

Weather Extremes

Posted by: Christopher C. Burt, 7:30 PM GMT on August 11, 2011

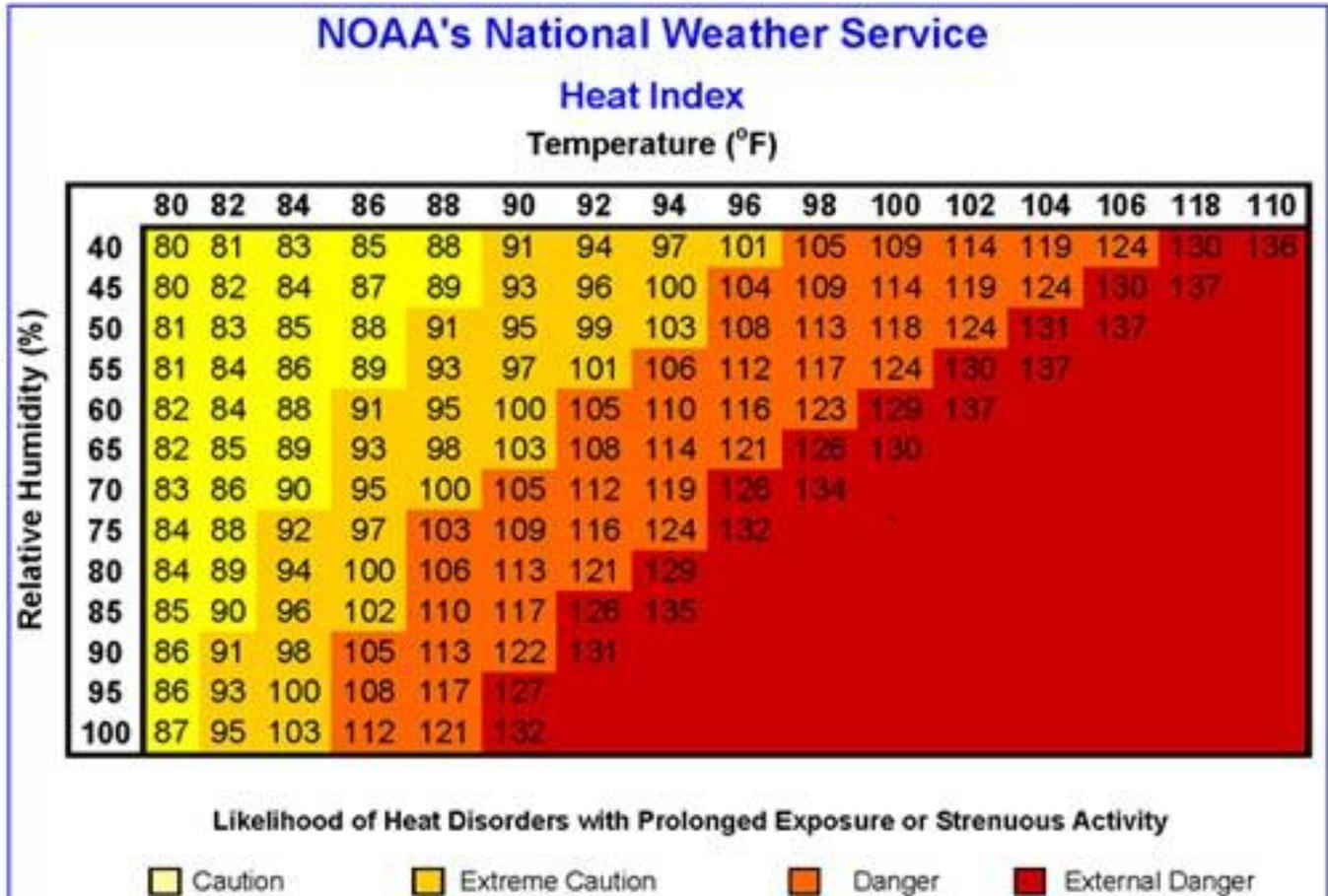
Record Dew Point Temperatures

Just recently the Minnesota State Climate Office issued a statement declaring the 88° dew point temperature measured at Moorhead (on the Red River across from Fargo, North Dakota) between 7pm and 9pm on July 19, 2011 as a new all-time state record for the highest such reading ever observed. This would also be one of the highest dew points ever observed in the United States.

Here is a brief summary of record dew point levels from both the U.S.A. and around the world.

The 88° Dew Point Measured at Moorhead, Minnesota on July 19, 2011

One might assume that the highest dew points measured in the United States would be those observed during in areas along or near the coast of the Gulf of Mexico during the summer months. Although for the most part this is true the other region that occasionally seems to record extraordinary heat and humidity is the Upper Midwest. I have not been able to discover just why the dew points in Iowa, Minnesota, and Wisconsin sometimes are higher than anywhere else in the United States during exceptional heat waves versus, say, Missouri or other states that are generally more humid and also endure exceptional summer heat. One possible factor is that the worst heat waves in the area sometimes occur following heavy rainfalls that have saturated the ground and lowest levels of the atmosphere whereas other more southern places usually reach there highest temperatures during periods of drought, as is the current situation in the Southern Plains.



Heat Index Chart (Temperature & Dewpoint)

Dewpt (° F)	Temperature (° F)															
	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
65	94	95	96	97	98	100	101	102	103	104	106	107	108	109	110	112
66	94	95	97	98	99	100	101	103	104	105	106	108	109	110	111	112
67	95	96	97	98	100	101	102	103	105	106	107	108	110	111	112	113
68	95	97	98	99	100	102	103	104	105	107	108	109	110	112	113	114
69	96	97	99	100	101	103	104	105	106	106	109	110	111	113	114	115
70	97	98	99	101	102	103	105	106	107	109	110	111	112	114	115	116
71	98	99	100	102	103	104	106	107	108	109	111	112	113	115	116	117
72	98	100	101	103	104	105	107	108	109	111	112	113	114	116	117	118
73	99	101	102	103	105	106	108	109	110	112	113	114	116	117	118	119
74	100	102	103	104	106	107	109	110	111	113	114	115	117	118	119	121
75	101	103	104	106	107	108	110	111	113	114	115	117	118	119	121	122
76	102	104	105	107	108	110	111	112	114	115	117	118	119	121	122	123
77	103	105	106	108	109	111	112	114	115	117	118	119	121	122	124	125
78	105	106	108	109	111	112	114	115	117	118	119	121	122	124	125	126
79	106	107	109	111	112	114	115	117	118	120	121	122	124	125	127	128
80	107	109	110	112	114	115	117	118	120	121	123	124	126	127	128	130
81	109	110	112	114	115	117	118	120	121	123	124	126	127	129	130	132
82	110	112	114	115	117	116	120	122	123	125	126	128	129	131	132	133

Note: Exposure to full sunshine can increase HI values by up to 15° F

Two graphics illustrating the affect of humidity on the apparent feel of the temperature: at top is NOAA's Heat Index chart (% of humidity with air temperature) and below that the effect of dew point with air temperature. Unfortunately the dew point table does not consider dew points above 82°.

On July 19th not only did Moorhead record its highest dew point on record but so did Minneapolis with an 82° (and possibly even 84° for a five minute period between 3:21-3:27 pm) on the same day. Another site in Minnesota, Madison, also registered an 88° dew point (although this site may not be considered an official reporting station). The NWS office in Grand Forks, North Dakota issued this statement [explaining how heavy rainfall the morning of the event had saturated the soil and left ponding water near the instrument site](#). Furthermore, the AWOS is surrounded by sugar beets and soy beans "two of the most prodigious transpiring plants".



A photograph of the Moorhead Airport Automated Station that registered the 88° dew point on July 19th. Photo courtesy of the Grand Forks, North Dakota National Weather Service Office.

Highest Dew Point Measurements in the United States

Last summer (2010), Newton, Iowa recorded an 88° dew point on July 14th. Chicago, Illinois's highest dew point was 83° at 8 a.m. on July 30, 1999 as was Milwaukee, Wisconsin's with an 82° the same day. But it was during the July heat wave of 1995 that the highest dew point of all was measured in the Upper Midwest: 90° at Appleton, Wisconsin at 5 p.m. on July 13th of that summer. The air temperature stood at 101° in Appleton at that time leading to a heat index reading of 148°, perhaps the highest such reading ever measured in the United States. Here are the METARS for Appleton that day:

Hourly Observations

Time (CDT)	Temp.	Heat Index	Dew Point	Humidity	Pressure	Visibility	Wind Dir	Wind Speed	Gust Speed	Precip	Events	Conditions
5:30 AM	79.0 °F	-	79.0 °F	100%	29.87 in	2.0 mi	SSW	9.2 mph	-	N/A	Fog	Fog
METAR KATW 131030Z 20008KT 2SM FG OVC// BKN060 BKN100 26/26 A2987 RMK F8; SLPNO T02610261												
6:00 AM	79.0 °F	-	79.0 °F	100%	29.87 in	2.0 mi	SSW	9.2 mph	-	N/A	Fog	Fog
METAR KATW 131100Z 21008KT 2SM FG OVC// BKN020 BKN060 26/26 A2987 RMK F8; SLPNO T02610261												
7:00 AM	79.9 °F	-	77.9 °F	94%	29.88 in	10.5 mi	SW	12.7 mph	-	N/A	Fog	Fog
METAR KATW 131200Z 22011KT 21/2SM FG OVC// OVC010 27/25 A2988 RMK F6; SLPNO T02660255												
8:00 AM	83.8 °F	99.2 °F	81.9 °F	94%	29.89 in	3.0 mi	SW	15.0 mph	-	N/A	Fog	Fog
METAR KATW 131300Z 22013KT 3SM FG CLR 29/28 A2989 RMK SLPNO T02880277												
9:00 AM	86.9 °F	105.6 °F	81.9 °F	85%	29.89 in	3.0 mi	SSW	13.8 mph	-	N/A	Fog	Fog
METAR KATW 131400Z 21012KT 3SM FG SCT040 31/28 A2989 RMK SLPNO T03050277												
10:00 AM	88.9 °F	120.3 °F	86.9 °F	94%	29.87 in	5.0 mi	SSW	17.3 mph	-	N/A	Fog	Fog
METAR KATW 131500Z 21015KT 5SM FG BKN060 32/31 A2987 RMK SLPNO T03160305												
12:00 PM	93.9 °F	132.4 °F	88.0 °F	83%	29.87 in	6.0 mi	SSW	13.8 mph	-	N/A		Drizzle
METAR KATW 131700Z 20012KT 6SM DZ BKN100 34/31 A2987 RMK SLPNO T03440311												
1:00 PM	95.9 °F	131.7 °F	86.9 °F	75%	29.86 in	7.0 mi	WSW	16.1 mph	-	N/A		Mostly Cloudy
METAR KATW 131800Z 24014KT 7SM BKN100 36/31 A2986 RMK HAZY; SLPNO T03550305												
2:00 PM	97.9 °F	135.1 °F	86.9 °F	71%	29.87 in	10.0 mi	WSW	11.5 mph	-	N/A		Mostly Cloudy
METAR KATW 131900Z 25010KT 10SM BKN200 37/31 A2987 RMK HAZY; SLPNO T03660305												
3:00 PM	99.9 °F	143.6 °F	88.9 °F	71%	29.86 in	10.0 mi	WSW	11.5 mph	-	N/A		Scattered Clouds
METAR KATW 132000Z 25010KT 10SM SCT200 38/32 A2986 RMK HAZY; SLPNO T03770316												
4:00 PM	100.9 °F	135.5 °F	86.0 °F	62%	29.84 in	10.0 mi	WSW	15.0 mph	-	N/A		Scattered Clouds
METAR KATW 132100Z 24013KT 10SM SCT200 38/30 A2984 RMK SLPNO T03830300												
5:00 PM	100.9 °F	148.5 °F	90.0 °F	71%	29.83 in	10.0 mi	SW	15.0 mph	-	N/A		Scattered Clouds
METAR KATW 132200Z 23013KT 10SM SCT200 38/32 A2983 RMK SLPNO T03830322												
6:00 PM	99.0 °F	142.4 °F	88.9 °F	73%	29.82 in	10.0 mi	SW	13.8 mph	-	N/A		Scattered Clouds
METAR KATW 132300Z 22012KT 10SM SCT200 37/32 A2982 RMK SLPNO T03720316												
7:00 PM	95.9 °F	127.1 °F	84.9 °F	71%	29.82 in	10.0 mi	SW	11.5 mph	-	N/A		Scattered Clouds
METAR KATW 140000Z 22010KT 10SM SCT200 36/29 A2982 RMK SLPNO T03550294												
8:00 PM	88.9 °F	111.5 °F	82.9 °F	83%	29.83 in	10.0 mi	SW	9.2 mph	-	N/A		Scattered Clouds
METAR KATW 140100Z 23008KT 10SM SCT200 32/28 A2983 RMK SLPNO T03160283												

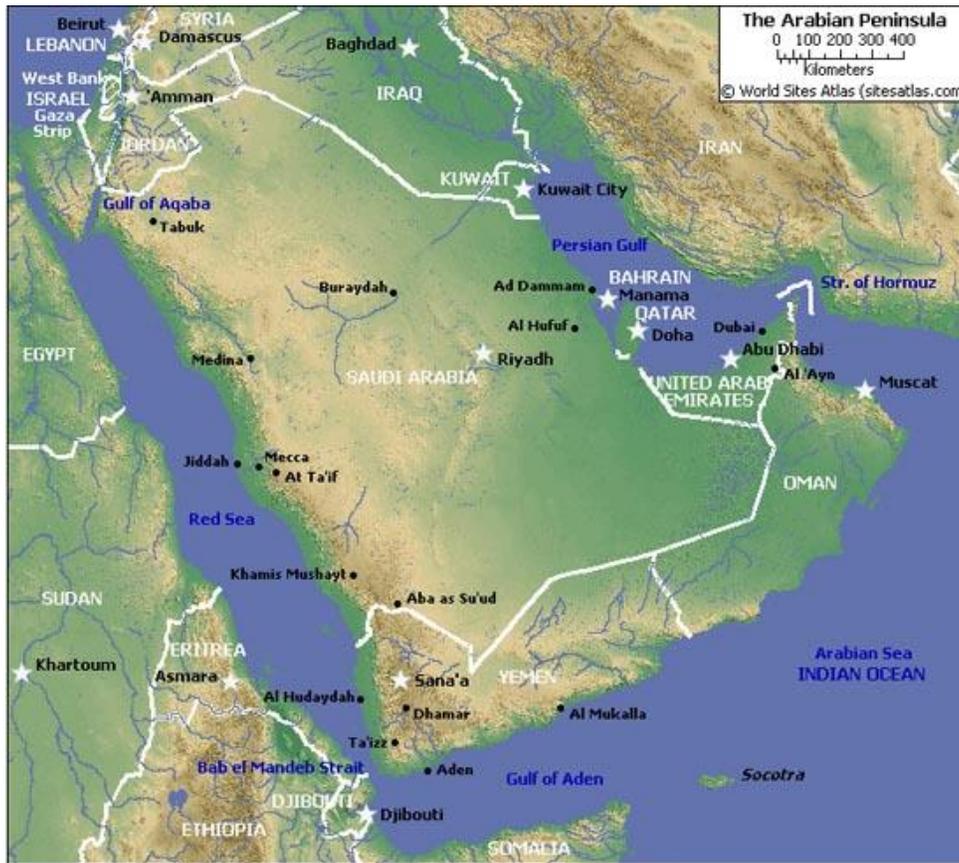
METARS chart for Appleton, Wisconsin on July 13, 1995 from wunderground.com.

The July 1995 heat wave resulted in the deaths of 750 people in Chicago and other cities in the region recorded amazing dew points as well such as Cedar Rapids, Iowa: 84° (heat index 129°) and Oelwein, Iowa 85° (heat index 131°). Unusually high dew points in the region persisted for a couple days, aided by evaporation from soil and a stable layer of air aloft that prevented moist air in the lowest few thousand feet from mixing with drier air above. This was also the case in Minnesota and North Dakota last month on July 19th.

Aside from Appleton, the only other instances of 90° or higher dew points I am aware of are the following: 91° at Melbourne, Florida at 2 p.m. on July 12, 1987 (air temperature 95°) and 90° at New Orleans Naval Air Station at 5 p.m. on July 30, 1987 (air temperature 91°). Both of these records have not been vetted for accuracy. Record high dew points seem to be a particularly difficult record to verify. On the East Coast I can find no reference to what New York City's highest dew point might have been. Philadelphia's highest such was 82° on July 15, 1995 (the heat index peaked at 129°). Syracuse, New York's record was 77° on July 4, 1999. Anecdotal on-line reports claim an 86° dew point at Virginia Beach, Virginia sometime during the summer of 1998. In general, it may be assumed that the highest dew points on record for most places east of the Great Plains would be in the 77°-85° range.

Highest Dew Point Levels in The World

The hottest most humid regions of the world are the coastal areas of The Persian Gulf, Red Sea, and Gulf of Aden.



Map of the Arabian Peninsula region, the coastal areas of which record the highest dew points in the world. Boosaso (referenced below) is located on the Gulf of Aden coast of Somalia just visible at the bottom portion of the map. Dhahran, Saudi Arabia is located on the Persian Gulf just north of Bahrain.

Thanks to the shallow nature of these bodies of water they heat up during the summer season with average sea surface temperatures in the upper 80°s. In fact, the hottest sea surface temperatures ever recorded anywhere in the world have been 98° in the Persian Gulf and 96° in the Red Sea. Data compiled by the British Met Office (in its 'Tables of Temperature, Relative Humidity and Precipitation for the World: Part 4; Africa and the Indian Ocean', 1967) for Boosaso (formerly known as Bender Caasim), Somalia between 1934-1946 indicate an average dew point of 83° at 2:30 p.m. during the entire month of June (104° air temperature with 61% humidity). Obviously, some days are even hotter and more humid (the record June high for the period was 113° and the record low 78°). Assab, Eritrea has an average June afternoon dew point of 84°.

The absolute highest dew point recorded in the region and therefore the world (of which I am aware) was 95° at Dhahran, Saudi Arabia at 3 p.m. on July 8, 2003. The dry bulb temperature stood at 108° at the time, so theoretically the heat index was 176°. Sharjah in the United Arab Emirates (UAE) apparently once recorded a dew point of 93.2° (date unknown) according to 'Weather Climate Extremes' Army Corps of Engineers TEC-0099 report.

KUDOS: Thomas Schlatter of NOAA for USA dew point records and Dr. Adnan Akyuz, North Dakota State Climatologist for Moorhead, MN information.

Categories: [Temperature Dew Point Records](#)