CHAPTER 3

STORM DESCRIPTION

The rainfall which drenched a large portion of northeastern Oklahoma and southeastern Kansas from 29 September to 4 October 1986 was the result of a storm caused by the combination of **three** meteorological events (see **Figure 3-1**).

1. There was a high-pressure system over the southeastern United States. The clockwise circulation around this high pressure system provided an abundant supply of warm, moist air from the Gulf of Mexico which served as a blocking mechanism to prevent movement of the storm.

2. A strong, upper-level low pressure system was situated over the southwestern United States. The counter-clockwise winds of the low pressure system picked up remnants of Hurricane Paine which had formed earlier off the western coast of Mexico.

3. A jet stream, with winds in excess of 100 miles per hour, blew from southwest to northeast across Oklahoma. This jet stream provided the "steering mechanism" for moisture from the low and high pressure systems to meet in Oklahoma and Kansas.

NATIONAL WEATHER SERVICE SUMMARY OF THE STORM

The National Weather Service office in Tulsa, Oklahoma summarized the meteorological events for the flood of September-October 1986 as follows:

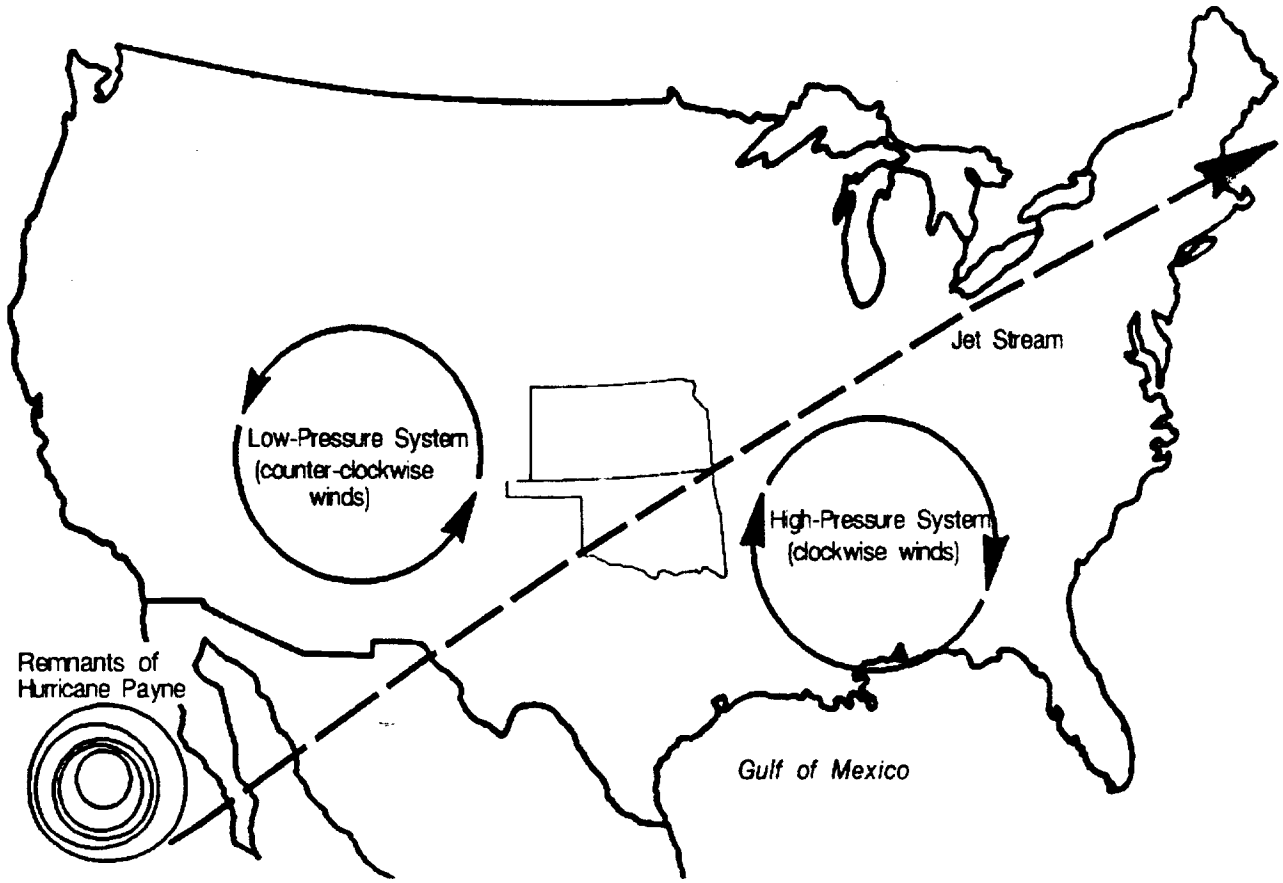

Figure 3-1 **STORM SYSTEM**

HEAVY RAINS - 29 SEPTEMBER THROUGH 4 OCTOBER 1986

...Introduction

A major heavy rain period and resulting floods affected a large part of Oklahoma during a 6-day period from 29 September through 4 October 1986. About 20 to 25 inches of rain fell on some sections of northeast Oklahoma in this time period. The large volume of water was more than half the rainfall expected in northeast Oklahoma during a full year. In part of north-central Oklahoma the rainfall exceeded the average rainfall for the whole year. About half of the rainfall (8 to 10 inches) occurred from 7 p.m. Thursday (2 October) to 7 a.m. Friday (3 October).

...The Floods Begin

A series of short-term heavy rains triggered scattered flash floods early Monday morning (29 September), and in less than 24 hours another round of heavy rains caused additional flash flooding in parts of northeast Oklahoma. Small scale upper storms continued daily until 1 October. Flash flooding was occurring in many counties in central and northeast Oklahoma, and most counties were completely saturated by late Wednesday (1 October).

...The Hurricane

The final blow to the flood of September-October 1986 started off the coast of Mexico in the form of Hurricane Paine. Moving slowly to the north, Hurricane Paine was being picked up by the strong, upper wind system flowing from southwest to northeast on course for Oklahoma. As most people are aware, tropical storms are noted for their ability to carry large amounts of moisture...the fuel that keeps them going. This was the same in the case of Hurricane Paine. The moisture was heading for Oklahoma. During the morning

hours of Thursday, 2 October 1986, it looked like a history-making event was about to occur for parts of Oklahoma.

...The Weather Features

1. A large, nearly stationary high pressure system was over the southeast United States. The flow around this blocking system kept a supply of warm, moisture-laden air pumping into Oklahoma from the Gulf of Mexico.

2. A strong slow-moving, upper-level storm system was in the western United States. A zone of high speed winds was between the storm system in the west and the high pressure in the southeast part of the United States. This jet stream was over part of Oklahoma.

3. A frontal system was nearly stationary from the Great Lakes southwest across Kansas into north central Oklahoma.

4. Hurricane Paine was off the Mexican coast.

...The Main Event

The remains of Hurricane Paine moved progressively faster to the north and northeast on 1 and 2 October. Helped by the strong upper winds, the moisture from Hurricane Paine flowed into Oklahoma, combined with the frontal system in Oklahoma, and moved across the saturated counties in north central Oklahoma and south central Kansas.

RAINFALL DATA

Some of the heavier daily rainfall totals for the period are shown on **Table 3-1**. This table also shows 6-day record rainfall for these stations. An isohyetal rainfall map with the total rainfall is shown in **Figure 3-2**.

TABLE 3-1

RAINFALL TOTALS AT SELECTED LOCATIONS

Station Name	24-Hour Rainfall (inches) *							Previous 6-Day Record Rainfall**
	29 Sep	30 Sep	1 Oct	2 Oct	3 Oct	4 Oct	6-Day Total	
Cedar Vale, KS	4.10	4.75	3.00	4.00	6.82	--	**22.67**	9.38 May 1961
Newkirk, OK	4.81	3.22	3.42	4.00	5.50	.50	**21.45**	9.29 Jan 1961
Fort Scott, KS	2.50	4.08	0.85	2.19	8.60	2.75	**20.97**	9.97 Jul 1958
Sedan, KS	2.72	6.68	1.21	0.03	8.74	0.77	**20.15**	8.42 Oct 1983
Elk City Lake, KS	2.06	5.98	2.66	0.02	8.10	1.15	**19.97**	11.14 Jun 1977
Ponca City, OK	5.76	2.71	0.35	4.06	6.58	0.20	**19.66**	7.73 Sep 1959
Elgin, KS	2.18	7.79	1.46	0.06	6.56	0.83	**18.88**	10.38 Oct 1984
Walnut, KS	1.60	4.82	2.24	0.15	7.56	1.82	**18.19**	9.74 Jun 1977
Redrock, OK	6.00	7.40	0.30	--	4.45	--	**18.15**	11.44 Jul 1959
Moran, KS	4.43	2.33	0.90	2.53	6.25	1.60	**18.04**	8.01 Jun 1977
Galesburg, KS	1.10	5.69	1.84	0.01	7.85	1.42	**17.91**	6.77 Oct 1981
Foraker, OK	3.14	7.34	0.55	0.10	6.30	--	**17.43**	10.25 Nov 1979
Enid, OK	2.50	4.00	0.63	0.01	9.06	1.02	**17.22**	15.73 Oct 1973
Billings, OK	3.15	4.33	T	T	7.88	1.33	**16.69**	9.17 Sep 1973
Wagoner, OK	T	6.48	7.41	2.71	--	--	**16.60**	10.34 Jul 1960

T = Trace

* Data published by the National Oceanic and Atmospheric Administration.
** Data furnished by Oklahoma Climatological Survey.

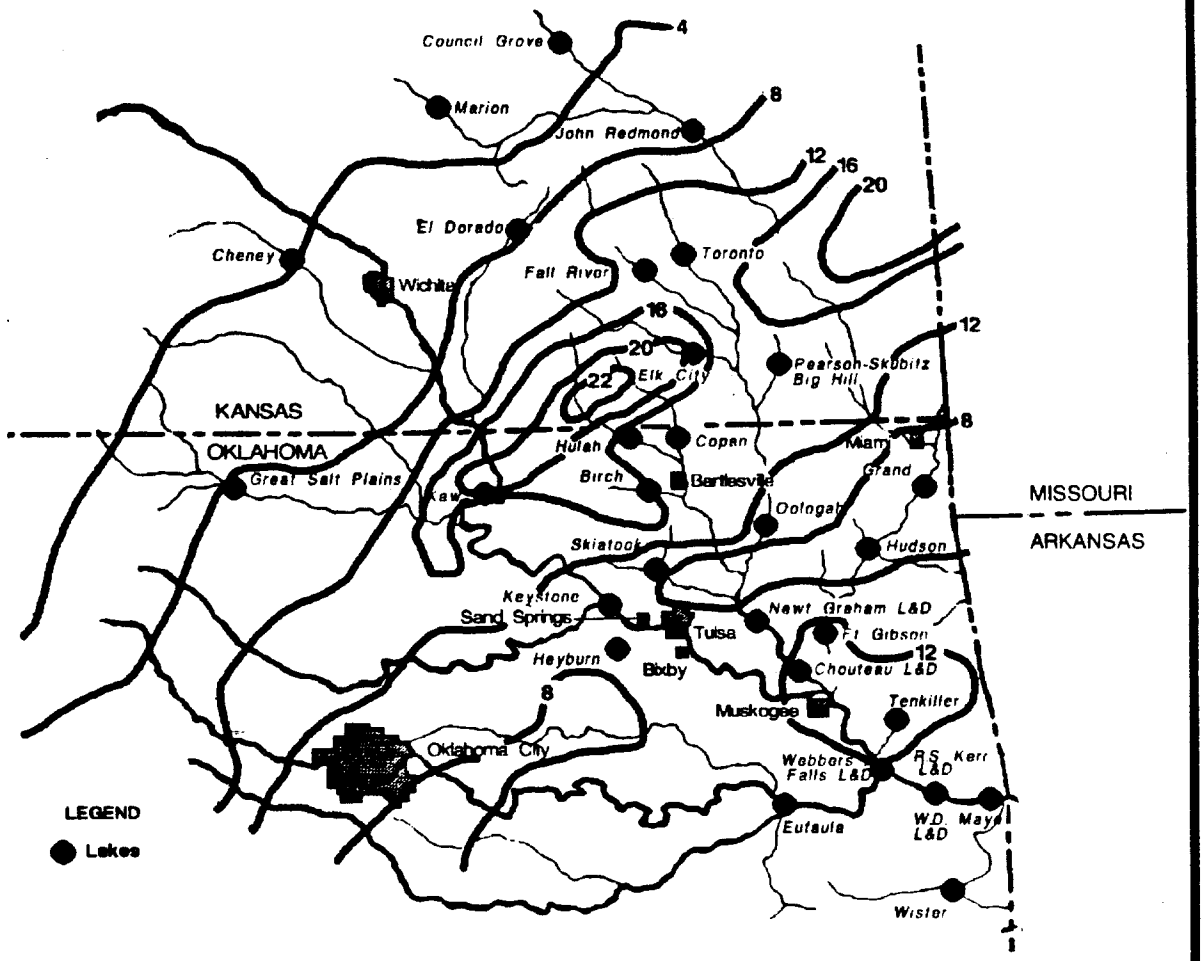

Figure 3-2 **Rainfall Totals in the Report Area**

29 September - 4 October 1986