO (DEN)

LATITUDE: LONGITUDE: ELEVATION (FT): TIME ZONE: WBAN: 03017 39° 52′ 00″ N 104° 40′ 00″ W GRND: 5414 BARO: 5382 (UTC+ 7) MOUNTAIN ELEMENT JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC YEAR MEAN DAILY MAXIMUM 44.3 44.8 50.8 57.6 75.0 78.7 88.1 86.1 83.6 63.1 55.0 42.6 64.1 78 HIGHEST DAILY MAXIMUM 59 64 75 86 94 100 95 95 80 74 72 100 24+ JUL 20 0.2 29+ 30 05+ DATE OF OCCURRENCE 24 25+ 29+ 20 13 22+ 0.2 47.3 37.3 MEAN DAILY MINIMUM 21.0 23.0 23.0 31.9 43.2 60.5 57.3 52.4 29.2 15.1 36.8 2.1 52 51 42 28 -19 LOWEST DAILY MINIMUM 7 14 1 35 34 11 -1909 DATE OF OCCURRENCE 28 08 17 09 06+ 04 15 2.7 21+ 09 22 DEC 22 74.3 60.7 AVERAGE DRY BULB 44.8 37.2 71.7 32.7 33.9 36.9 59.1 63.0 68.0 50.2 42.1 28.9 50.5 34.7 MEAN WET BULB 26.8 48.2 50.8 58.8 53.9 41.9 23.2 MEAN DEW POINT 17.8 27.6 38.0 39.3 52.4 50.5 42.9 33.4 24.1 13.1 NUMBER OF DAYS WITH: MAXIMUM ≥ 90° Λ Ω Ω Λ Λ 13 10 Λ Λ Λ 36 MAXIMUM ≤ 32° 3 5 Λ 0 0 0 0 0 0 Λ R 17 MINIMUM ≤ 32 29 28 24 19 0 0 Λ 0 0 7 19 30 156 MINIMUM ≤ 0 Ω Ω 0 0 0 0 0 0 0 n Ω 6 6 HEATING DEGREE DAYS 996 865 865 597 186 137 1 46 453 680 1113 5940 COOLING DEGREE DAYS 0 0 0 0 296 215 143 0 755 13 88 0 0 MEAN (PERCENT) 60 61 61 58 52 49 48 60 57 57 56 HOUR 05 LST 64 74 75 76 75 68 73 73 68 75 65 63 71 HOUR 11 LST 50 48 48 42 35 34 43 37 48 47 45 43 RH 34 HOUR 17 LST 61 49 44 44 36 33 46 40 32 49 50 58 45 HOUR 23 LST 70 70 69 64 65 61 66 64 71 66 64 65 PERCENT POSSIBLE SUNSHINE NUMBER OF DAYS WITH: 0 HEAVY FOG(VISBY ≤ 1/4 MI) 6 38 0 2 9 5 THUNDERSTORMS 0 12 12 0 50 SUNRISE-SUNSET: (OKTAS) CEILOMETER (\leq 12,000 FT.) SATELLITE (> 12,000 FT.) CLOUDINES MIDNIGHT-MIDNIGHT: (OKTAS) CEILOMETER (≤ 12,000 FT.) SATELLITE (> 12,000 FT.) NUMBER OF DAYS WITH: CLEAR PARTLY CLOUDY CLOUDY MEAN STATION PRESS. (IN.) 24.45 24.52 24.51 24.54 24.70 24.74 24.63 24.61 24.54 24.60 29.93 29.99 29.97 MEAN SEA-LEVEL PRESS. (IN.) 29.89 29.93 29.89 29.78 29.78 30.10 RESULTANT SPEED (MPH) 3.8 0.30.1 2.8 3.4 0.6 3.3 2.8 3.7 RES. DIR. (TENS OF DEGS.)
MEAN SPEED (MPH) 17 21 20 21 21 18 29 22 19 21 10.7 9.8 8.9 8.3 10.0 10.0 8.9 8.8 9.7 8.8 9.4 9.5 10.8 PREVAIL.DIR.(TENS OF DEGS.) 20 20 21 20 01 21 16 21 2.2 21 24 21 21 MAXIMUM 2-MINUTE WIND: 46 SPEED (MPH) 37 38 44 46 43 30 38 36 40 31 31 34 DIR. (TENS OF DEGS.) 28 21 Nβ 20 01 29 31 23 22 34 31 28 31 DATE OF OCCURRENCE 02 2.4 29+ 11 0.8 13 14 0.8 25+ 17 18 2.8 TIII. 14 MAXIMUM 5-SECOND WIND: 43 47 51 45 SPEED (MPH) 36 40 44 61 49 39 41 61 46 DIR. (TENS OF DEGS.) 2.8 20 32 21 2.4 29 32 22 02 34 31 2.8 32 DATE OF OCCURRENCE JUL 14 02 24 26 11 28 13 14 NΑ 13 17 22+ 28 WATER EQUIVALENT: TOTAL (IN.) 0.05 0.23 0.86 2.47 1.73 0.73 5.92 1.19 0.73 1.20 0.40 0.42 15.93 2.79 GREATEST 24-HOUR (IN.) 0.04 0.21 0.37 1.06 0.47 0.29 0.38 0.31 0.42 0.22 0.17 2.79 DATE OF OCCURRENCE 05-06 15-16 18 02 22-23 04-05 24-25 10-11 21 27-28 07 20-21 JUL 24-25 NUMBER OF DAYS WITH: PRECIPITATION ≥ 0.01 3 2 5 11 10 9 10 8 10 6 86 PRECIPITATION ≥ 0.10 0 3 5 5 3 5 2 37 PRECIPITATION ≥ 1.00 n n 0 1 0 0 2 Ω n Ω 0 n 3 SNOW, ICE PELLETS, HAIL: TOTAL (IN.) GREATEST 24-HOUR (IN.) DATE OF OCCURRENCE MAXIMUM SNOW DEPTH (IN.) DATE OF OCCURRENCE NUMBER OF DAYS WITH: SNOWFALL ≥ 1.0

NORMALS, MEANS, AND EXTREMES

DENVER, CO (DEN)

	DENVER, CO (DEN) LATITUDE: LONGITUDE: ELEVATION (FT): TIME ZONE: WRAN: 03017														
39	LATITUDE: LONGITUDE: ELEVATION (FT): TIME ZONE: WBAN: 0301' 39° 52′ 00″ N 104° 40′ 00″ W GRND: 5414 BARO: 5382 MOUNTAIN (UTC+ 7)													3017	
TEMPERATURE °F	ELEMENT NORMAL DAILY MAXIMUM MEAN DAILY MAXIMUM HIGHEST DAILY MAXIMUM YEAR OF OCCURRENCE MEAN OF EXTREME MAXS. NORMAL DAILY MINIMUM MEAN DAILY MINIMUM LOWEST DAILY MINIMUM YEAR OF OCCURRENCE MEAN OF EXTREME MINS. NORMAL DRY BULB MEAN DRY BULB MEAN DRY BULB MEAN DEW POINT NORMAL NO. DAYS WITH: MAXIMUM \(\geq 90^\) MAXIMUM \(\leq 32^\) MINIMUM \(\leq 32^\) MINIMUM \(\leq 0^\)	3	42.0 72 1997 66.7 13.8 16.4 -14 1997	45.1 69 1996 66.3 18.3 20.1 -16 1996 2.0 32.3 32.6 25.9	23.9 -2 1996 2.3 38.0 38.6	44.0 26.8	69.5 93 1996 87.3 41.2 42.4 27 1997 31.8 55.9 56.0 35.0	93.2 50.1 50.7 34 1998 39.8	48.5 72.1 72.9 58.7	86.5 99 1995 96.0 54.2 57.6 42 1995 48.5 69.8 72.1 58.7	32.2 61.0 63.7 51.7	18.0 50.2 49.8 40.0	52.1 74 1998 72.0 23.4 25.9 -3 1997 5.5 37.6 39.0 32.1	43.1 72 1998 64.5 15.3 18.2 -19 1998 -3.8 29.6 30.7 25.1	YEAR 63.9 63.1 100 JUL 1998 81.3 33.9 35.8 -19 DEC 1998 19.5 48.9 49.5 36.6 30.5
H/C	NORMAL HEATING DEG. DAYS NORMAL COOLING DEG. DAYS	30 30		916 0	837 0	546 0		84 102	0 224	11 160	162 42	459 0	822 0	1097 0	6363 534
RH	NORMAL (PERCENT) HOUR 05 LST HOUR 11 LST HOUR 17 LST HOUR 23 LST														
Ø	PERCENT POSSIBLE SUNSHINE														
0/M	MEAN NO. DAYS WITH: HEAVY FOG(VISBY≤1/4 MI) THUNDERSTORMS	3	2.3	2.3	3.1	2.3 1.5		0.7 12.3		1.3 11.8	1.7 6.5	3.8 0.7	2.5		25.8 55.8
CLOUDINESS	MEAN: SUNRISE-SUNSET (OKTAS) MIDNIGHT-MIDNIGHT (OKTAS) MEAN NO. DAYS WITH: CLEAR PARTLY CLOUDY CLOUDY	1 1 1 1	3.0	5.0 10.0 2.0 6.0	5.3 5.3 9.0 6.0 10.0	7.2 7.2 6.0 4.0 13.0	6.4 10.0 5.5	2.5 3.0 12.0 9.0 5.0	2.0 2.0 1.0	2.5 2.0 7.0 9.0 3.0	6.0 6.0 5.0	9.0		2.5 13.0 1.0 2.0	
PR	MEAN STATION PRESSURE(IN) MEAN SEA-LEVEL PRES. (IN)	3	24.48 29.95	24.56 30.07	24.58 29.94	24.53 29.88	24.56 29.85	24.59 29.81	24.69 29.91	24.70 29.93	24.64 29.93	24.58 29.92	24.57 29.98	24.54 30.02	24.59 29.93
	MEAN SPEED (MPH) PREVAIL.DIR(TENS OF DEGS)	3 2	9.2 20		10.5 21	10.8		10.3 16	9.4 21	9.3 21			9.3 20		9.8 21
WINDS	MAXIMUM 2-MINUTE: SPEED (MPH) DIR. (TENS OF DEGS) YEAR OF OCCURRENCE MAXIMUM 5-SECOND:	3	41 28 1996	24	28	43 26 1995		29	47 18 1997	43 23 1998	30	34	26	30	53 28 MAR 1995
	SPEED (MPH) DIR. (TENS OF DEGS) YEAR OF OCCURRENCE	3	48 02 1996	45 02 1996	56 32 1997	51 02 1995		51 29 1998	61 32 1998	49 22 1998	39 31 1996	53 19 1997		30	61 32 JUL 1998
PRECIPITATION	NORMAL (IN) MAXIMUM MONTHLY (IN) YEAR OF OCCURRENCE MINIMUM MONTHLY (IN) YEAR OF OCCURRENCE MAXIMUM IN 24 HOURS (IN) YEAR OF OCCURRENCE NORMAL NO. DAYS WITH: PRECIPITATION ≥ 0.01 PRECIPITATION ≥ 1.00	30 3 3	0.50 0.29 1996 0.05 1998 0.13 1996	0.54 1997 0.09 1996 0.29	0.86 1998 0.26 1997 0.63	1.68 2.47 1998 0.33 1996 1.06 1998	4.67 1995 1.57 1997 1.16	3.07 1995 0.73 1998	1998 1.01 1996 3.06	3.52 1997 0.56 1996 0.90	2.34 1996 0.73 1998 1.22	1.87 1997 0.39 1996 1.12	0.61 1997 0.31 1995 0.39	0.50 1997 0.06 1995 0.19	16.11 5.92 JUL 1998 0.05 JAN 1998 3.06 JUL 1997
SNOWFALL	NORMAL (IN) MAXIMUM MONTHLY (IN) YEAR OF OCCURRENCE MAXIMUM IN 24 HOURS (IN) YEAR OF OCCURRENCE MAXIMUM SNOW DEPTH (IN) YEAR OF OCCURRENCE NORMAL NO. DAYS WITH: SNOWFALL ≥ 1.0														

PRECIPITATION (inches) 1998 DENVER, CO (DEN)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1995 1996	0.29	0.09	0.28	2.44	4.67 2.40	3.07 1.77	2.31	1.04	2.28	0.72	0.31	0.06	10.39
1997 1998	0.26 0.05	0.54 0.23	0.26 0.86	1.30 2.47	1.57 1.73	2.57 0.73	5.60 5.92	3.52 1.19	0.97 0.73	1.87 1.20	0.61 0.40	0.50 0.42	19.57 15.93
POR= 3 YRS	0.20	0.28	0.55	1.72	2.28	1.90	4.39	1.84	1.34	1.39	0.45	0.33	16.67

WBAN: 03017 AVERAGE TEMPERATURE (°F) 1998 DENVER, CO (DEN)

AVERAG	1 1 11 11 11	EICAIOI	(1.)	1998			2, 00 (DEIN /					
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1995	27.0	22 0	39.3	42.9	50.0	62.2	70.9	75.3	61.7	48.5	41.8	33.0	40.0
1996 1997 1998	27.0 27.9 32.7	33.9 30.0 33.9	36.0 42.1 36.9	48.0 40.5 44.8	58.1 56.6 59.1	68.2 67.8 63.0	73.4 73.1 74.3	71.6 69.7 71.7	60.8 64.3 68.0	50.9 49.7 50.2	37.2 34.8 42.1	33.0 27.9 28.9	49.8 48.7 50.5
1998 POR=	34.1	33.9	30.9	44.8	59.1	03.0	74.3	/1./	08.0	50.2	42.1	20.9	50.5
3 YRS	29.2	32.6	38.9	43.6	56.6	65.3	73.2	71.6	64.5	49.9	38.8	30.0	49.5

HEATING DEGREE DAYS (base $65^{\circ}F$) 1998 DENVER, CO (DEN)

1111111111	O DEGI		ib (Dat	05 1	, 1000		EIC, CO	(DELA)					
YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
1994-95									788	655	457	132	
1995-96 1996-97	26	2 4	188 192	505 444	686 824	981 985	1166 1142	894 975	893 704	230 728	29 264	0 35	5600 6297
1997-98 1998-	2	11	92 46	475 453	895 680	1142 1113	996	865	865	597	186	137	6263
1998-	1	1	46	453				003				137	0203

COOLING DEGREE DAYS (base 65°F) 1998 DENVER, CO (DEN)

COOLIN	IG DEGI	REE DA	YS (bas	se 65°E	7) 1998	DENV	ZER, CO	(DEN)					
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1995 1996	0	0	0	3	0 26	55 133	212 269	327 215	98 71	13	0	0	730
1997 1998	0	0	0	0	11 13	126 88	260 296	160 215	77 143	8	0	0 0	642 755

WBAN : 03017

YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
POR=													

WBAN: 03017

REFERENCE NOTES:

THE TEMPERATURE GRAPH SHOWS NORMAL MAXIMUM AND NORMAL MINIMUM DAILY TEMPERATURES (SOLID CURVES) AND THE ACTUAL DAILY HIGH AND LOW TEMPERATURES (VERTICAL BARS).

PAGE 2 AND 3:

H/C INDICATES HEATING AND COOLING DEGREE DAYS

RH INDICATES RELATIVE HUMIDITY

W/O INDICATES WEATHER AND OBSTRUCTIONS

S INDICATES SUNSHINE.

PR INDICATES PRESSURE.

CLOUDINESS ON PAGE 3 IS THE SUM OF THE CEILOMETER AND SATELLITE DATA NOT TO EXCEED EIGHT EIGHTHS(OKTAS).

GENERAL:

T INDICATES TRACE PRECIPITATION, AN AMOUNT GREATER THAN ZERO BUT LESS THAN THE LOWEST REPORTABLE VALUE. INDICATES THE VALUE ALSO OCCURS ON EARLIER DATES. BLANK ENTRIES DENOTE MISSING OR UNREPORTED DATA. NORMALS ARE 30-YEAR AVERAGES (1961 - 1990). ASOS INDICATES AUTOMATED SURFACE OBSERVING SYSTEM. PM INDICATES THE LAST DAY OF THE PREVIOUS MONTH. POR (PERIOD OF RECORD) BEGINS WITH THE JANUARY DATA MONTH AND IS THE NUMBER OF YEARS USED TO COMPUTE

THE MEAN. INDIVIDUAL MONTHS WITHIN THE POR MAY BE MISSING. WHEN THE POR FOR A NORMAL IS LESS THAN 30 YEARS, THE NORMAL IS PROVISIONAL AND IS BASED ON THE NUMBER

OF YEARS INDICATED. 0.* OR * INDICATES THE VALUE OR MEAN-DAYS-WITH IS BETWEEN 0.00 AND 0.05.

CLOUDINESS FOR ASOS STATIONS DIFFERS FROM THE NON-ASOS OBSERVATION TAKEN BY A HUMAN OBSERVER. ASOS STATION CLOUDINESS IS BASED ON TIME-AVERAGED CEILOMETER DATA FOR CLOUDS AT OR BELOW 12,000 FEET AND ON SATELLITE DATA FOR CLOUDS ABOVE 12,000 FEET.

THE NUMBER OF DAYS WITH CLEAR, PARTLY CLOUDY, AND CLOUDY CONDITIONS FOR ASOS STATIONS IS THE SUM OF THE CEILOMETER AND SATELLITE DATA FOR THE SUNRISE TO SUNSET PERIOD.

GENERAL CONTINUED:

CLEAR INDICATES 0 - 2 OKTAS, PARTLY CLOUDY INDICATES 3 - 6 OKTAS, AND CLOUDY INDICATES 7 OR 8 OKTAS. WHEN AT LEAST ONE OF THE ELEMENTS (CEILOMETER OR SATELLITE) IS MISSING, THE DAILY CLOUDINESS IS NOT COMPUTED.

WIND DIRECTION IS RECORDED IN TENS OF DEGREES (2 DIGITS) CLOCKWISE FROM TRUE NORTH. "00" INDICATES CALM. INDICATES TRUE NORTH.

RESULTANT WIND IS THE VECTOR AVERAGE OF THE SPEED AND DIRECTION

AVERAGE TEMPERATURE IS THE SUM OF THE MEAN DAILY MAXIMUM AND MINIMUM TEMPERATURE DIVIDED BY 2.

SNOWFALL DATA COMPRISE ALL FORMS OF FROZEN PRECIPITATION, INCLUDING HAIL.

A HEATING (COOLING) DEGREE DAY IS THE DIFFERENCE BETWEEN THE AVERAGE DAILY TEMPERATURE AND 65° F.

DRY BULB IS THE TEMPERATURE OF THE AMBIENT AIR.

DEW POINT IS THE TEMPERATURE TO WHICH THE AIR MUST BE COOLED TO ACHIEVE 100 PERCENT RELATIVE HUMIDITY. WET BULB IS THE TEMPERATURE THE AIR WOULD HAVE IF THE

MOISTURE CONTENT WAS INCREASED TO 100 PERCENT RELATIVE HUMIDITY.

ON JULY 1, 1996, THE NATIONAL WEATHER SERVICE BEGAN USING THE "METAR" OBSERVATION CODE THAT WAS ALREADY EMPLOYED BY MOST OTHER NATIONS OF THE WORLD. THE MOST NOTICEABLE DIFFERENCE IN THIS ANNUAL PUBLICATION WILL BE THE CHANGE IN UNITS FROM TENTHS TO EIGHTS(OKTAS) FOR REPORTING THE AMOUNT OF SKY COVER.

1998 DENVER, COLORADO (DEN)

Denver enjoys the invigorating climate that prevails over much of the central Rocky Mountain region, without the extremely cold mornings of the high elevations during winter, or the hot afternoons of summer at lower altitudes. Extremely warm or cold weather in Denver is usually of short duration.

Situated a long distance from any moisture source, and separated from the Pacific Ocean by several high mountain barriers, Denver enjoys low relative humidity, light precipitation, and abundant sunshine.

Air masses from four different sources influence Denver weather. These include arctic air from Canada and Alaska, warm, moist air from the Gulf of Mexico, warm, dry air from Mexico and the southwestern deserts, and Pacific air modified by its passage over mountains to the west.

In winter, the high altitude and mountains to the west combine to moderate temperatures in Denver. Invasions of cold air from the north, intensified by the high altitude, can be abrupt and severe. However, many of the cold air masses that spread southward out of Canada never reach the altitude of Denver, but move off over the lower plains to the east. Surges of air from the west are moderated in their descent down the east face of the Rockies, and reach Denver in the form of chinook winds that often raise temperatures into the 60s, even in midwinter.

In spring, polar air often collides with warm, moist air from the Gulf of Mexico and these collisions result in frequent, rapid and drastic weather changes. Spring is the cloudiest, windiest, and wettest season in the city. Much of the precipitation falls as snow, especially in March and early April. Stormy periods are interspersed with stretches of mild, sunny weather that quickly melt previous snow cover.

Summer precipitation falls mainly from scattered thunderstorms during the afternoon and evening. Mornings are usually clear and sunny, with clouds forming during early afternoon to cut off the sunshine at what would otherwise be the hottest part of the day. Severe thunderstorms, with large hail and heavy rain occasionally occur in the city, but these conditions are more common on the plains to the east.

Autumn is the most pleasant season. Few thunderstorms occur and invasions of cold air are infrequent. As a result, there is more sunshine and less severe weather than at any other time of the year.

Based on the 1951-1980 period, the average first occurrence of 32 degrees Fahrenheit in the fall is October 8 and the average last occurrence in the spring is May 3.

																DENVER, COLORADO
				L	L			ELE	VATI	IA NC	BOVE				A U	* <u>Type</u>
				拿	Ň	SEA LEVEL				GROUI					Ť	M = AMOS T = ATTOR
LOCATION	OCCUPIED FROM	OCCUPIED TO	AIRLINE DISTANCES AND DIRECTIONS FROM PREVIOUS LOCATION	AT I I U D E NORTH	LO NG GIT UD E	GROUND TEMPERATURE	WHND HNSTRUMENTS	EXTREME THERMOMETERS	PSYCHROMETER	SUNSHINE SWITCH	RAIN GAGE TIPPING BUCKET	WEIGHING RAIN GAGE	8 INCH RAIN GAGE	HYGROTHERMOMETER	MATHC OBSERVING	
<u>CITY</u> - Denver, CO	03/01/95	Present		39°52'	104°40'	5414		NA	NA	NA		NA	NA		S	a - Hourly and summary of the day observations began at the new Denver International Airport 03/01/95
																03/01/95 ASOS Commissioned 03/01/95
SUBSCRIPŢION:																

SUBSCRIPTION:
Price and ordering information available through: National Climatic Data Center, Federal Building, Asheville, North Carolina 28801.
INQUIRIES/COMMENTS CALL: (828) 271-4800

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