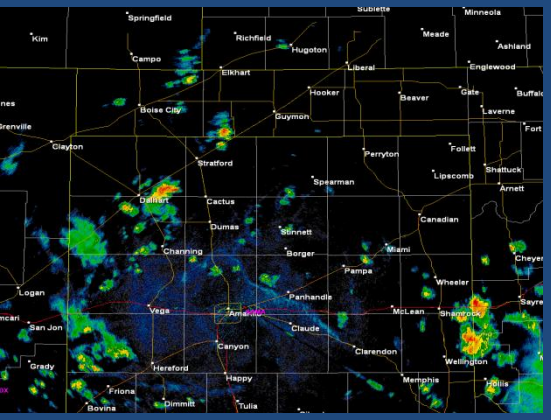
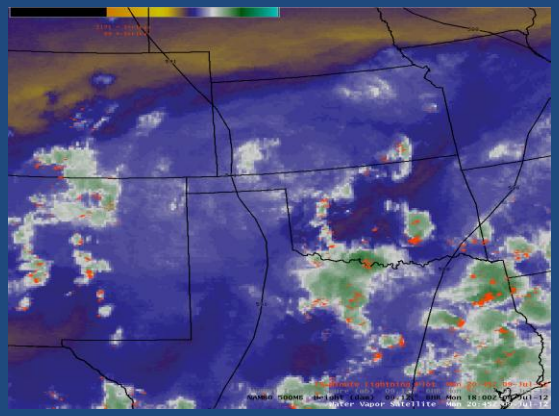
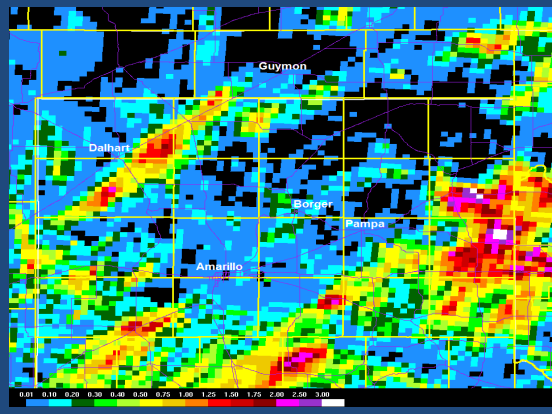
Model Performance of the 9-10 July 2012 Precipitation Event



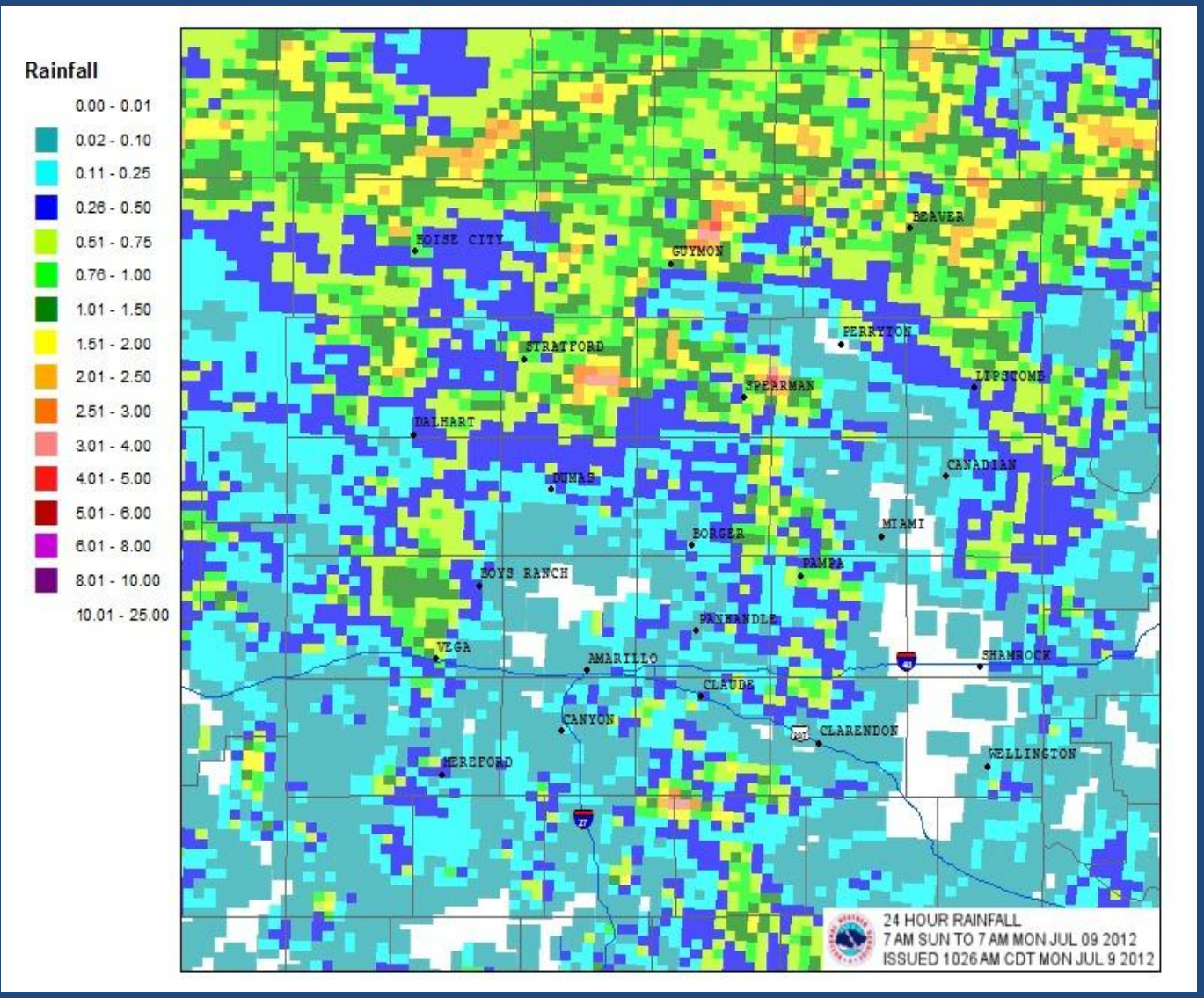




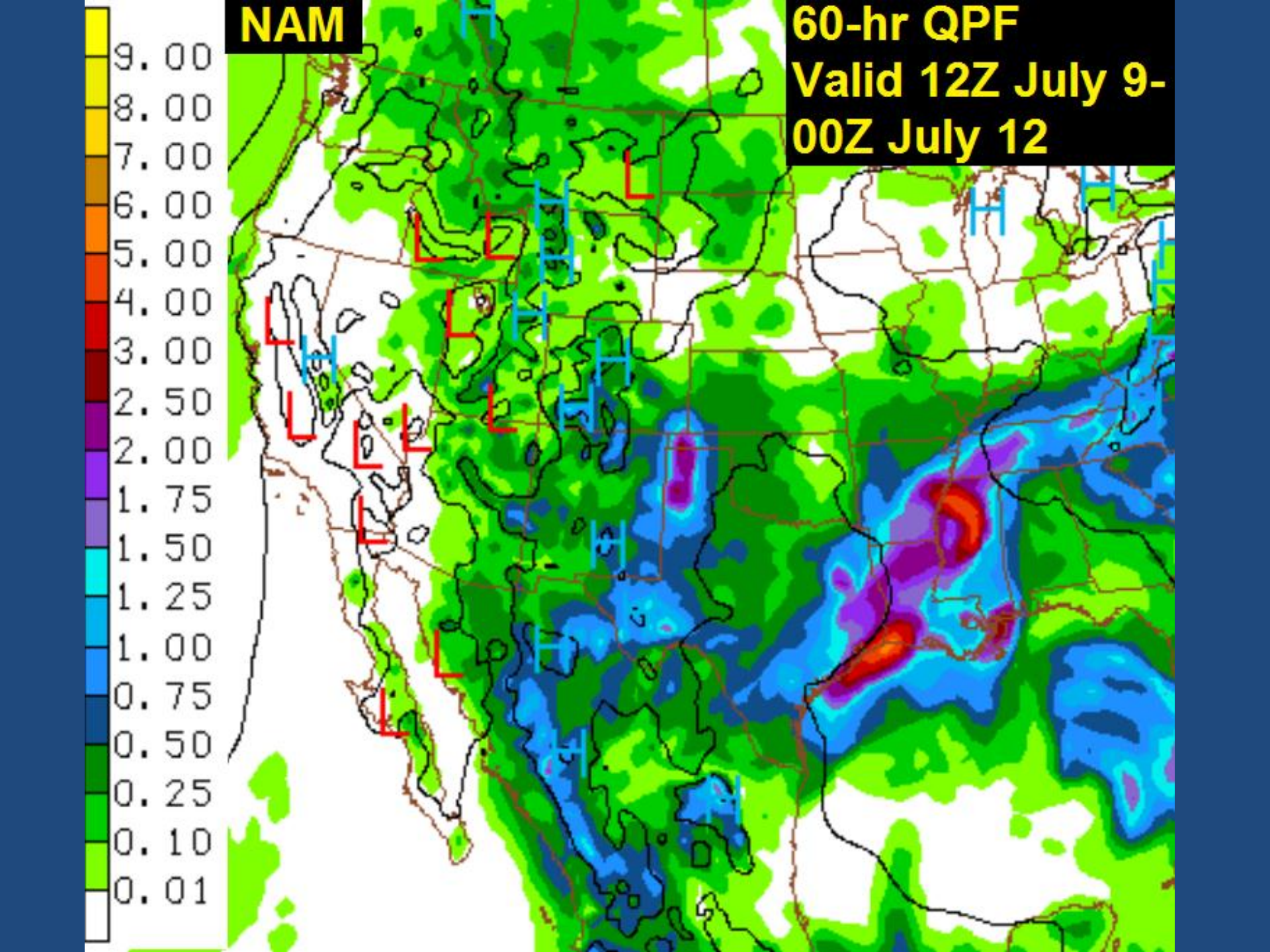
Why Such an Aggressive Forecast?

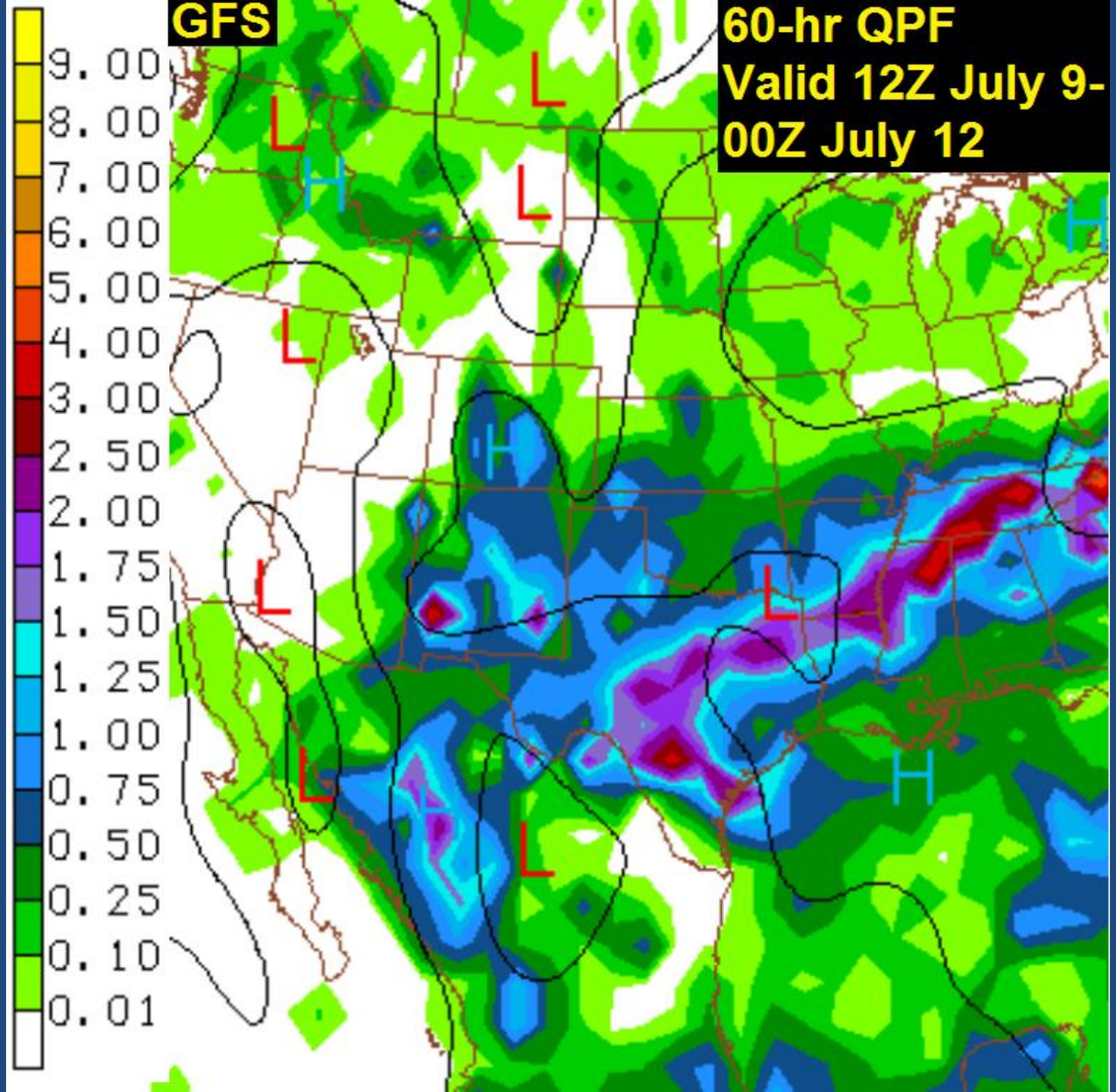
- **Widespread heavy rains occurred over a large portion of the area on Sunday (7/8).**
- **Model guidance was forecasting high POPs over a widespread portion of the CWA, especially Monday (7/9) evening and night.**
- **Model guidance was forecasting a very favorable environment for precipitation with respect to lift, moisture, and instability.**

24-hr Precipitation 7/8 12Z-7/9 12Z

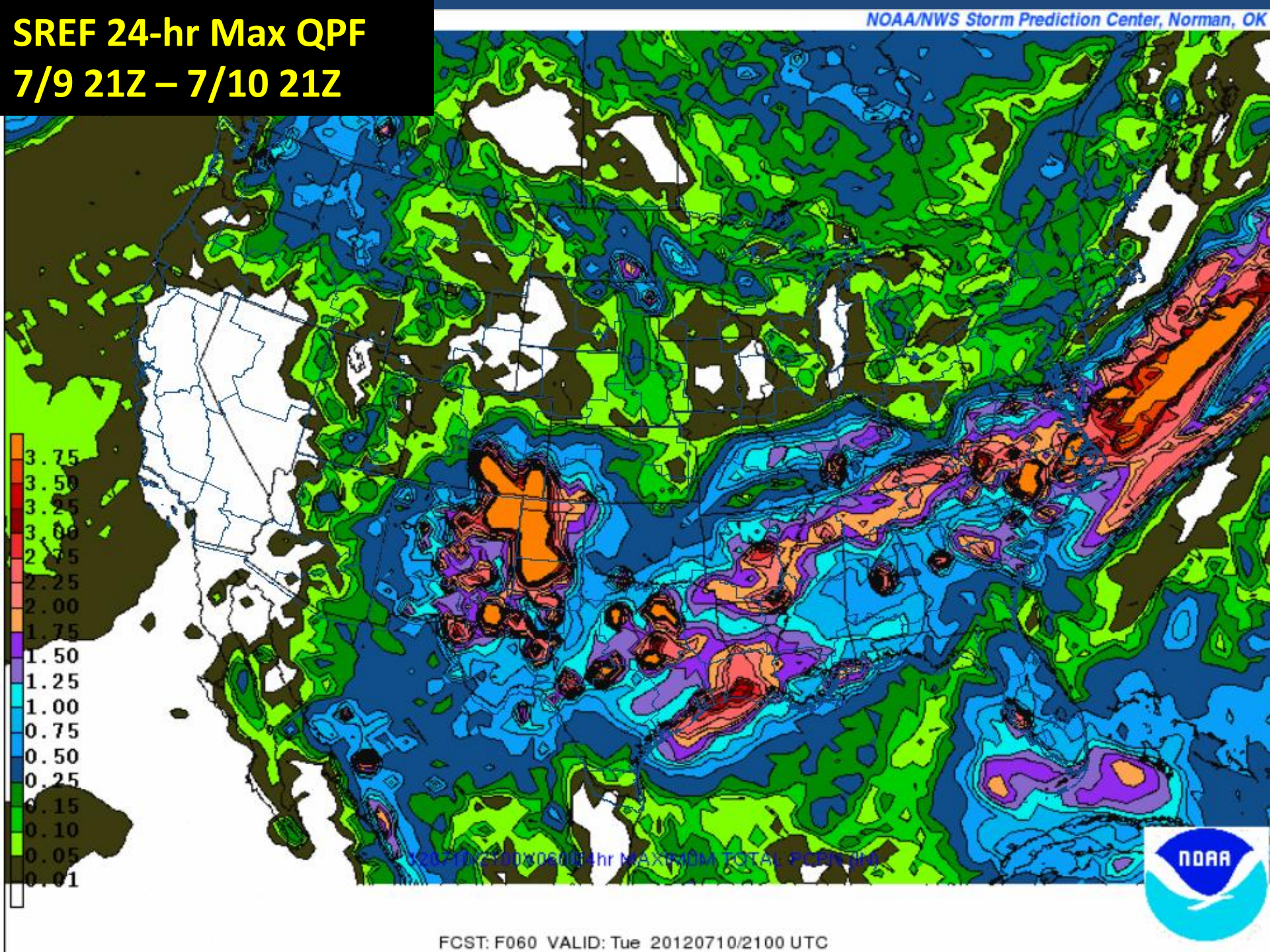


Precipitation was not expected to be as widespread or as heavy on Sunday (7/8) as compared to what was forecast to occur Monday-Tuesday morning. This led to high confidence that widespread, heavy rain would be likely during the Monday-Tuesday morning time period.

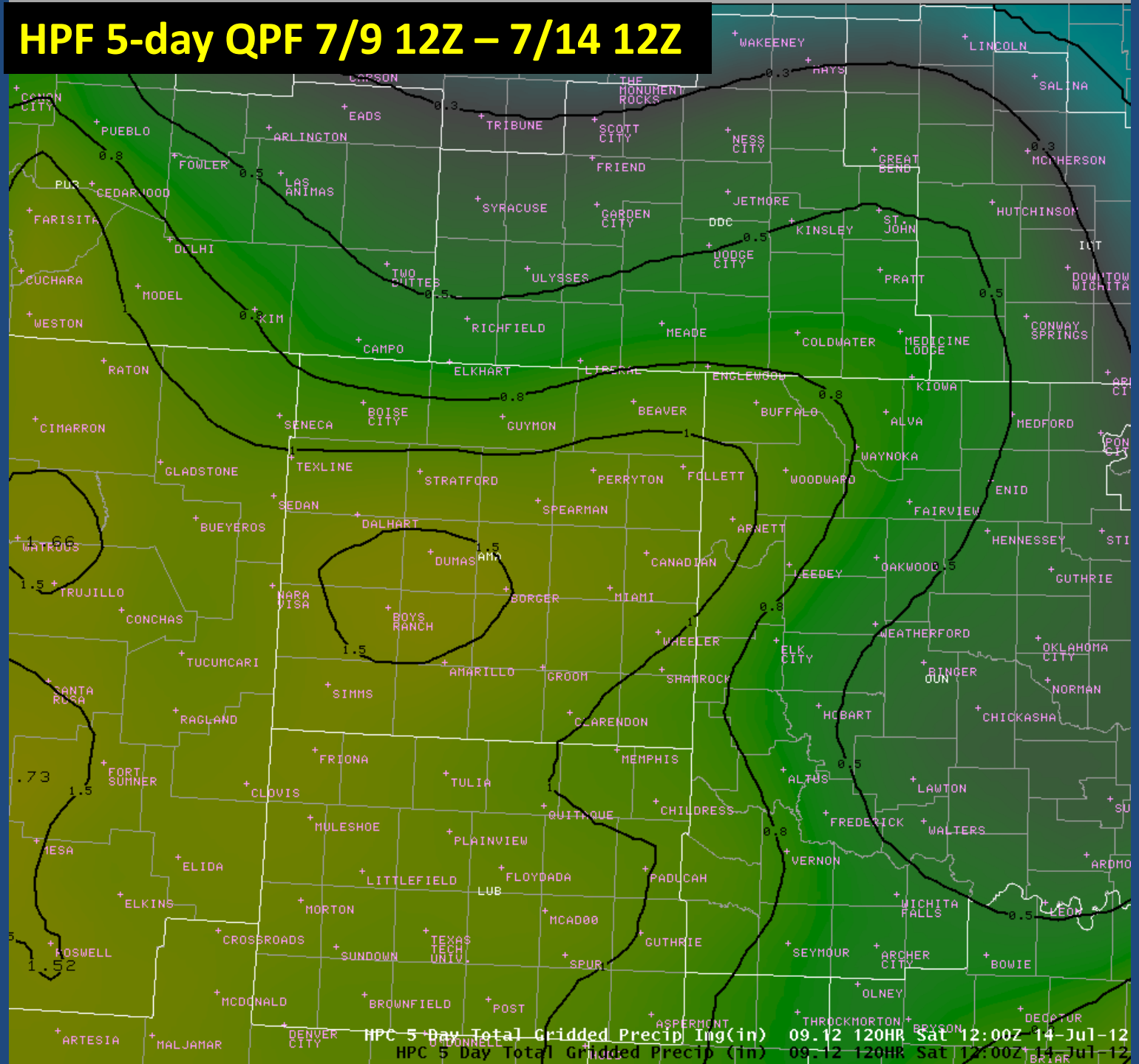

NAM
60-hr QPF
Valid 12Z July 9-
00Z July 12
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.50
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.10
0.01


GFS
60-hr QPF
Valid 12Z July 9-
00Z July 12
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.50
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.10
0.01

SREF 24-hr Max QPF
7/9 21Z – 7/10 21Z



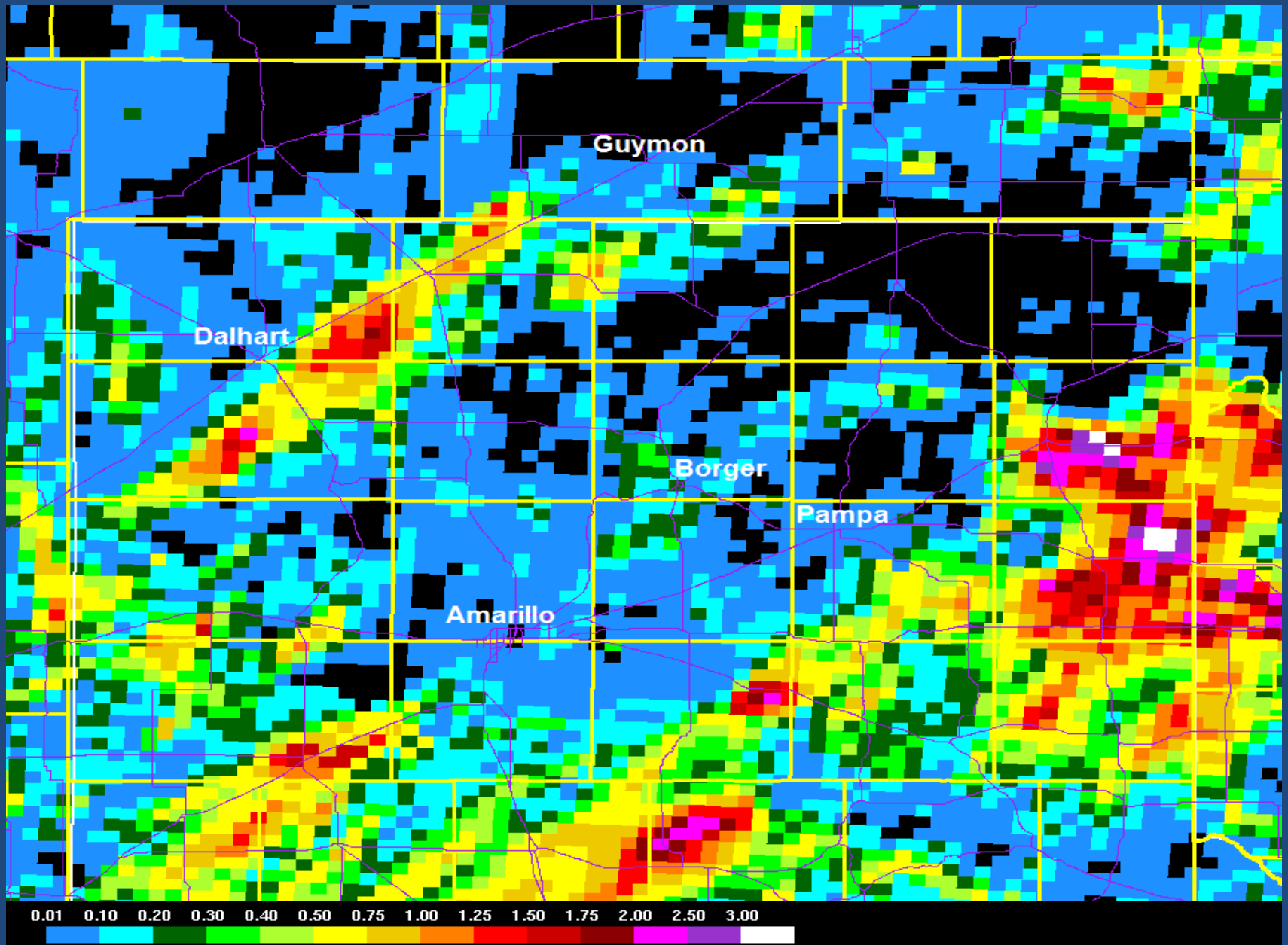
HPF 5-day QPF 7/9 12Z – 7/14 12Z

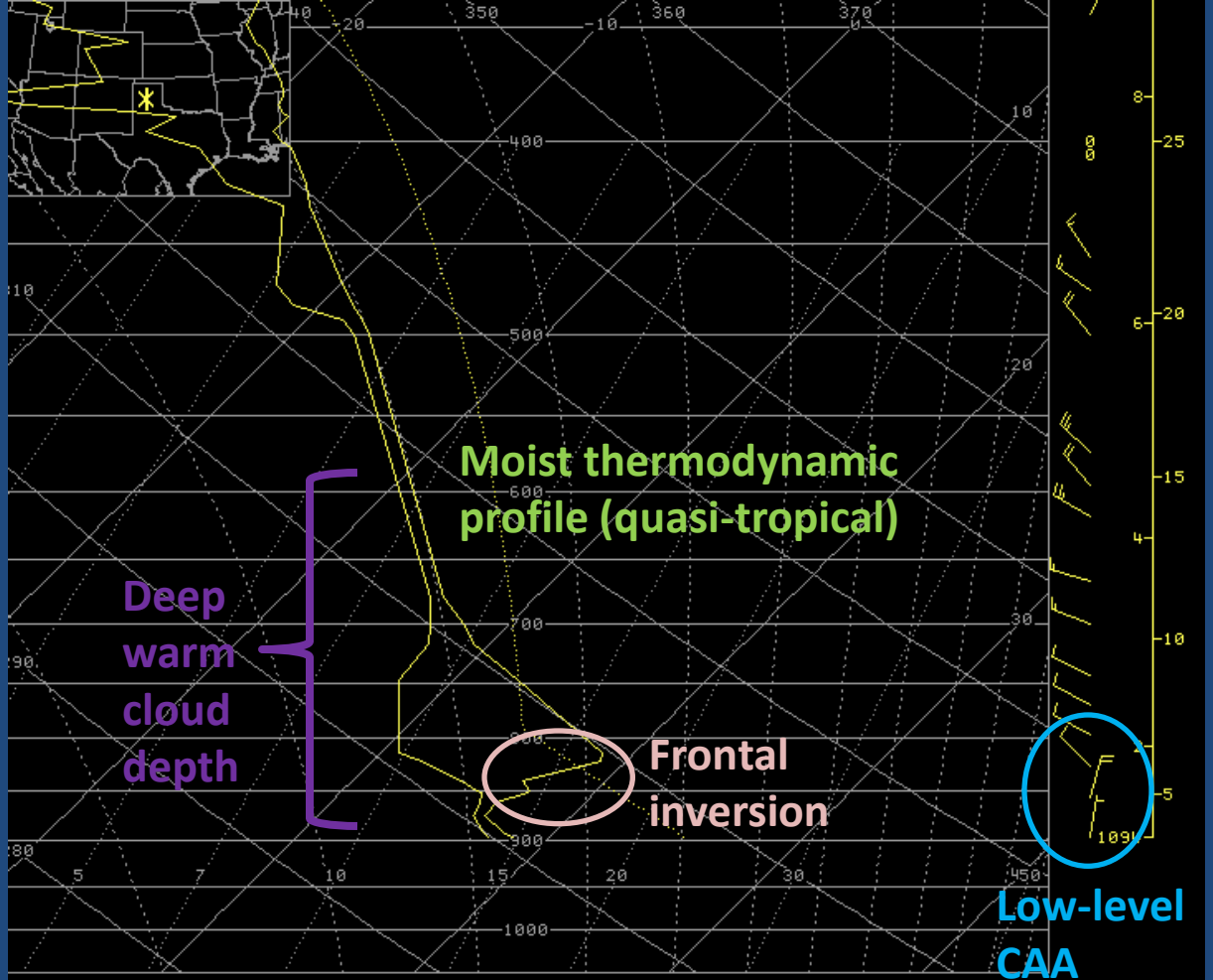


What Happened?

- **The coverage of precipitation wasn't as widespread as model guidance suggested.**
- **Many areas saw precipitation, but the heavy precipitation was isolated.**

36-hr Precipitation 7/9 12Z-7/11 00Z

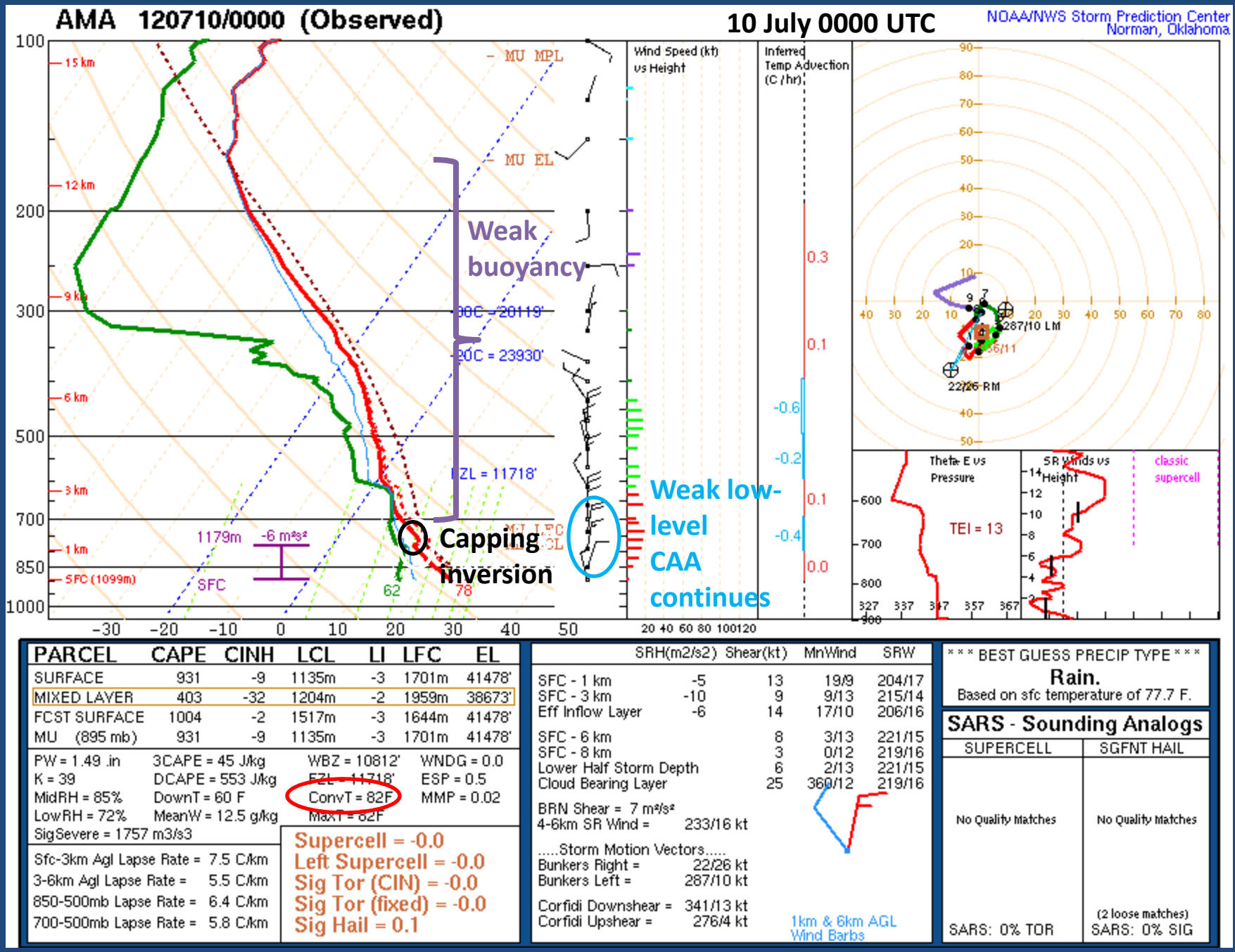




KAMA Skewt Mon 12:00Z 09-Jul-12

PRECIP WATER= 1.52 in
K-INDEX= 34
TOTALS INDEX= 42
SWEAT INDEX= 161
DRY MICROBURST POT=2: GST < 30 kts
FREEZING LEVEL= 15169 ft ASL
WET-BULB ZERO HGT= 14954 ft ASL
0-6 KM AVG WIND= 313°/14 kts
0-6 KM STM MTN (30R75)= 343°/10 kts
0-3 KM STM REL HELICITY= 22 m^2/s^2
FORECAST MAX TEMP= 77°F
TRIGGER TEMP= 27°C/81°F
SOARING INDEX=NA
MDPI/WINDEX = 0.17/0

* -PARCEL- T=FCST MAX; Td=50 mb MEAN
* MOD PARCEL P= 897 mb
* MOD PARCEL T/Td= 77/61° F; 25/16° C
* CONVECTIVE TEMP= 82° F
* LIFTED INDEX= -3.3
* CCL= 8119 ft ASL/ 763 mb
* LCL= 7135 ft ASL/ 790 mb
* LFC= 8735 ft ASL/ 746 mb
* MAX HAILSIZE= 8.4 cm/3.3 in
* MAX VERTICAL VELOCITY= 42 m/s
* EQUIL LEVEL= 43552 ft ASL/174 mb
* APPROX CLOUD TP= 54461 ft ASL
* POSITIVE ENERGY ABV LFC= 1247 J/KG
* NEGATIVE ENERGY BLW LFC= -36 J/KG
* BULK RICHARDSON NUMBER= 48.7



PARCEL	CAPE	CINH	LCL	LI	LFC	EL
SURFACE	931	-9	1135m	-3	1701m	41478'
MIXED LAYER	403	-32	1204m	-2	1959m	38673'
FCST SURFACE	1004	-2	1517m	-3	1644m	41478'
MU (895 mb)	931	-9	1135m	-3	1701m	41478'

PW = 1.49 in	3CAPE = 45 J/kg	WBZ = 10812'	WNDG = 0.0
K = 39	DCAPE = 553 J/kg	FZL = 11718'	ESP = 0.5
MidRH = 85%	DownT = 60 F	ConvT = 82F	MMP = 0.02
LowRH = 72%	MeanW = 12.5 g/kg	MaxT = 82F	
SigSevere = 1757 m3/s3			

Sfc-3km AgI Lapse Rate =	7.5 C/km
3-6km AgI Lapse Rate =	5.5 C/km
850-500mb Lapse Rate =	6.4 C/km
700-500mb Lapse Rate =	5.8 C/km

Supercell = -0.0
Left Supercell = -0.0
Sig Tor (CIN) = -0.0
Sig Tor (fixed) = -0.0
Sig Hail = 0.1

	SRH(m2/s2)	Shear(kt)	MnWind	SRW
SFC - 1 km	-5	13	19/9	204/17
SFC - 3 km	-10	9	9/13	215/14
Eff Inflow Layer	-6	14	17/10	206/16
SFC - 6 km		8	3/13	221/15
SFC - 8 km		3	0/12	219/16
Lower Half Storm Depth		6	2/13	221/15
Cloud Bearing Layer		25	360/12	219/16

BRN Shear = 7 m²/s²
4-6km SR Wind = 233/16 kt

.....Storm Motion Vectors.....
Bunkers Right = 22/26 kt
Bunkers Left = 287/10 kt

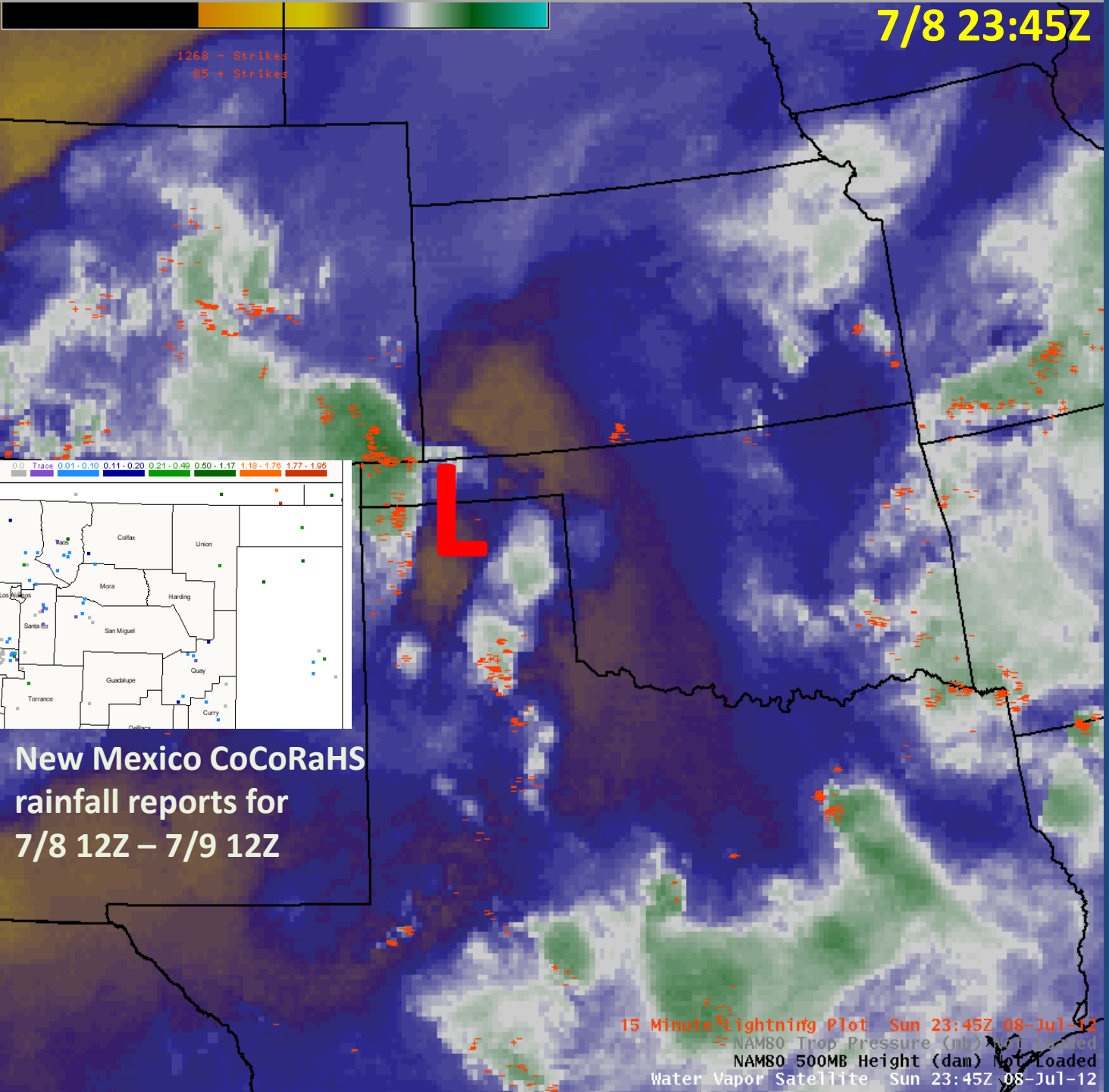
Corfidi Downshear = 341/13 kt
Corfidi Upshear = 276/4 kt

1km & 6km AGL Wind Barbs

*** BEST GUESS PRECIP TYPE ***
Rain.
Based on sfc temperature of 77.7 F.

SARS - Sounding Analogs

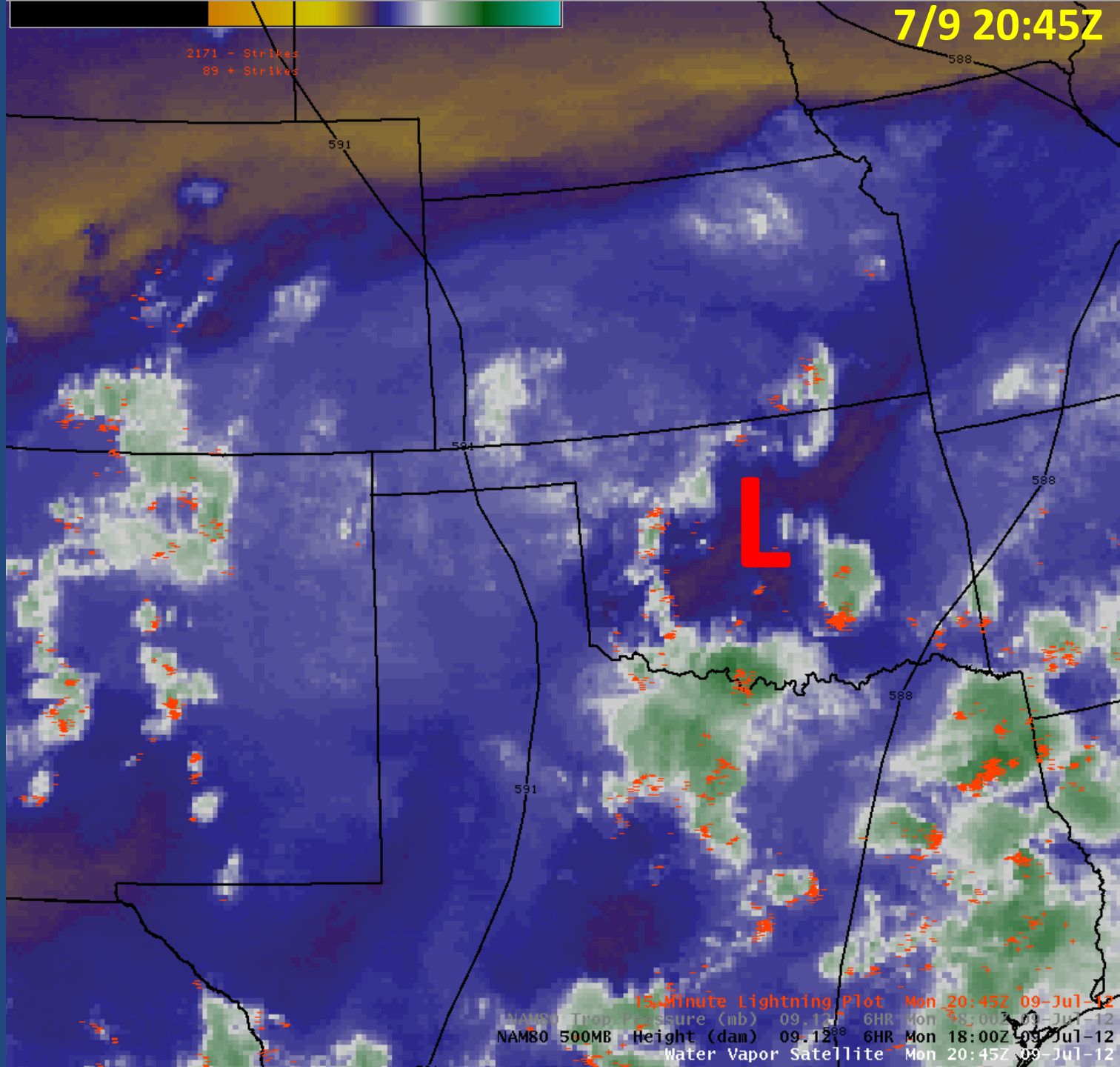
SUPERCELL	SGFNT HAIL
No Quality Matches	No Quality Matches
SARS: 0% TOR	(2 loose matches) SARS: 0% SIG

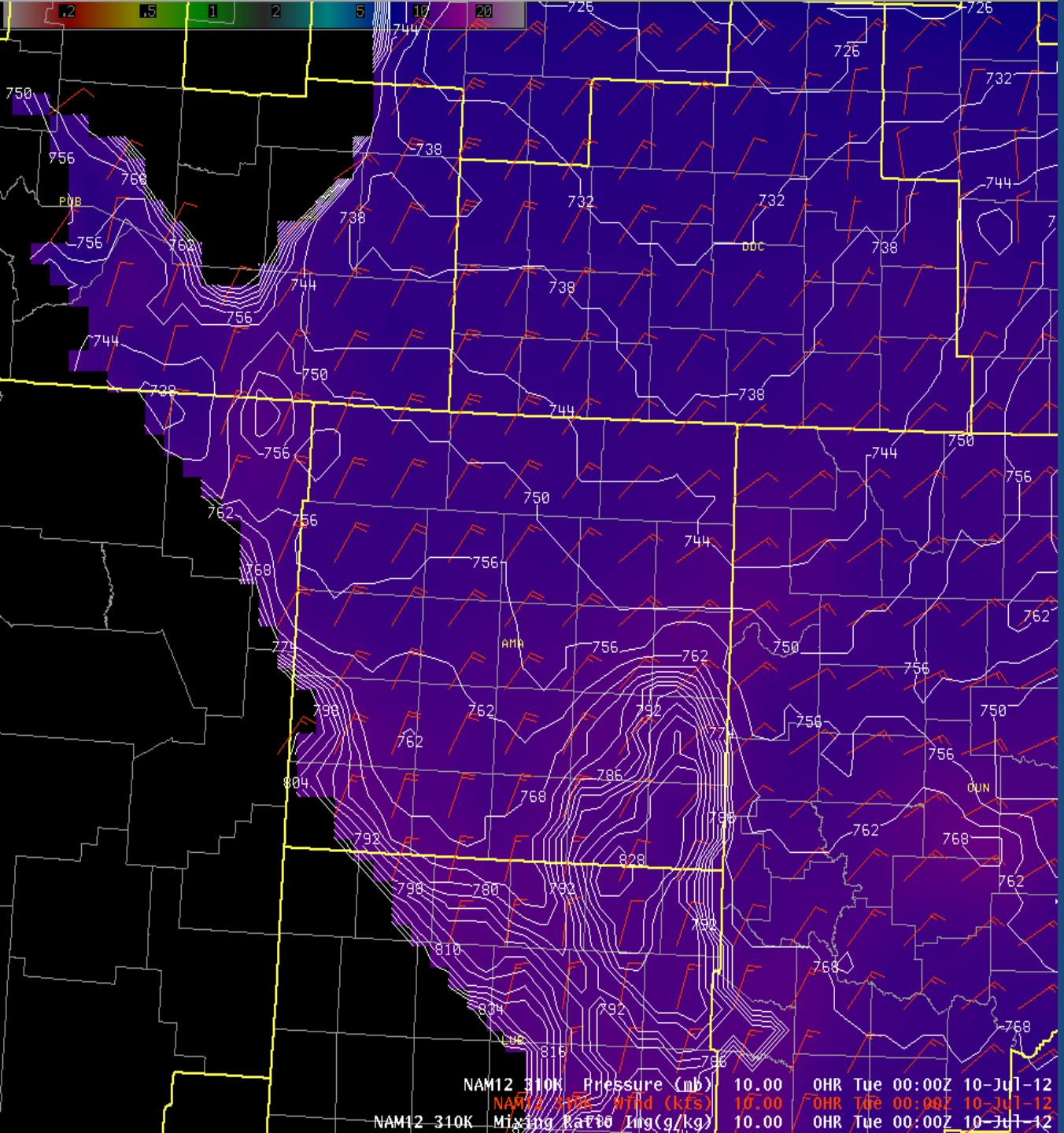


New Mexico CoCoRaHS rainfall reports for 7/8 12Z – 7/9 12Z

A mesoscale upper-level low went undetected by NWP guidance. This feature was responsible for initiating deep moist convection Sunday afternoon and evening. Limited coverage of precipitation was noted farther west across Northeast New Mexico.

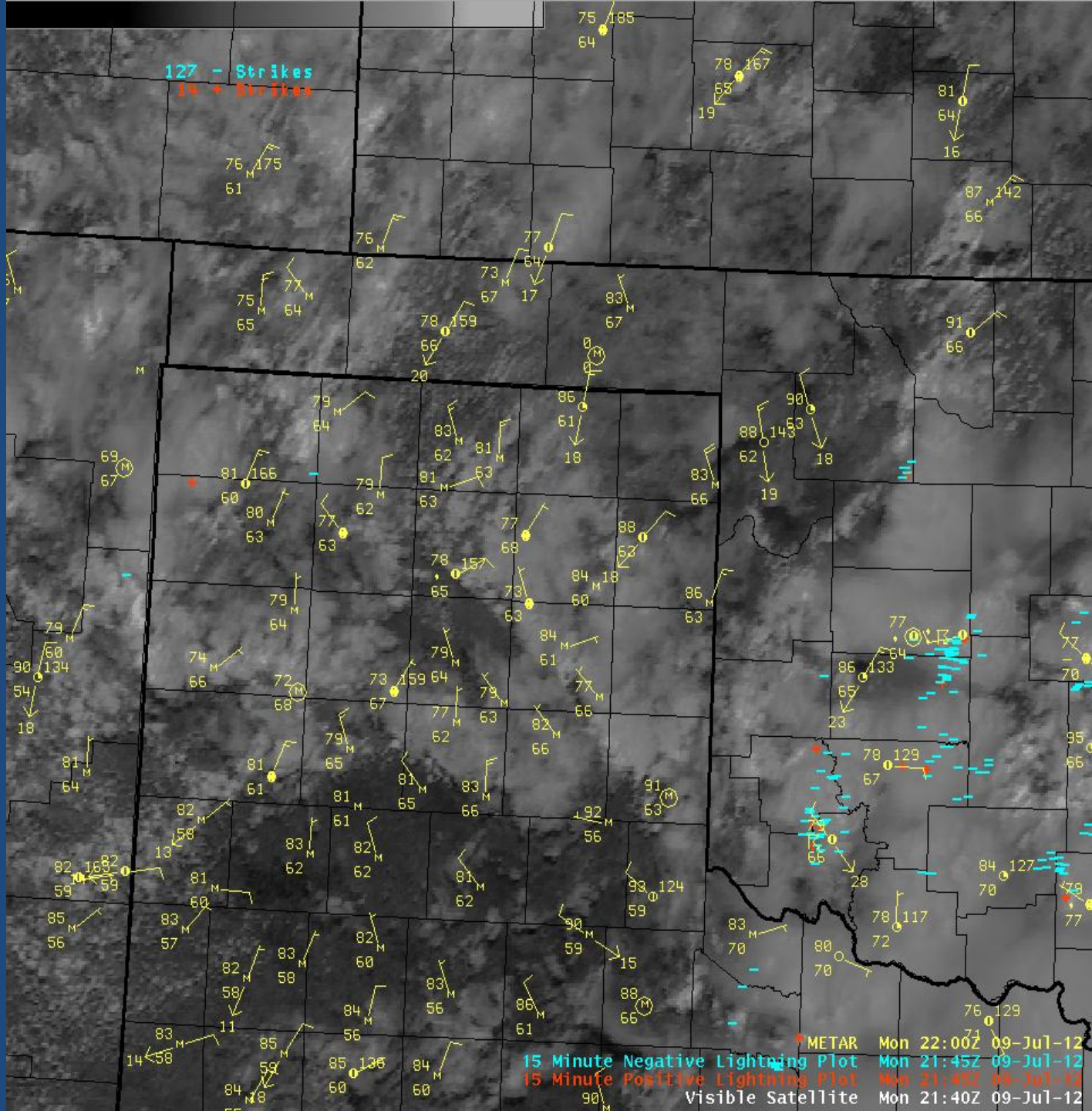
The upper-level low was located over Central Oklahoma Monday afternoon with widespread coverage of showers and thunderstorms across much of Oklahoma. Meanwhile, the Panhandles were influenced by mid-level subsidence on the far western side of the upper-level low.

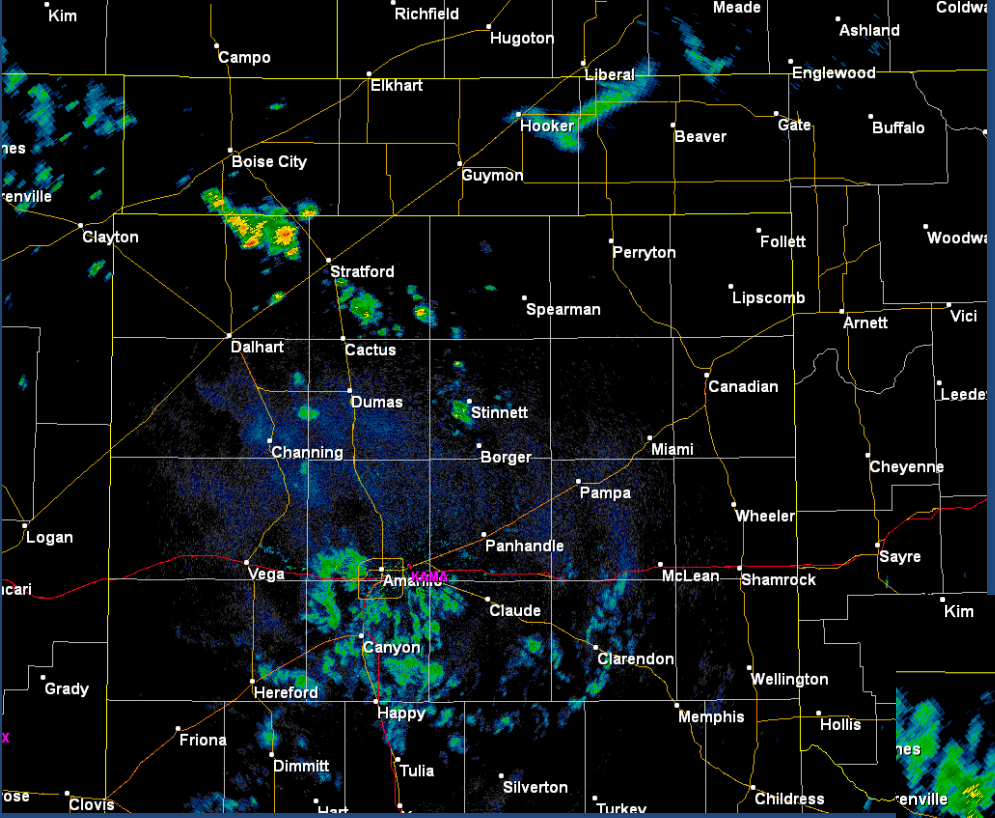




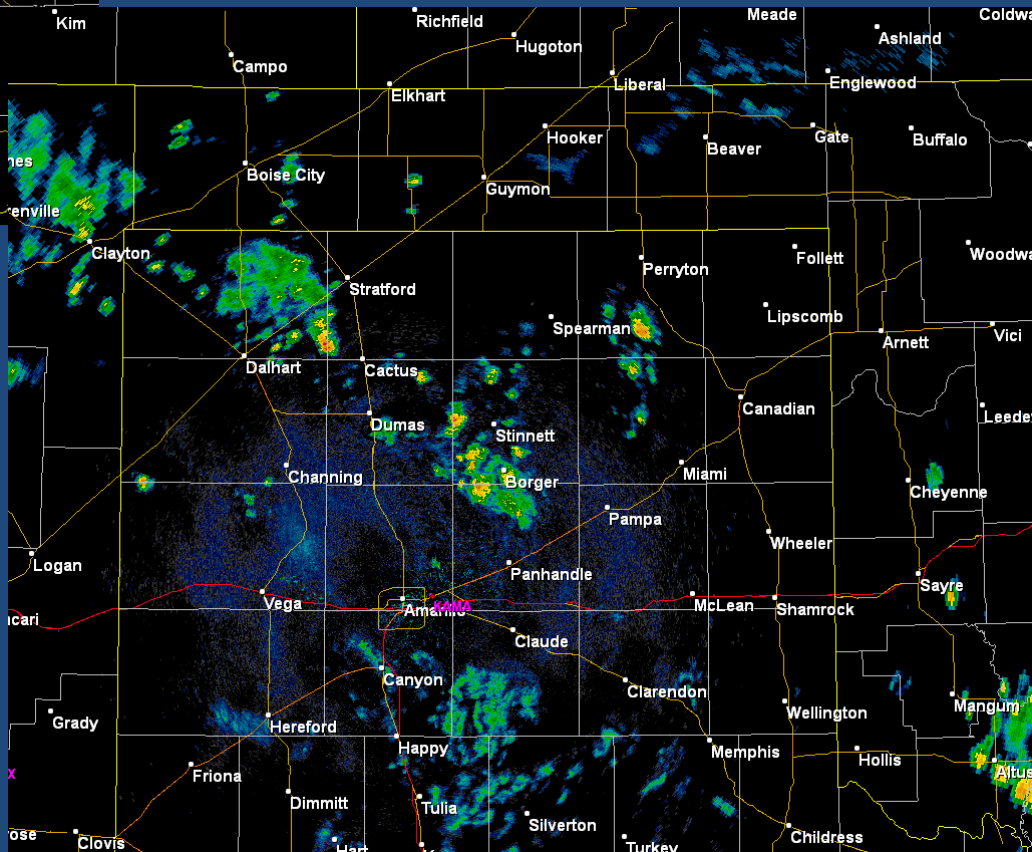
Isentropic descent was occurring across all of the Texas and Oklahoma Panhandles Monday afternoon and evening.

Extensive low and mid-level clouds hindered temperatures from reaching convective temps (81-82° F). Showers and thunderstorms developed where breaks in the clouds allowed more diabatic heating. Due to limited heating and weak mid-level lapse rates, only a weakly buoyant environment was present.

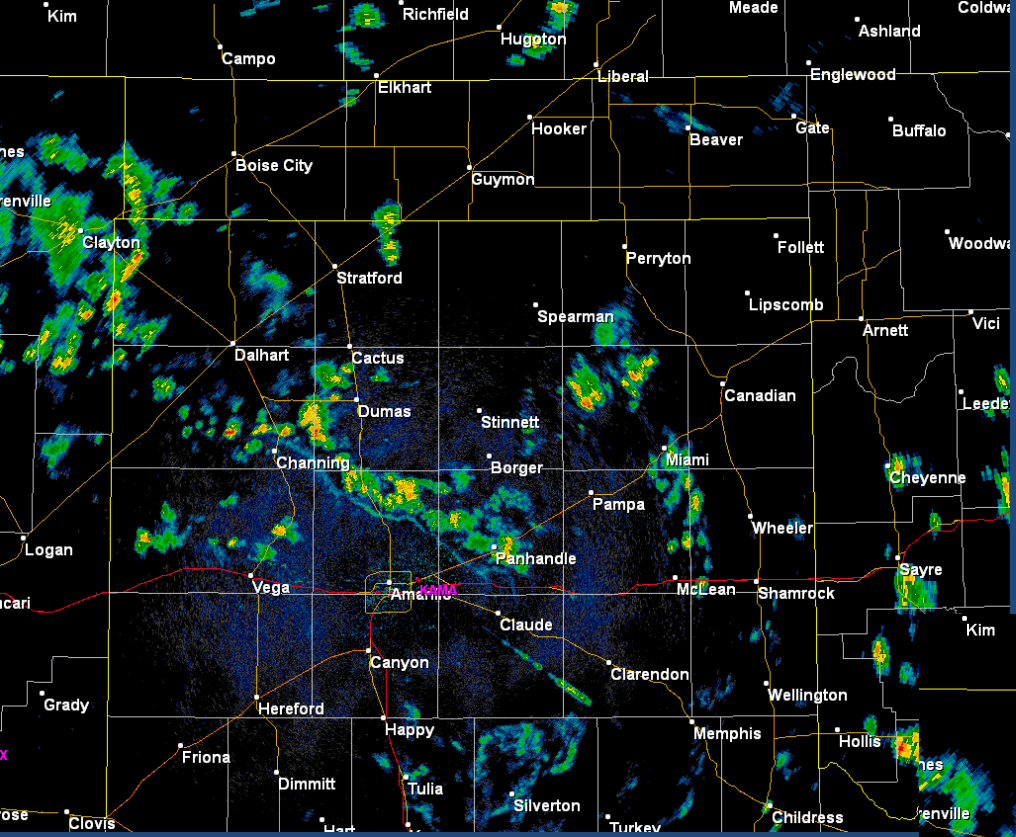




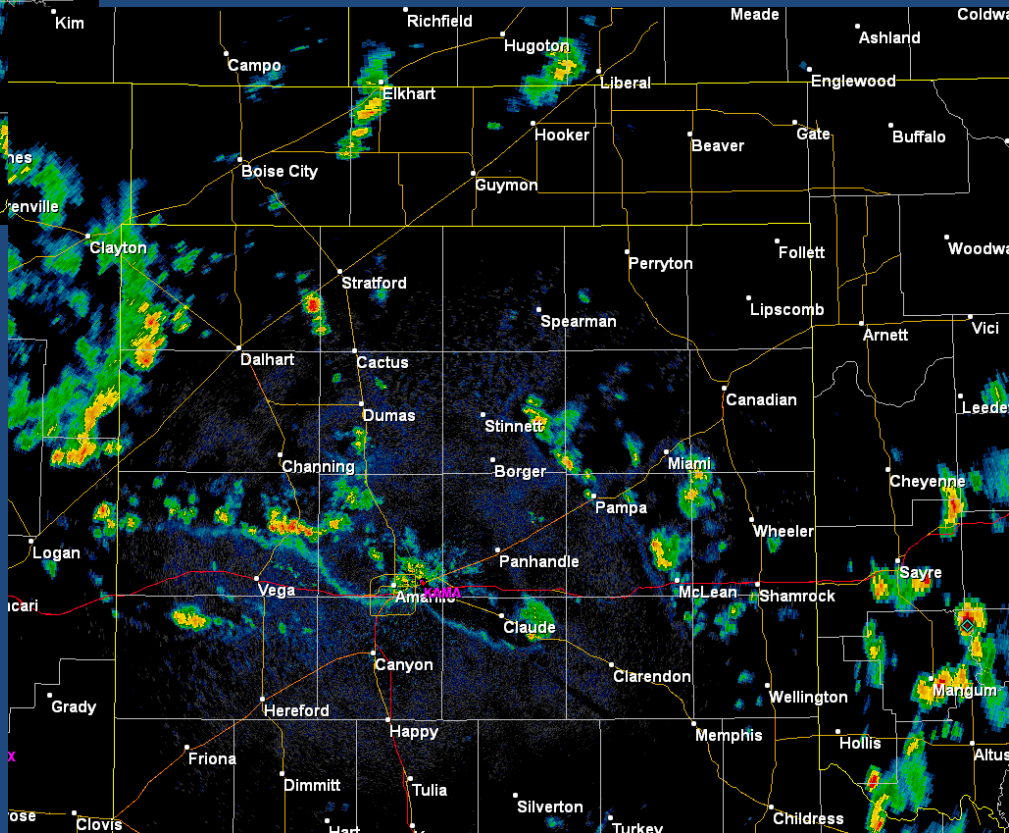
7/9 1800Z 0.5 deg KAMA Base Reflectivity



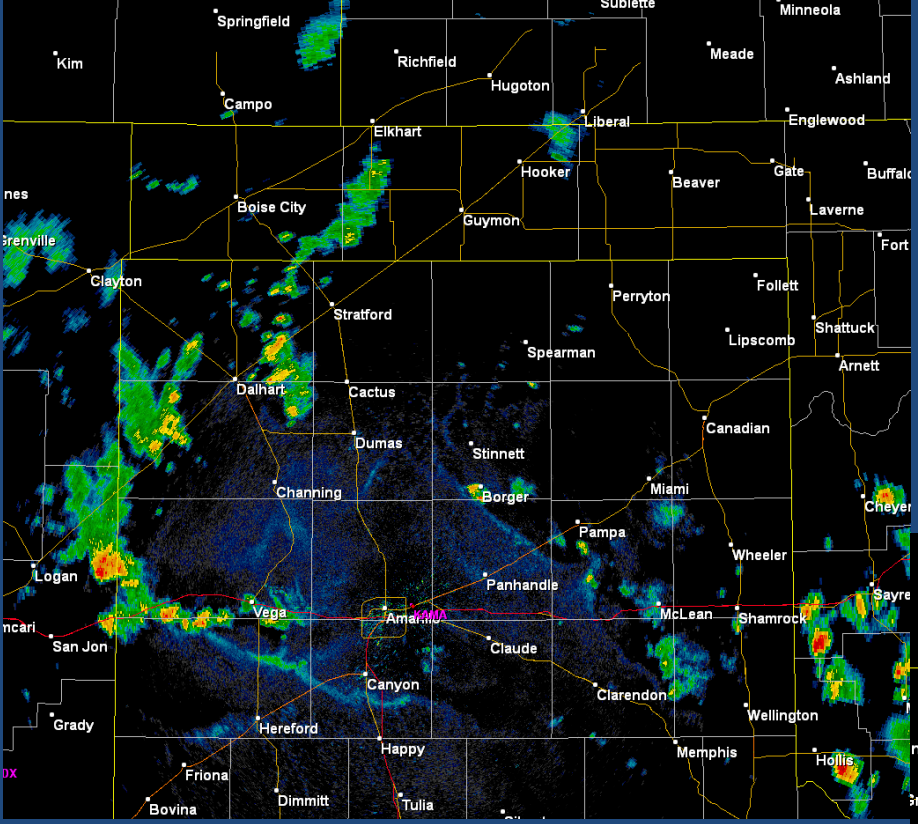
7/9 1859Z 0.5 deg KAMA Base Reflectivity



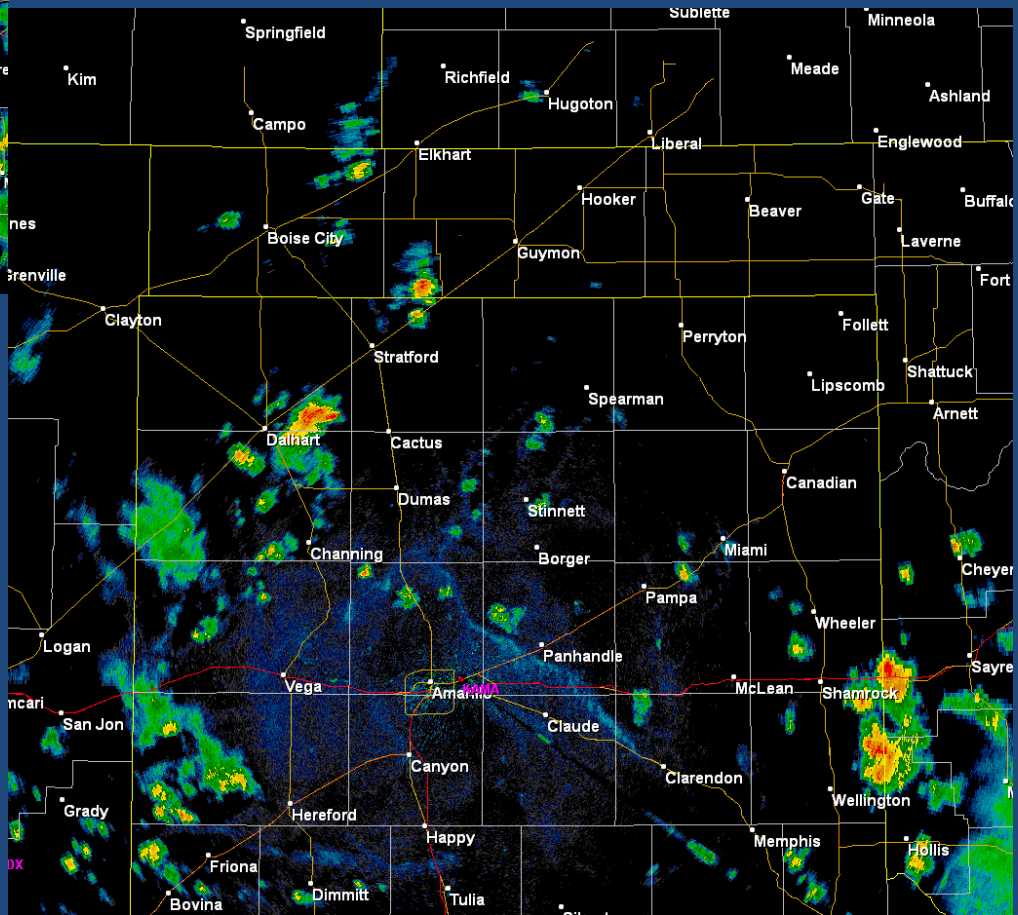
7/9 2000Z 0.5 deg KAMA Base Reflectivity



7/9 2101Z 0.5 deg KAMA Base Reflectivity



7/9 2200Z 0.5 deg KAMA Base Reflectivity



7/9 2302Z 0.5 deg KAMA Base Reflectivity

Verification

Amarillo MET/MAV 12-hr POP

	MET	7/9 835Z CCF	Precip	Beat Guidance
7/9 00Z Run **9/12Z-10/00Z**	43%	50%	0.15”	Yes
7/9 12Z Run **10/00Z-10/12Z**	70%	100%	0.01”	Yes
7/9 12Z Run **10/12Z-11/00Z**	55%	80%	Trace	No

	MAV	7/9 835Z CCF	Precip	Beat Guidance
7/9 00Z Run **9/12Z-10/00Z**	59%	50%	0.15”	No
7/9 12Z Run **10/00Z-10/12Z**	73%	100%	0.01”	Yes
7/9 12Z Run **10/12Z-11/00Z**	57%	80%	Trace	No

Borger MET/MAV 12-hr POP

	MET	7/9 835Z CCF	Precip	Beat Guidance
7/9 00Z Run **9/12Z-10/00Z**	52%	70%	0.20”	Yes
7/9 12Z Run **10/00Z-10/12Z**	72%	80%	0.00”	No
7/9 12Z Run **10/12Z-11/00Z**	53%	50%	0.00”	Yes

	MAV	7/9 835Z CCF	Precip	Beat Guidance
7/9 00Z Run **9/12Z-10/00Z**	57%	70%	0.20”	Yes
7/9 12Z Run **10/00Z-10/12Z**	72%	80%	0.00”	No
7/9 12Z Run **10/12Z-11/00Z**	51%	50%	0.00”	Yes

Dalhart MET/MAV 12-hr POP

	MET	7/9 835Z CCF	Precip	Beat Guidance
7/9 00Z Run **9/12Z-10/00Z**	45%	80%	0.04”	Yes
7/9 12Z Run **10/00Z-10/12Z**	72%	100%	Trace	No
7/9 12Z Run **10/12Z-11/00Z**	58%	70%	Trace	No

	MAV	7/9 835Z CCF	Precip	Beat Guidance
7/9 00Z Run **9/12Z-10/00Z**	74%	80%	0.04”	Yes
7/9 12Z Run **10/00Z-10/12Z**	71%	100%	Trace	No
7/9 12Z Run **10/12Z-11/00Z**	50%	70%	Trace	No

Guymon MET/MAV 12-hr POP

	MET	7/9 835Z CCF	Precip	Beat Guidance
7/9 00Z Run **9/12Z-10/00Z**	58%	80%	0.00”	No
7/9 12Z Run **10/00Z-10/12Z**	72%	60%	Trace	Yes
7/9 12Z Run **10/12Z-11/00Z**	47%	40%	0.00”	Yes

	MAV	7/9 835Z CCF	Precip	Beat Guidance
7/9 00Z Run **9/12Z-10/00Z**	58%	80%	0.00”	No
7/9 12Z Run **10/00Z-10/12Z**	67%	60%	Trace	Yes
7/9 12Z Run **10/12Z-11/00Z**	37%	40%	0.00”	No

Pampa MET/MAV 12-hr POP

	MET	7/9 835Z CCF	Precip	Beat Guidance
7/9 00Z Run **9/12Z-10/00Z**	37%	70%	0.00”	No
7/9 12Z Run **10/00Z-10/12Z**	63%	80%	0.04”	Yes
7/9 12Z Run **10/12Z-11/00Z**	53%	50%	0.00”	Yes

	MAV	7/9 835Z CCF	Precip	Beat Guidance
7/9 00Z Run **9/12Z-10/00Z**	51%	70%	0.00”	No
7/9 12Z Run **10/00Z-10/12Z**	75%	80%	0.04”	Yes
7/9 12Z Run **10/12Z-11/00Z**	51%	50%	0.00”	Yes

Results

- It is speculated that the scattered coverage of the showers and thunderstorms from Monday through early Tuesday afternoon was the result of:
  - Lack of upper forcing for ascent, mid-level subsidence, isentropic descent, and low-level CAA.
  - Low/mid-level clouds prevented many areas from reaching convective temps and only resulted in a weakly buoyant environment.

Lessons Learned & Observations

- It is uncommon in this area to get widespread coverage of precipitation due primarily to diabatic heating. Large scale dynamic sinking motion also prevented widespread coverage.
- Very little CG lightning was noted with the showers and storms.
- The quasi-tropical thermodynamic environment resulted in highly efficient precipitation producers.