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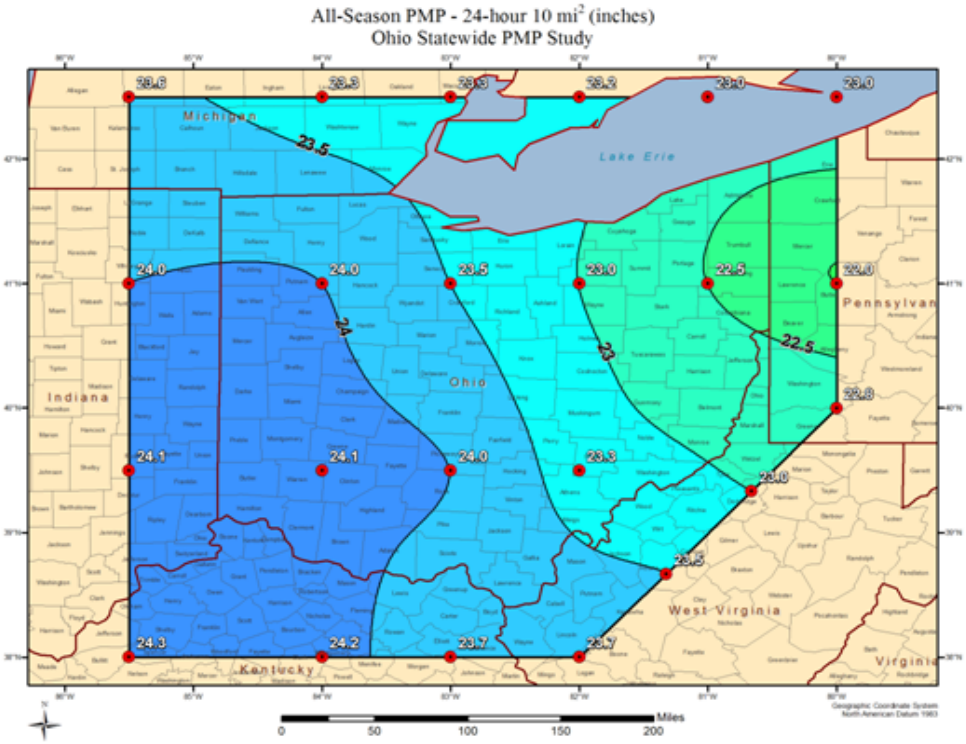
Probable Maximum Precipitation Study for the State of Ohio
Appendix F - Storm Analysis Data



Prepared for

Ohio Dept. of Natural Resources
2050 East Wheeling Ave
Cambridge, OH 43725

Prepared by

Applied Weather Associates, LLC
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April 2013

NOTICE

This report was prepared by Applied Weather Associates, LLC (AWA). The results and conclusions in this report are based upon our best professional judgment using currently available data. Therefore, neither AWA nor any person acting on behalf of AWA can (a) make any warranty, express or implied, regarding future use of any information or method shown in the report or (b) assume any future liability regarding use of any information or method contained in the report.

Storm files were made for forty-five storms comprising the short list of storms. Table F.1 displays the short storm list. Applied Weather Associates analyzed each of these storms to determine the storm representative dew point for in-place maximization. Each storm was then transpositioned to each of the grid points for which it was transpositionable. Seventeen of these storms were analyzed using SPAS, while storm analyses were performed for the other storms based on available data from previously published reports (HMR 51, USACE, and/or FERC Michigan/Wisconsin). The data used to analyze and develop the adjusted DAD table for each of these storms is included in this appendix (refer to the dew point climatology maps in Appendix A for data used in the maximization calculations) so that a user is able to understand how each of the storms was analyzed and replicate/reproduce the process if required. The storm analyses that follow display one example spreadsheet representing a specific grid point, although each storm was analyzed for each grid point as appropriate.

Table F.1 Ohio Statewide PMP Study Short Storm List (listed chronologically)

Storm Name	State	AWA Storm Number	Lat	Lon	Year	Month	Day	Max Rainfall	Precipitation Source
JEFFERSON	OH	1	40.8017	-82.0223	1878	9	10	15.00	OR 9-19
LARRABEE	IA	3	42.8608	-95.5453	1891	6	23	13.00	MR 4-2
GREELEY	NE	5	41.5500	-98.5333	1896	6	4	12.30	MR 4-3
WOODBURN	IA	9	41.0120	-93.5991	1903	8	24	15.50	MR 1-10
BONAPARTE	IA	10	40.7667	-91.7500	1905	6	10	12.10	UMV 2-5
MEEKER	OK	13	35.5034	-96.9028	1908	10	19	16.23	SW 1-11
BEAULIEU	MN	14	47.3000	-95.9000	1909	7	18	10.50	UMV 1-11A
IRONWOOD	MI	15	46.4500	-90.1833	1909	7	21	13.20	UMV 1-11B
COOPER	MI	18	42.3764	-85.6103	1914	8	31	12.60	GL 2-16
NEOSHO FALLS	KS	19	38.0820	-95.7010	1926	9	12	14.00	SW 2-1
BOYDEN	IA	20	43.1900	-96.0100	1926	9	17	24.00	MR 4-24
CHEYENNE	OK	25	35.6100	-99.6700	1934	4	3	23.00	SW 2-11
NEWCOMERSTOWN	OH	29	40.2723	-81.6060	1935	8	6	12.70	OR 9-11
GRANT TOWNSHIP	NE	30	42.2400	-96.5900	1940	6	3	13.00	MR 4-5
INDEX	AR	31	33.5471	-94.0419	1940	6	30	11.50	LMV 4-25
HALLETT	OK	32	36.2000	-96.6000	1940	9	2	24.00	SW 2-18
HAYWARD	WI	34	46.0130	-91.4846	1941	8	28	15.00	UMV 1-22
WARNER	OK	35	35.4900	-95.3100	1943	5	6	25.00	SW 2-20
MOUNDS	OK	37	35.8770	-96.0610	1943	5	16	17.00	SW 2-21
STANTON	NE	40	41.8670	-97.0500	1944	6	10	17.30	MR 6-15
COLE CAMP	MO	44	38.4600	-93.2027	1946	8	12	19.40	MR 7-2A
COLLINSVILLE	IL	45	38.6717	-89.9800	1946	8	12	18.70	MR 7-2B
HOLT	MO	47	39.4528	-94.3422	1947	6	18	17.60	MR 8-20
DUMONT	IA	57	42.7519	-92.9755	1951	6	25	12.00	UMV 3-29
COUNCIL GROVE	KS	58	38.6600	-96.4900	1951	7	9	18.50	MR 10-2
KELSO	MO	59	37.1906	-89.5495	1952	8	11	13.00	UMV 3-30
PARIS WATERWORK	IN	63	39.0500	-87.7000	1957	6	27	12.40	HMB-V18
IDA GROVE	IA	70	42.3167	-95.4667	1962	8	30	12.85	FERC MI/WI
COLLEGE HILL	OH	71	40.0854	-81.6479	1963	6	3	19.39	SPAS 1226
DAVID CITY	NE	72	41.2132	-97.0710	1963	6	24	15.98	SPAS 1030
EDGERTON	MO	75	40.4125	-95.5125	1965	7	18	20.76	SPAS 1183
WOOSTER	OH	78	40.9146	-81.9729	1969	7	4	14.95	SPAS 1209
ENID	OK	83	36.3805	-97.8683	1973	10	10	19.45	SPAS 1034
LOUISVILLE	MS	88	33.1167	-89.0500	1979	4	12	22.07	SPAS 1227
CLYDE	TX	92	32.4790	-99.4790	1981	10	12	23.00	SPAS 1184
BIG FORK	AR	94	35.8708	-92.1208	1982	12	1	15.92	SPAS 1219
FOREST CITY	MN	96	45.2394	-94.5404	1983	6	20	17.00	SPAS 1035
BIG RAPIDS	MI	100	43.6125	-85.3125	1986	9	9	13.42	SPAS 1206
MINNEAPOLIS	MN	102	44.8890	-93.4021	1987	7	23	11.55	SPAS 1210
AURORA COLLEGE	IL	112	41.7500	-88.3333	1996	7	16	18.24	SPAS 1029
FALL RIVER	KS	120	37.6300	-96.0500	2007	6	30	25.50	SPAS 1228
HOKAH	MN	121	43.8125	-91.3625	2007	8	18	18.32	SPAS 1048
DOUGLASVILLE	GA	125	33.8700	-84.7600	2009	9	19	25.37	SPAS 1218
WARNER PARK	TN	126	36.0611	-86.9056	2010	4	30	19.71	SPAS 1208
DUBUQUE	IA	127	42.4400	90.7500	2011	7	27	15.14	SPAS 1220

Table of Contents (listed chronologically)

Jefferson, OH September 10, 1878
Transpositioned Grid Points: 12-23
Storm Type: Synoptic

Storm Name:	**Jefferson, OH OR 9-19**
Storm Date:	**9/10/1878**
AWA Analysis Date:	**4/12/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date **25-Aug**

	Lat	Long
Storm center location	**41.75 N**	**80.80 W**
Storm Rep Td location	**39.15 N**	**77.45 W**
Transposition Td location	**38.40 N**	**78.73 W**
Basin location	**41.00 N**	**82.00 W**

Moisture Inflow Direction:	**SE @ 250**	miles
Basin Elevation	**900**	feet
Storm Elevation	**950**	feet
Storm Duration	**24**	hours

The storm representative Td is	**73.0 F**	with total precipitable water above sea level of				**2.60**	inches.
The in-place maximum Td is	**76.0 F**	with total precipitable water above sea level of				**2.99**	inches.
The transpositioned maximum Td is	**76.5 F**	with total precipitable water above sea level of				**3.07**	inches.
The in-place storm elevation is	**950**	which subtracts	**0.220**	inches of precipitable water at		**73.0 F**	
The in-place storm elevation is	**950**	which subtracts	**0.245**	inches of precipitable water at		**76.0 F**	
The transposition storm elevation at	**900**	which subtracts	**0.240**	inches of precipitable water at		**76.5 F**	
The moisture inflow barrier height is	**900**	which subtracts	**0.240**	inches of precipitable water at		**76.5 F**	

The in-place maximization factor is	**1.15**
The transposition factor is	**1.03**
The elevation/barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.19**

Notes: DAD values taken from USACE OR 9-19. 2° added to the storm rep based on EPRI, Nebraska, and TRWD analyses to adjust 12-hr persisting Td to 24-hr average Td.

Observed Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**5.9**	**11.2**	**11.7**	**12.2**	**13.0**	**13.4**	**14.3**	**14.9**	**15.0**
100 sq miles	**5.8**	**10.9**	**11.6**	**12.1**	**12.7**	**13.2**	**14.1**	**14.6**	**14.7**
200 sq miles	**5.8**	**10.8**	**11.4**	**11.9**	**12.5**	**12.9**	**13.9**	**14.4**	**14.5**
500 sq miles	**5.6**	**10.5**	**11.1**	**11.5**	**12.2**	**12.6**	**13.4**	**13.9**	**14.0**
1000 sq miles	**5.3**	**10.1**	**10.6**	**11.0**	**11.7**	**12.1**	**12.9**	**13.4**	**13.5**
2000 sq miles	**4.9**	**9.4**	**10.0**	**10.4**	**11.1**	**11.5**	**12.1**	**12.6**	**12.7**
5000 sq miles	**4.1**	**8.0**	**8.8**	**9.2**	**9.9**	**10.3**	**10.9**	**11.3**	**11.3**
10000 sq miles	**3.5**	**6.8**	**7.5**	**8.1**	**8.8**	**9.0**	**9.7**	**9.9**	**10.0**
20000 sq miles	**2.8**	**5.4**	**6.1**	**6.7**	**7.2**	**7.5**	**8.1**	**8.4**	**8.4**

Adjusted Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**7.0**	**13.3**	**13.9**	**14.5**	**15.4**	**15.9**	**17.0**	**17.7**	**17.8**
100 sq miles	**6.9**	**12.9**	**13.8**	**14.4**	**15.1**	**15.7**	**16.7**	**17.3**	**17.4**
200 sq miles	**6.9**	**12.8**	**13.5**	**14.1**	**14.8**	**15.3**	**16.5**	**17.1**	**17.2**
500 sq miles	**6.6**	**12.5**	**13.2**	**13.7**	**14.5**	**15.0**	**15.9**	**16.5**	**16.6**
1000 sq miles	**6.3**	**12.0**	**12.6**	**13.1**	**13.9**	**14.4**	**15.3**	**15.9**	**16.0**
2000 sq miles	**5.8**	**11.2**	**11.9**	**12.3**	**13.2**	**13.7**	**14.4**	**15.0**	**15.1**
5000 sq miles	**4.9**	**9.5**	**10.4**	**10.9**	**11.8**	**12.2**	**12.9**	**13.4**	**13.4**
10000 sq miles	**4.2**	**8.1**	**8.9**	**9.6**	**10.4**	**10.7**	**11.5**	**11.8**	**11.9**
20000 sq miles	**3.3**	**6.4**	**7.2**	**8.0**	**8.5**	**8.9**	**9.6**	**10.0**	**10.0**

Storm or Storm Center Name	**Jefferson, OH OR 9-19**			
Storm Date(s)	9/10/1878			
Storm Type	Synoptic			
Storm Location	41.75 N	80.80 W		
Storm Center Elevation	950			
Precipitation Total & Duration	15.00 Inches 66-hours USACE OR 9-19			
Storm Representative Dewpoint	73.0 F	24		
Storm Representative Dewpoint Location	39.15 N	77.45 W	Aug	Sept
Maximum Dewpoint	76.0 F		77	74.5
Moisture Inflow Vector	SE @ 250			
In-place Maximization Factor	1.15			
Temporal Transposition (Date)	25-Aug			
Transposition Dewpoint Location	38.40 N	78.73 W		
Transposition Maximum Td	76.5 F			
Transposition Adjustment Factor	**1.03**			
Average Basin Elevation	900			
Highest Elevation in Basin				
Inflow Barrier Height	900			
Elevation Adjustment Factor	**1.00**			
Total Adjustment Factor	**1.19**			

Jefferson, OH September 10, 1878 Moisture Inflow Analysis

WAR DEPARTMENT CORPS OF ENGINEERS, U. S. ARMY

STORM STUDIES - PERTINENT DATA SHEET

LOCATION MAP

Storm of Sept. 10 - 13, 1878
Assignment O R 9 - 19
Location Ohio, Pa. and W.Va.
Study Prepared by:
Ohio River Division
Pittsburgh District Office

Part I Reviewed by H. M. Sec. of Weather Bureau, 8/18/41
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 4/16/42
Remarks: Center at
Jefferson, Ohio

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 5 sheet, scale vary

Precipitation data and mass curves: (Number of Sheets)

Form 5001-C (Hourly precip. data)	-
Form 5001-B (24-hour " ")	26
Form 5001-D (" " " ")	7
Misc. precip. records, meteorological data, etc.	42
Form 5002 (Mass rainfall curves)	33

PART II

Final isohyetal maps, in 1 sheet, scale 1 : 1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)	2
Form S-11 (Depth-area data from isohyetal map)	1
Form S-12 (Maximum depth-duration data)	7
Maximum duration-depth-area curves	1
Data relating to periods of maximum rainfall	3

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48	60	66	84	
10*	5.9	11.2	11.7	12.2	13.0	13.4	14.3	14.9	15.0	*15.0	
100	5.8	10.9	11.6	12.1	12.7	13.2	14.1	14.6	14.7	14.7	
200	5.8	10.8	11.4	11.9	12.5	12.9	13.9	14.4	14.5	14.5	
500	5.6	10.5	11.1	11.5	12.2	12.6	13.4	13.9	14.0	14.0	
1,000	5.3	10.1	10.6	11.0	11.7	12.1	12.9	13.4	13.5	13.5	
2,000	4.9	9.4	10.0	10.4	11.1	11.5	12.2	12.6	12.7	12.7	
5,000	4.1	8.0	8.8	9.2	9.9	10.3	10.9	11.3	11.3	11.3	
10,000	3.5	6.8	7.5	8.1	8.8	9.0	9.7	9.9	10.0	10.0	
20,000	2.8	5.4	6.1	6.7	7.2	7.5	8.1	8.4	8.4	8.4	
50,000	1.9	3.5	4.1	4.6	4.9	5.2	5.8	6.1	6.1	6.1	
70,000	1.6	2.8	3.4	3.8	4.0	4.3	4.9	5.1	5.2	5.2	
90,000	1.3	2.2	2.9	3.2	3.4	3.7	4.1	4.4	4.5	4.5	

* Extrapolated

Form S-2

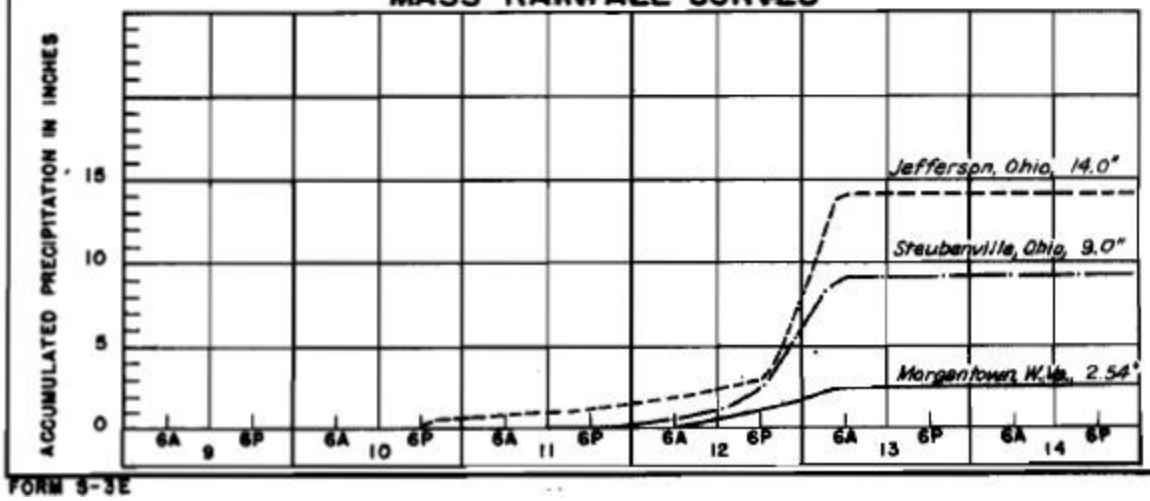
WAR DEPARTMENT — CORPS OF ENGINEERS, U. S. ARMY

STORM STUDIES – ISOHYETAL MAP

Storm of *September 10-13, 1878* Assignment *OR 9-19*

Study Prepared by: *Pittsburgh, Penna. District*
Ohio River Division

MASS RAINFALL CURVES



FORM 5-3E

Larrabee, IA June 23, 1891
Transpositioned Grid Points: 1-3, 6-9, 12-16, 18-21
Storm Type: MCC

Storm Name:	**USACE MR 4-2-Larrabee, IA**
Storm Date:	**6/23/1891**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date **10-Jul**

	Lat	Long
Storm center location	**42.86 N**	**95.55 W**
Storm Rep SST location	**39.96 N**	**95.55 W**
Transposition SST location	**38.10 N**	**82.00 W**
Grid point location	**41.00 N**	**82.00 W**

Moisture Inflow Direction:	**S @ 200**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**1,400**	feet
Storm Duration	**12**	hours

The storm representative SST is	**79.0 F**	with total precipitable water above sea level of				**3.44**	inches.
The in-place maximum SST is	**81.0 F**	with total precipitable water above sea level of				**3.75**	inches.
The transpositioned maximum SST is	**78.0 F**	with total precipitable water above sea level of				**3.29**	inches.
The in-place storm elevation is	**1,400**	which subtracts	**0.390**	inches of precipitable water at		**79.0 F**	
The in-place storm elevation is	**1,400**	which subtracts	**0.410**	inches of precipitable water at		**81.0 F**	
The transposition storm elevation at	**900**	which subtracts	**0.250**	inches of precipitable water at		**78.0 F**	
The moisture inflow barrier height is	**900**	which subtracts	**0.250**	inches of precipitable water at		**78.0 F**	

The in-place maximization factor is	**1.10**
The transposition factor is	**0.91**
The elevation/barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.00**

Notes: DAD values taken from USACE MR 4-2. Storm representative dew point value was based on adding 7° to the USACE analyzed storm rep Td based on guidance from EPRI, Nebraska, and TRWD.

Observed Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**10.4**	**11.7**	**11.7**	**12.9**	**12.9**	**12.9**	**12.9**	**12.9**	**12.9**
10 sq miles	**9.0**	**11.1**	**11.6**	**12.8**	**12.8**	**12.8**	**12.8**	**12.8**	**12.8**
100 sq miles	**7.5**	**10.0**	**11.1**	**12.2**	**12.2**	**12.2**	**12.2**	**12.2**	**12.2**
200 sq miles	**7.0**	**9.5**	**10.5**	**11.5**	**11.6**	**11.6**	**11.6**	**11.6**	**11.6**
500 sq miles	**6.1**	**8.6**	**9.6**	**10.3**	**10.5**	**10.5**	**10.5**	**10.5**	**10.5**
1000 sq miles	**5.3**	**7.7**	**8.7**	**9.3**	**9.5**	**9.5**	**9.5**	**9.5**	**9.5**
2000 sq miles	**4.5**	**6.6**	**7.7**	**8.2**	**8.3**	**8.3**	**8.3**	**8.3**	**8.3**
5000 sq miles	**3.4**	**5.0**	**5.8**	**6.5**	**6.6**	**6.6**	**6.6**	**6.6**	**6.6**
10000 sq miles	**2.5**	**3.7**	**4.4**	**5.2**	**5.3**	**5.3**	**5.3**	**5.3**	**5.3**
20000 sq miles	**1.6**	**2.5**	**2.9**	**3.6**	**3.9**	**4.2**	**4.2**	**4.4**	**4.6**

Adjusted Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**10.4**	**11.7**	**11.7**	**12.9**	**12.9**	**12.9**	**12.9**	**12.9**	**12.9**
10 sq miles	**9.0**	**11.1**	**11.6**	**12.8**	**12.8**	**12.8**	**12.8**	**12.8**	**12.8**
100 sq miles	**7.5**	**10.0**	**11.1**	**12.2**	**12.2**	**12.2**	**12.2**	**12.2**	**12.2**
200 sq miles	**7.0**	**9.5**	**10.5**	**11.5**	**11.6**	**11.6**	**11.6**	**11.6**	**11.6**
500 sq miles	**6.1**	**8.6**	**9.6**	**10.3**	**10.5**	**10.5**	**10.5**	**10.5**	**10.5**
1000 sq miles	**5.3**	**7.7**	**8.7**	**9.3**	**9.5**	**9.5**	**9.5**	**9.5**	**9.5**
2000 sq miles	**4.5**	**6.6**	**7.7**	**8.2**	**8.3**	**8.3**	**8.3**	**8.3**	**8.3**
5000 sq miles	**3.4**	**5.0**	**5.8**	**6.5**	**6.6**	**6.6**	**6.6**	**6.6**	**6.6**
10000 sq miles	**2.5**	**3.7**	**4.4**	**5.2**	**5.3**	**5.3**	**5.3**	**5.3**	**5.3**
20000 sq miles	**1.6**	**2.5**	**2.9**	**3.6**	**3.9**	**4.2**	**4.2**	**4.4**	**4.6**

Storm or Storm Center Name	**USACE MR 4-2-Larrabee, IA**	
Storm Date(s)	6/23/1891	
Storm Type	MCC-Thunderstorm Complex	
Storm Location	42.86 N	95.55 W
Storm Center Elevation	1,400	
Precipitation Total & Duration	12.90 Inches 24-hours	
Storm Representative Dewpoint	79.0 F	12
Storm Representative Dewpoint Location	39.96 N	95.55 W
Maximum Dewpoint	81.0 F	
Moisture Inflow Vector	S @ 200	
In-place Maximization Factor	1.10	
Temporal Transposition (Date)	10-Jul	
Transposition Dewpoint Location	38.10 N	82.00 W
Transposition Maximum Dewpoint	78.0 F	
Transposition Adjustment Factor	**0.91**	
Grid Point Elevation	900	
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.00**	

Larrabee, IA June 23, 1891 Moisture Inflow Analysis

DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET

Storm of 23-27 June 1891
Assignment MR 4-2
Location Iowa-Nebr-Minn,
Study Prepared by:
Missouri River Division
Omaha, District Office

Part I Reviewed by H. M. Sec. of Weather Bureau, 10/29/47
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 10/14/48
Remarks: Center at Larrabee, Ia.
Dewpt. 72° - Ref. Pt. 200 S Grid D-15

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 1 sheet, scale 1: 2,500,000

Precipitation data and mass curves: (Number of Sheets)

Form 5001-C (Hourly precip. data)	6
Form 5001-B (24-hour " ")	0
Form 5001-D (" " " ")	3
Misc. precip. records, meteorological data, etc.	12
Form 5002 (Mass rainfall curves)	9

PART II

Final isohyetal maps, in 1 sheet, scale 1: 1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)	1
Form S-11 (Depth-area data from isohyetal map)	1
Form S-12 (Maximum depth-duration data)	7
Maximum duration-depth-area curves	1
Data relating to periods of maximum rainfall	3

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours									
	6	12	18	24	30	36	48	60	72	96
Max. Station	10.4	11.7	11.7	12.9	12.9	12.9	12.9	13.0	13.0	13.0
10	9.0	11.1	11.6	12.8	12.8	12.8	12.8	12.8	12.8	12.8
100	7.5	10.0	11.1	12.2	12.2	12.2	12.2	12.2	12.2	12.2
200	7.0	9.5	10.5	11.5	11.6	11.6	11.6	11.6	11.6	11.6
500	6.1	8.6	9.6	10.3	10.5	10.5	10.5	10.5	10.5	10.5
1,000	5.3	7.7	8.7	9.3	9.5	9.5	9.5	9.5	9.5	9.5
2,000	4.5	6.6	7.7	8.2	8.3	8.3	8.3	8.3	8.3	8.3
5,000	3.4	5.0	5.8	6.5	6.6	6.6	6.6	6.6	6.6	6.6
10,000	2.5	3.7	4.4	5.2	5.3	5.3	5.3	5.3	5.3	5.3
20,000	1.6	2.5	2.9	3.6	3.9	4.2	4.2	4.4	4.6	4.7
30,000	1.1	1.7	2.0	2.4	3.1	3.7	3.8	4.2	4.5	4.6

Form S-2

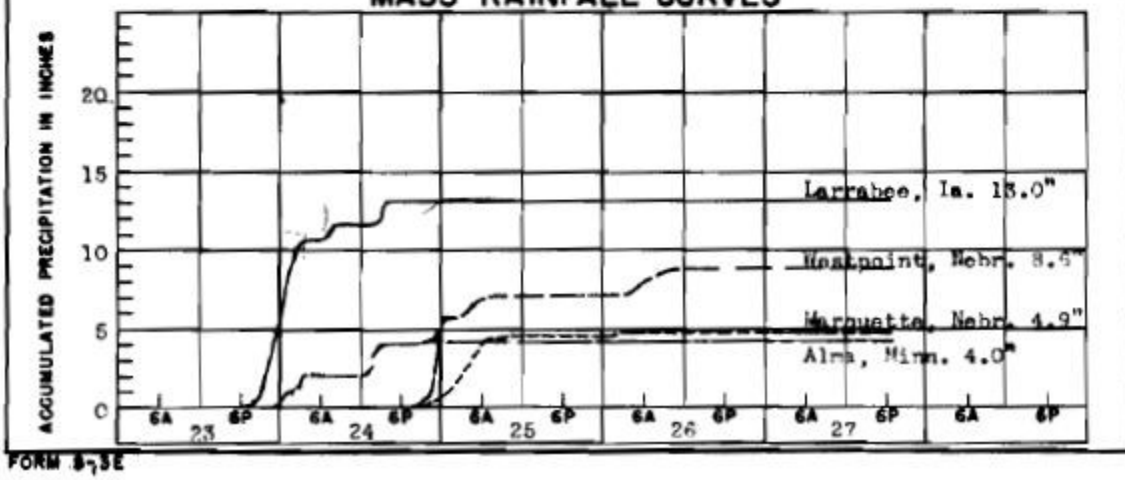
DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES - ISOHYETAL MAP

Storm of 23-27 June 1891 — Assignment MR 4-2

Study Prepared by: Omaha, Nebr. District
Missouri River Division

MASS RAINFALL CURVES



FORM 8-7SE

Greeley, NE June 4, 1896
Transpositioned Grid Points: 2-3, 6, 14-17, 19
Storm Type: MCC

Storm Name:	**USACE MR 4-3-Greeley, NE**
Storm Date:	**6/4/1896**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 14

Temporal Transposition Date	**19-Jun**	
	Lat	**Long**
Storm center location	**41.55 N**	**98.53 W**
Storm Rep Td location	**40.05 N**	**95.55 W**
Transposition Td location	**39.50 N**	**80.17 W**
Grid point location	**41.00 N**	**83.00 W**

Moisture Inflow Direction:	**SE @ 145**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**2,000**	feet
Storm Duration	**6**	hours

The storm representative dew point is	**76.0 F**	with total precipitable water above sea level of				**2.99**	inches.
The in-place maximum dew point is	**79.0 F**	with total precipitable water above sea level of				**3.44**	inches.
The transpositioned maximum dew point is	**77.5 F**	with total precipitable water above sea level of				**3.22**	inches.
The in-place storm elevation is	**2,000**	which subtracts	**0.500**	inches of precipitable water at		**76.0 F**	
The in-place storm elevation is	**2,000**	which subtracts	**0.550**	inches of precipitable water at		**79.0 F**	
The transposition basin elevation at	**900**	which subtracts	**0.230**	inches of precipitable water at		**77.5 F**	
The inflow barrier/basin elevation height is	**900**	which subtracts	**0.230**	inches of precipitable water at		**77.5 F**	

The in-place storm maximization factor is	**1.16**
The transposition/elevation to basin factor is	**1.03**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.20**

Notes: DAD values taken from USACE MR 4-3. 6hr average, 7° added to USACE storm rep Td based on EPRI , Nebraska, and TRWD guidance.

Observed Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**12.0**	**12.0**	**12.2**	**12.3**	**12.3**	**12.3**	**12.3**	**12.3**	**12.3**
100 sq miles	**11.6**	**11.6**	**11.6**	**11.8**	**11.8**	**11.8**	**11.8**	**11.8**	**11.8**
200 sq miles	**11.2**	**11.2**	**11.2**	**11.5**	**11.5**	**11.5**	**11.5**	**11.5**	**11.5**
500 sq miles	**10.2**	**10.2**	**10.2**	**10.6**	**10.6**	**10.6**	**10.6**	**10.6**	**10.6**
1000 sq miles	**8.7**	**8.9**	**9.0**	**9.2**	**9.4**	**9.4**	**9.4**	**9.4**	**9.4**
2000 sq miles	**6.6**	**6.9**	**7.0**	**7.2**	**7.5**	**7.5**	**7.5**	**7.5**	**7.5**
5000 sq miles	**4.0**	**4.3**	**4.9**	**5.1**	**5.2**	**5.3**	**5.3**	**5.3**	**5.3**
10000 sq miles	**2.4**	**2.8**	**3.7**	**4.0**	**4.1**	**4.2**	**4.2**	**4.4**	**4.5**
20000 sq miles	**1.3**	**1.8**	**2.6**	**3.0**	**3.1**	**3.2**	**3.2**	**3.7**	**3.8**

Adjusted Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**14.4**	**14.4**	**14.6**	**14.7**	**14.7**	**14.7**	**14.7**	**14.7**	**14.7**
100 sq miles	**13.9**	**13.9**	**13.9**	**14.1**	**14.1**	**14.1**	**14.1**	**14.1**	**14.1**
200 sq miles	**13.4**	**13.4**	**13.4**	**13.8**	**13.8**	**13.8**	**13.8**	**13.8**	**13.8**
500 sq miles	**12.2**	**12.2**	**12.2**	**12.7**	**12.7**	**12.7**	**12.7**	**12.7**	**12.7**
1000 sq miles	**10.4**	**10.7**	**10.8**	**11.0**	**11.3**	**11.3**	**11.3**	**11.3**	**11.3**
2000 sq miles	**7.9**	**8.3**	**8.4**	**8.6**	**9.0**	**9.0**	**9.0**	**9.0**	**9.0**
5000 sq miles	**4.8**	**5.2**	**5.9**	**6.1**	**6.2**	**6.4**	**6.4**	**6.4**	**6.4**
10000 sq miles	**2.9**	**3.4**	**4.4**	**4.8**	**4.9**	**5.0**	**5.0**	**5.3**	**5.4**
20000 sq miles	**1.6**	**2.2**	**3.1**	**3.6**	**3.7**	**3.8**	**3.8**	**4.4**	**4.6**

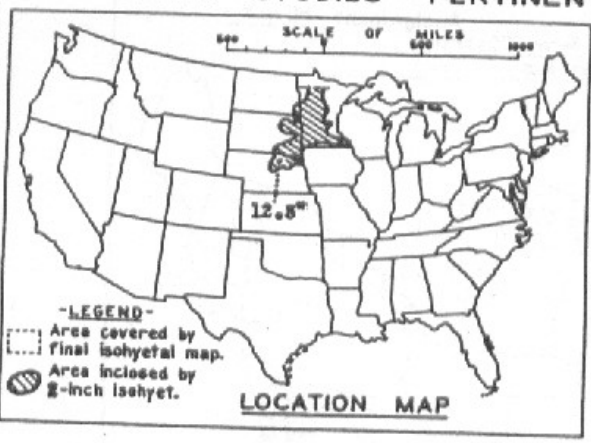
Storm or Storm Center Name	**USACE MR 4-3-Greeley, NE**	
Storm Date(s)	6/4/1896	
Storm Type	MCC	
Storm Location	41.55 N	98.53 W
Storm Center Elevation	2,000	
Precipitation Total & Duration	12.30 Inches 24-hours USACE MR 4-3	
Storm Representative Dewpoint	76.0 F	6
Storm Representative Dewpoint Location	40.05 N	95.55 W
Maximum Dewpoint	79.0 F	
Moisture Inflow Vector	SE @ 145	
In-place Maximization Factor	1.16	
Temporal Transposition (Date)	19-Jun	
Transposition Dewpoint Location	39.50 N	80.17 W
Transposition Maximum Td	77.5 F	
Transposition Adjustment Factor	**1.03**	
Grid Point Elevation	900	
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.20**	

Greeley, NE June 4, 1896 Moisture Inflow Analysis

DEPARTMENT OF THE ARMY

CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET



LOCATION MAP

Storm of 4-7 June 1896
Assignment MR 4-3
Location Nebr., S.D. Minn.
Study Prepared by:
Missouri River Division
Omaha District Office

Part I Reviewed by H. M. Sec. of Weather Bureau, 8/11/49
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 2/9/51
Remarks: Center at Greeley, Nebr.
Dewpt. 69°-Ref. Pt. 145 SE Grid D-16

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 1 sheet, scale 1: 2,500,000

Precipitation data and mass curves:

	(Number of Sheets)
Form 5001-C (Hourly precip. data)	8
Form 5001-B (24-hour " ")	-
Form 5001-D (" " " ")	10
Misc. precip. records, meteorological data, etc.	9
Form 5002 (Mass rainfall curves)	24

PART II

Final isohyetal maps, in 1 sheet, scale 1: 1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)	3
Form S-11 (Depth-area data from isohyetal map)	2
Form S-12 (Maximum depth-duration data)	13
Maximum duration-depth-area curves	1
Data relating to periods of maximum rainfall	7

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48	60	72	78	
10	12.0	12.0	12.2	12.3	12.3	12.3	12.3	12.3	12.3	12.3	
100	11.6	11.6	11.6	11.8	11.8	11.8	11.8	11.8	11.8	11.8	
200	11.2	11.2	11.2	11.5	11.5	11.5	11.5	11.5	11.5	11.5	
500	10.2	10.2	10.2	10.8	10.6	10.6	10.6	10.6	10.6	10.6	
1,000	8.7	8.9	9.0	9.2	9.4	9.4	9.4	9.4	9.4	9.4	
2,000	6.6	6.9	7.0	7.2	7.5	7.5	7.5	7.5	7.5	7.5	
5,000	4.0	4.3	4.9	5.1	5.2	5.3	5.3	5.3	5.3	5.3	
10,000	2.4	2.8	3.7	4.0	4.1	4.2	4.2	4.4	4.5	4.5	
20,000	1.3	1.8	2.6	3.0	3.1	3.2	3.2	3.7	3.8	3.8	
50,000	0.6	1.1	1.7	2.1	2.3	2.4	2.5	3.1	3.3	3.3	
84,000	0.5	1.0	1.4	1.8	2.2	2.3	2.4	3.0	3.2	3.2	

Form S-2

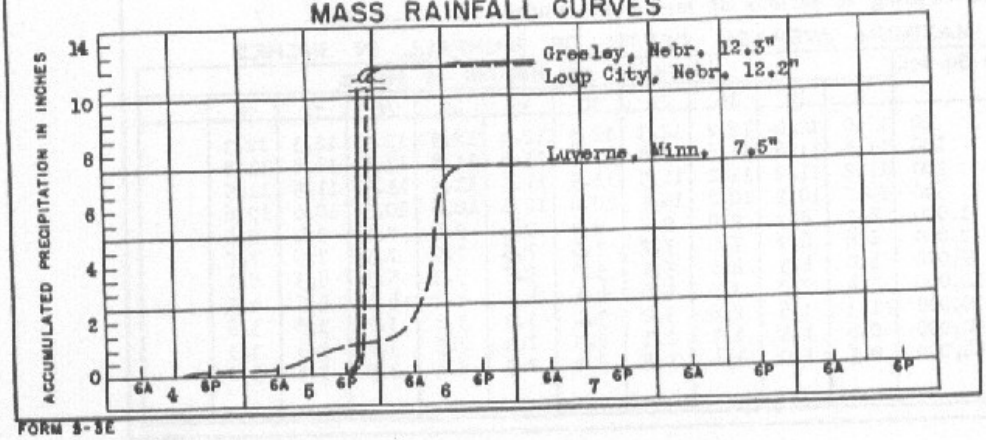
DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES - ISOHYETAL MAP

Storm of 4-7 June 1896 — Assignment MR 4-3

Study Prepared by: Omaha, Nebr. District
Missouri River Division

MASS RAINFALL CURVES



FORM 3-3E

Woodburn, IA August 24, 1903
Transpositioned Grid Points: All
Storm Type: MCC/ Synoptic

Storm Name:	**USACE MR 1-10-Woodburn, IA**
Storm Date:	**8/24-25/1903**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date	**5-Aug**

	Lat	**Long**
Storm center location	**41.01 N**	**93.60 W**
Storm Rep Td location	**38.52 N**	**91.81 W**
Transposition Td location	**38.51 N**	**80.21 W**
Grid point location	**41.00 N**	**82.00 W**

Moisture Inflow Direction:	**SW @ 150**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**1,200**	feet
Storm Duration	**24**	hours

The storm representative Td is	**75.0 F**	with total precipitable water above sea level of				**2.85**	inches.
The in-place maximum Td is	**80.5 F**	with total precipitable water above sea level of				**3.68**	inches.
The transpositioned maximum Td is	**77.5 F**	with total precipitable water above sea level of				**3.22**	inches.
The in-place storm elevation is	**1,200**	which subtracts	**0.300**	inches of precipitable water at		**75.0 F**	
The in-place storm elevation is	**1,200**	which subtracts	**0.360**	inches of precipitable water at		**80.5 F**	
The transposition storm elevation at	**900**	which subtracts	**0.250**	inches of precipitable water at		**77.5 F**	
The moisture inflow barrier height is	**900**	which subtracts	**0.250**	inches of precipitable water at		**77.5 F**	

The in-place maximization factor is	**1.30**
The transposition factor is	**0.89**
The elevation/barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.16**

Notes: DAD values taken from USACE MR 1-10. 2° added to the storm rep based on EPRI and Nebraska analyses to adjust 12-hr persisting Td to 24-hr average Td.

Observed Storm Depth-Area-Duration

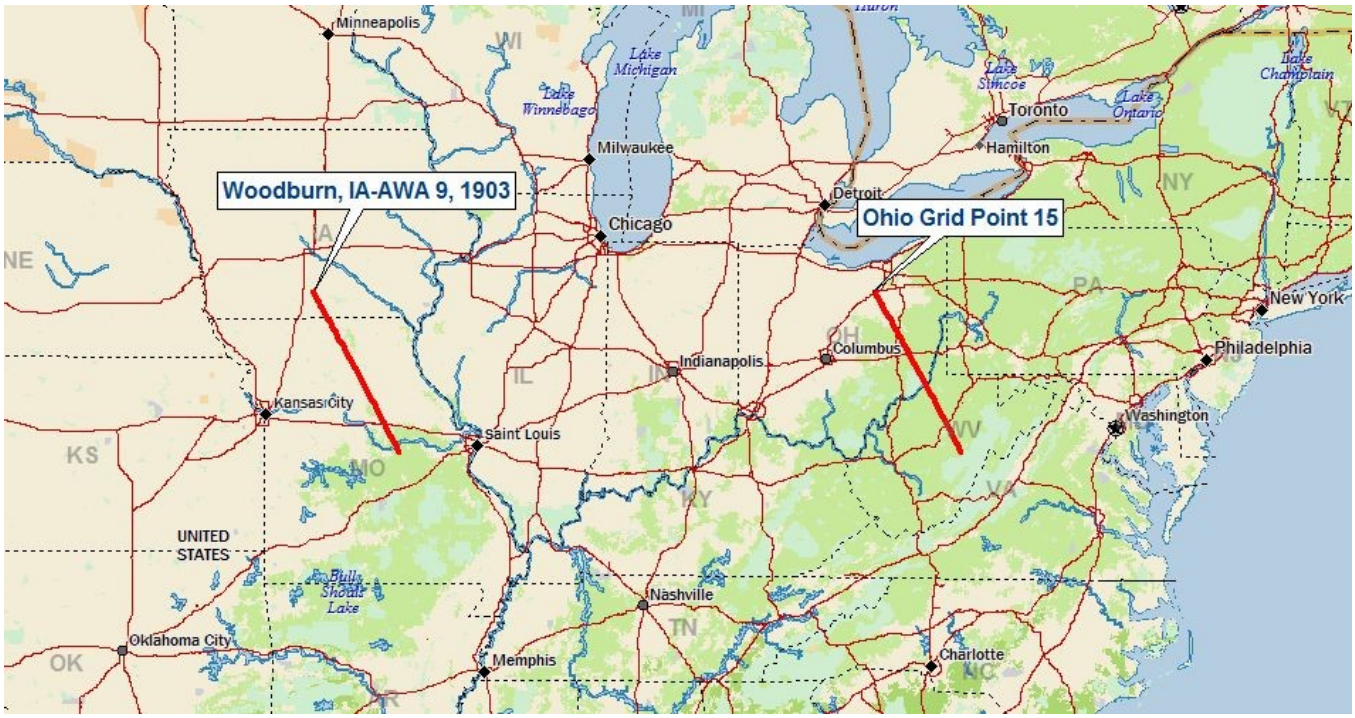
	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**6.9**	**11.5**	**11.9**	**14.7**	**14.7**	**14.7**	**15.4**	**15.5**	**15.5**
100 sq miles	**6.6**	**10.3**	**11.4**	**12.8**	**13.8**	**13.8**	**13.9**	**14.4**	**14.6**
200 sq miles	**6.3**	**9.9**	**11.0**	**12.2**	**13.2**	**13.2**	**13.2**	**13.8**	**13.9**
500 sq miles	**5.7**	**9.3**	**10.3**	**11.2**	**12.2**	**12.2**	**12.6**	**12.8**	**12.8**
1000 sq miles	**5.2**	**8.7**	**9.5**	**10.3**	**11.1**	**11.2**	**11.2**	**11.5**	**11.7**
2000 sq miles	**4.6**	**7.8**	**8.6**	**9.2**	**10.0**	**10.1**	**10.2**	**10.4**	**10.6**
5000 sq miles	**3.7**	**6.4**	**7.3**	**7.7**	**8.4**	**8.7**	**8.8**	**8.8**	**9.0**
10000 sq miles	**3.0**	**5.2**	**6.3**	**6.5**	**7.1**	**7.3**	**7.5**	**7.5**	**7.7**
20000 sq miles	**2.3**	**4.0**	**5.0**	**5.2**	**5.6**	**5.9**	**6.1**	**6.1**	**6.3**

Adjusted Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**8.0**	**13.4**	**13.8**	**17.1**	**17.1**	**17.1**	**17.9**	**18.0**	**18.0**
100 sq miles	**7.7**	**12.0**	**13.3**	**14.9**	**16.0**	**16.0**	**16.2**	**16.7**	**17.0**
200 sq miles	**7.3**	**11.5**	**12.8**	**14.2**	**15.3**	**15.3**	**15.3**	**16.0**	**16.2**
500 sq miles	**6.6**	**10.8**	**12.0**	**13.0**	**14.2**	**14.2**	**14.7**	**14.9**	**14.9**
1000 sq miles	**6.0**	**10.1**	**11.0**	**12.0**	**12.9**	**13.0**	**13.0**	**13.4**	**13.6**
2000 sq miles	**5.3**	**9.1**	**10.0**	**10.7**	**11.6**	**11.7**	**11.9**	**12.1**	**12.3**
5000 sq miles	**4.3**	**7.4**	**8.5**	**9.0**	**9.8**	**10.1**	**10.2**	**10.2**	**10.5**
10000 sq miles	**3.5**	**6.0**	**7.3**	**7.6**	**8.3**	**8.5**	**8.7**	**8.7**	**9.0**
20000 sq miles	**2.7**	**4.7**	**5.8**	**6.0**	**6.5**	**6.9**	**7.1**	**7.1**	**7.3**

Storm or Storm Center Name	**USACE MR 1-10-Woodburn, IA**	
Storm Date(s)	8/24-25/1903	
Storm Type	MCC	
Storm Location	41.01 N	93.60 W
Storm Center Elevation	1,200	
Precipitation Total & Duration	14.70 Inches 24-hours USACE MR 1-10	
Storm Representative Dewpoint	75.0 F	24
Storm Representative Dewpoint Location	38.52 N	91.81 W
Maximum Dewpoint	80.5 F	
Moisture Inflow Vector	SW @ 150	
In-place Maximization Factor	1.30	
Temporal Transposition (Date)	5-Aug	
Transposition Dewpoint Location	38.51 N	80.21 W
Transposition Maximum Td	77.5 F	
Transposition Adjustment Factor	**0.89**	
Grid Point Elevation	900	
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.16**	

Woodburn, IA August 24, 1903 Moisture Inflow



STORM STUDIES - PERTINENT DATA SHEET

LOCATION MAP

Storm of August 24 - 28, 1903
Assignment MR 1 - 10
Location Iowa
Study Prepared by:
Missouri River Division
Kansas City District Office

Part I Reviewed by H. M. Sec. of Weather Bureau, 6/6/39
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 11/4/44
Remarks: Centers at Woodburn, Ia., and Council Bluffs, Ia.

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 1 sheet, scale 1 : 2,500,000

Precipitation data and mass curves:

	(Number of Sheets)
Form 5001-C (Hourly precip. data)	5
Form 5001-B (24-hour " ")	21
Form 5001-D (" " " ")	-
Misc. precip. records, meteorological data, etc.	-
Form 5002 (Mass rainfall curves)	11

PART II

Final isohyetal maps, in 1 sheet, scale 1 : 1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)	4
Form S-11 (Depth-area data from isohyetal map)	2
Form S-12 (Maximum depth-duration data)	6
Maximum duration-depth-area curves	1
Data relating to periods of maximum rainfall	2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours									
	6	12	18	24	30	36	48	60	72	96
10	6.9	11.5	11.9	14.7	14.7	14.7	15.4	15.5	15.5	15.5
100	6.6	10.3	11.4	12.8	13.8	13.8	13.9	14.4	14.6	14.6
200	6.3	9.9	11.0	12.2	13.2	13.2	13.2	13.8	13.9	13.9
500	5.7	9.3	10.3	11.2	12.2	12.2	12.2	12.6	12.8	12.8
1,000	5.2	8.7	9.5	10.3	11.1	11.2	11.2	11.5	11.7	11.7
2,000	4.6	7.8	8.6	9.2	10.0	10.1	10.2	10.4	10.6	10.7
5,000	3.7	6.4	7.3	7.7	8.4	8.7	8.8	8.8	9.0	9.2
10,000	3.0	5.2	6.3	6.5	7.1	7.3	7.5	7.5	7.7	7.9
20,000	2.3	4.0	5.0	5.2	5.6	5.9	6.1	6.1	6.3	6.5
50,000	1.3	2.4	3.1	3.2	3.5	4.0	4.2	4.3	4.4	4.7
59,000	1.1	2.1	2.8	2.9	3.2	3.6	3.9	4.0	4.1	4.4

Form S-2

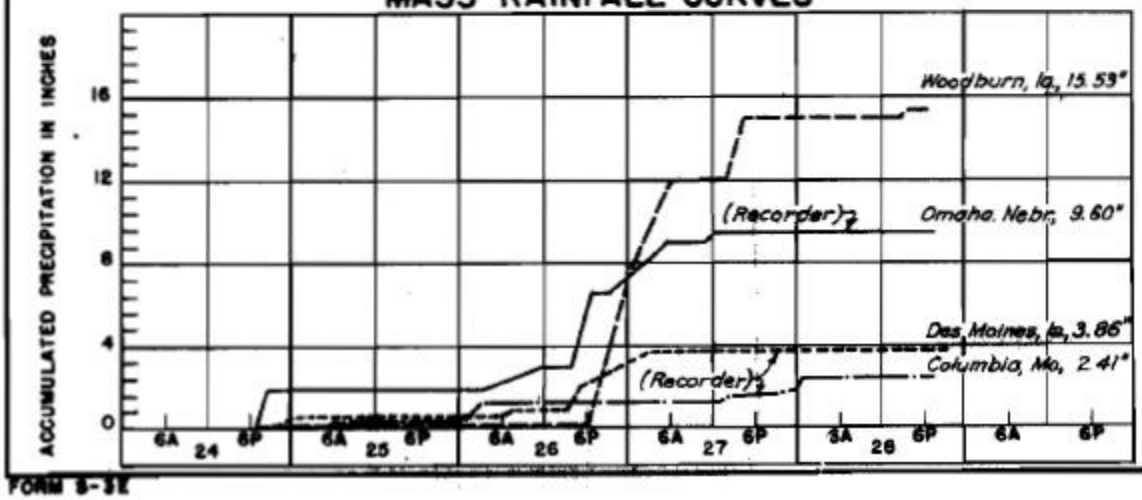
WAR DEPARTMENT — CORPS OF ENGINEERS, U. S. ARMY

STORM STUDIES - ISOHYETAL MAP

Storm of *August 24-28, 1903* Assignment *MR 1-10*

Study Prepared by: *Kansas City, Mo. District*
Missouri River Division

MASS RAINFALL CURVES



FORM 8-32

Bonaparte, IA June 10, 1905
Transpositioned Grid Points: 1-5, 6-9, 12-23
Storm Type: Synoptic

Storm Name:	**USACE UMV 2-5-Bonaparte, IA**
Storm Date:	**June 9, 1905**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date	**30-Jun**	
	Lat	**Long**
Storm center location	**40.77 N**	**91.75 W**
Storm Rep SST location	**38.52 N**	**91.81 W**
Transposition SST location	**38.75 N**	**82.06 W**
Grid point location	**41.00 N**	**82.00 W**

Moisture Inflow Direction:	**S @ 150**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**1,500**	feet
Storm Duration	**12**	hours

The storm representative SST is	**77.0 F**	with total precipitable water above sea level of			**3.14**	inches.
The in-place maximum SST is	**80.0 F**	with total precipitable water above sea level of			**3.60**	inches.
The transpositioned maximum SST is	**77.5 F**	with total precipitable water above sea level of			**3.22**	inches.
The in-place storm elevation is	**1,500**	which subtracts	**0.390**	inches of precipitable water at	**77.0 F**	
The in-place storm elevation is	**1,500**	which subtracts	**0.430**	inches of precipitable water at	**80.0 F**	
The transposition storm elevation at	**900**	which subtracts	**0.250**	inches of precipitable water at	**77.5 F**	
The moisture inflow barrier height is	**900**	which subtracts	**0.250**	inches of precipitable water at	**77.5 F**	

The in-place maximization factor is	**1.15**
The transposition factor is	**0.94**
The elevation/barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.08**

Notes: DAD values taken from USACE UMV 2-5. Added 7° to the USACE analyzed storm rep Td based on guidance from EPRI, Nebraska, TRWD.

Observed Storm Depth-Area-Duration

	1 Hours	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**2.0**	**10.2**	**12.1**							
10 sq miles	**2.0**	**10.0**	**12.0**							
100 sq miles	**1.9**	**9.2**	**11.5**							
200 sq miles	**1.8**	**8.9**	**11.3**							
500 sq miles	**1.8**	**8.5**	**10.7**							
1000 sq miles	**1.7**	**8.0**	**10.0**							
2000 sq miles	**1.6**	**7.2**	**9.1**							
5000 sq miles	**1.3**	**5.8**	**7.3**							
10000 sq miles	**1.0**	**4.4**	**5.6**							
20000 sq miles	**0.7**	**3.0**	**3.9**							

Adjusted Storm Depth-Area-Duration

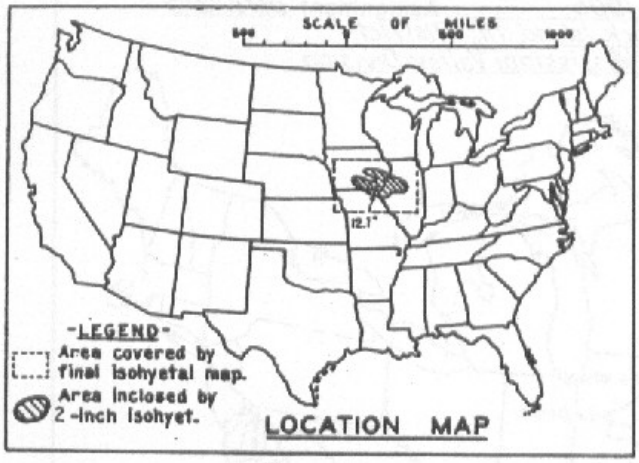
	1 Hours	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**2.2**	**11.0**	**13.0**							
10 sq miles	**2.2**	**10.8**	**12.9**							
100 sq miles	**2.0**	**9.9**	**12.4**							
200 sq miles	**1.9**	**9.6**	**12.2**							
500 sq miles	**1.9**	**9.2**	**11.5**							
1000 sq miles	**1.8**	**8.6**	**10.8**							
2000 sq miles	**1.7**	**7.8**	**9.8**							
5000 sq miles	**1.4**	**6.3**	**7.9**							
10000 sq miles	**1.1**	**4.7**	**6.0**							
20000 sq miles	**0.8**	**3.2**	**4.2**							

Storm or Storm Center Name	**USACE UMV 2-5-Bonaparte, IA**	
Storm Date(s)	9-Jun-1905	
Storm Type	MCC	
Storm Location	40.77 N	91.75 W
Storm Center Elevation	1,500	
Precipitation Total & Duration	12.10 Inches 12-hours USACE UMV 2-5	
Storm Representative Dewpoint	77.0 F	12
Storm Representative Dewpoint Location	38.52 N	91.81 W
Maximum Dewpoint	80.0 F	
Moisture Inflow Vector	S @ 150	
In-place Maximization Factor	1.15	
Temporal Transposition (Date)	30-Jun	
Transposition Dewpoint Location	38.75 N	82.06 W
Transposition Maximum SST	77.5 F	
Transposition Adjustment Factor	**0.94**	
Grid Point Elevation	900	
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.08**	

Bonaparte, IA June 10, 1905 Moisture Inflow Analysis

WAR DEPARTMENT CORPS OF ENGINEERS, U. S. ARMY

STORM STUDIES - PERTINENT DATA SHEET



LOCATION MAP

Storm of June 9 - 10, 1905
Assignment U M V 2 - 5
Location S.E. Ia. and W.Cent.Ill
Study Prepared by:
Upper Mississippi Valley Division

Rock Island District Office
Part I Reviewed by H. M. Sec. of Weather Bureau, 6/20/44
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 6/22/44
Remarks: Centers at: Bonapart (Near), Ia., and Le Harpe, Ill.

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 1 sheet, scale 1 : 2,500,000

Precipitation data and mass curves: (Number of Sheets)

Form 5001-C (Hourly precip. data)	8
Form 5001-B (24-hour " ")	-
Form 5001-D (" " " ")	6
Misc. precip. records, meteorological data, etc.	4
Form 5002 (Mass rainfall curves)	19

PART II

Final isohyetal maps, in 1 sheet, scale 1 : 1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)	2
Form S-11 (Depth-area data from isohyetal map)	1
Form S-12 (Maximum depth-duration data)	6
Maximum duration-depth-area curves	1
Data relating to periods of maximum rainfall	2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	1	2	3	4	5	6	7	8	10	12	
Max. Station	2.0	4.0	6.0	8.0	9.9	10.2	10.8	11.4	11.9	12.1	
10	2.0	4.0	5.9	7.9	9.7	10.0	10.5	11.2	11.8	12.0	
100	1.9	3.7	5.6	7.2	8.7	9.2	9.8	10.5	11.3	11.5	
200	1.8	3.6	5.5	7.0	8.4	8.9	9.5	10.2	11.1	11.3	
500	1.8	3.5	5.2	6.6	7.8	8.5	9.1	9.7	10.5	10.7	
1,000	1.7	3.4	4.9	6.2	7.4	8.0	8.6	9.0	9.8	10.0	
2,000	1.6	3.1	4.5	5.6	6.7	7.2	7.8	8.1	8.8	9.1	
5,000	1.3	2.5	3.5	4.5	5.2	5.8	6.2	6.5	7.0	7.3	
10,000	1.0	1.9	2.7	3.4	3.9	4.4	4.8	5.0	5.4	5.6	
20,000	0.7	1.3	1.7	2.1	2.5	3.0	3.1	3.3	3.7	3.9	

Form S-2

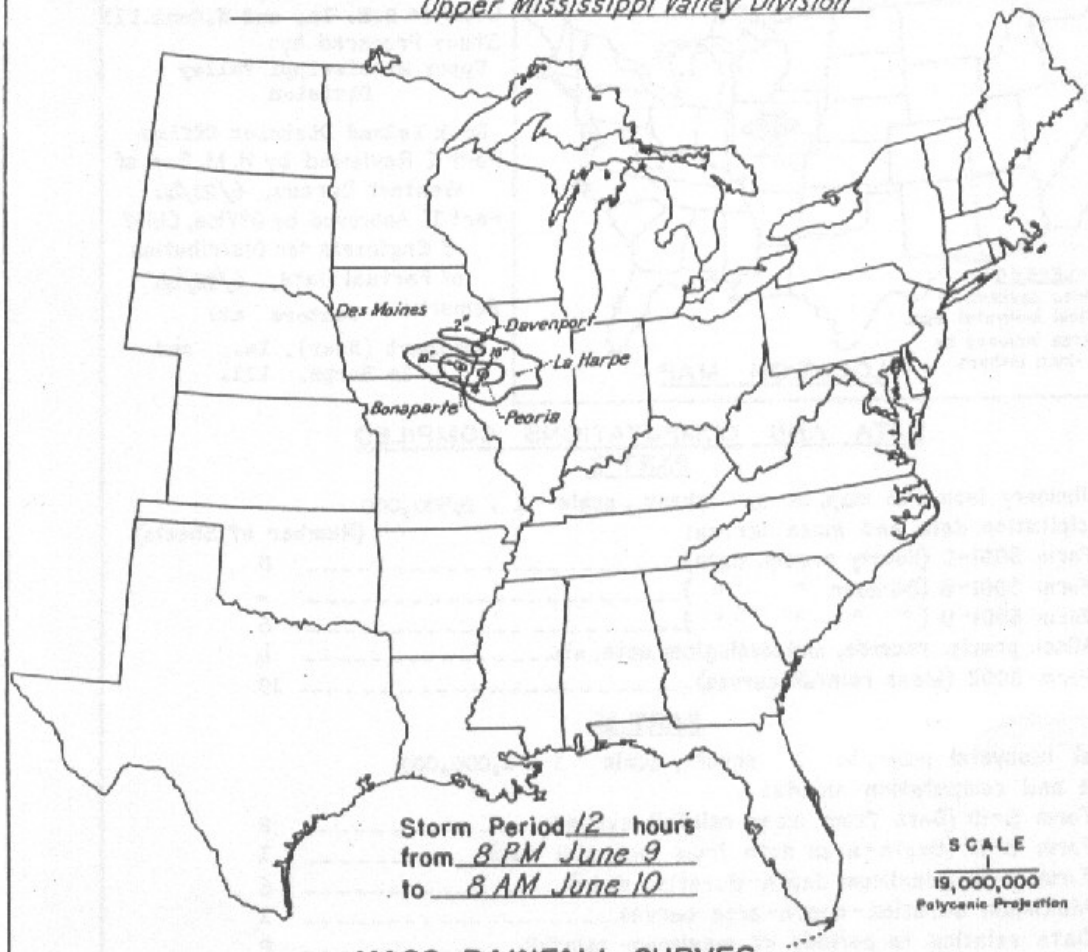
WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY

STORM STUDIES – ISOHYETAL MAP

Storm of June 9-10, 1905 Assignment UMV 2-5

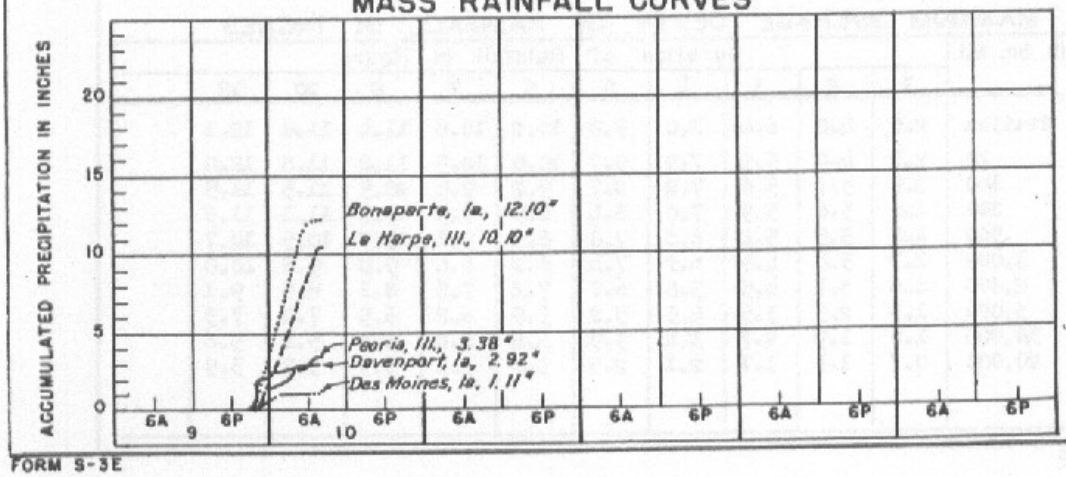
Study Prepared by: Rock Island, Ill. District
Upper Mississippi Valley Division



Storm Period 12 hours
from 8 PM June 9
to 8 AM June 10

SCALE
1
19,000,000
Polyconic Projection

MASS RAINFALL CURVES



FORM S-3E

Meeker, OK October 19, 1908
Transpositioned Grid Points: 1
Storm Type: Synoptic

Storm Name:	**USACE SW 1-11-Meeker, OK**
Storm Date:	**10/19-23/1908**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 1

Temporal Transposition Date	**5-Oct**	
	Lat	**Long**
Storm center location	**35.50 N**	**96.90 W**
Storm Rep SST location	**33.43 N**	**94.45 W**
Transposition SST location	**35.93 N**	**83.05 W**
Grid point location	**38.00 N**	**85.50 W**

Moisture Inflow Direction:	**SE @ 200**	miles
Grid Point Elevation	**600**	feet
Storm Elevation	**900**	feet
Storm Duration	**24**	hours

The storm representative SST is	**68.0 F**	with total precipitable water above sea level of			**2.05**	inches.
The in-place maximum SST is	**75.5 F**	with total precipitable water above sea level of			**2.92**	inches.
The transpositioned maximum SST is	**73.5 F**	with total precipitable water above sea level of			**2.67**	inches.
The in-place storm elevation is	**900**	which subtracts	**0.180**	inches of precipitable water at	**68.0 F**	
The in-place storm elevation is	**900**	which subtracts	**0.230**	inches of precipitable water at	**75.5 F**	
The transposition storm elevation at	**600**	which subtracts	**0.150**	inches of precipitable water at	**73.5 F**	
The moisture inflow barrier height is	**600**	which subtracts	**0.150**	inches of precipitable water at	**73.5 F**	

The in-place maximization factor is	**1.44**
The transposition factor is	**0.93**
The elevation/barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.34**

Notes: DAD values taken from USACE SW 1-11.

Observed Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**9.4**	**10.0**	**10.0**	**11.4**	**11.8**	**12.0**	**14.5**	**14.9**	**15.2**
100 sq miles	**8.2**	**9.3**	**9.4**	**10.3**	**11.3**	**11.5**	**13.6**	**14.4**	**14.9**
200 sq miles	-	-	-	-	-	-	-	-	-
500 sq miles	**7.1**	**8.4**	**8.5**	**9.2**	**10.5**	**10.7**	**13.2**	**13.8**	**14.2**
1000 sq miles	**6.3**	**7.5**	**7.7**	**8.6**	**9.9**	**10.2**	**12.7**	**13.3**	**13.7**
2000 sq miles	**5.5**	**6.6**	**6.8**	**7.8**	**9.0**	**9.4**	**11.9**	**12.5**	**12.9**
5000 sq miles	**4.4**	**5.4**	**5.7**	**6.6**	**7.6**	**8.2**	**10.5**	**11.3**	**11.7**
10000 sq miles	**3.5**	**4.5**	**4.8**	**5.6**	**6.4**	**7.1**	**9.2**	**10.0**	**10.6**
20000 sq miles	**2.7**	**3.6**	**3.9**	**4.6**	**5.3**	**5.9**	**7.7**	**8.6**	**9.0**

Adjusted Storm Depth-Area-Duration

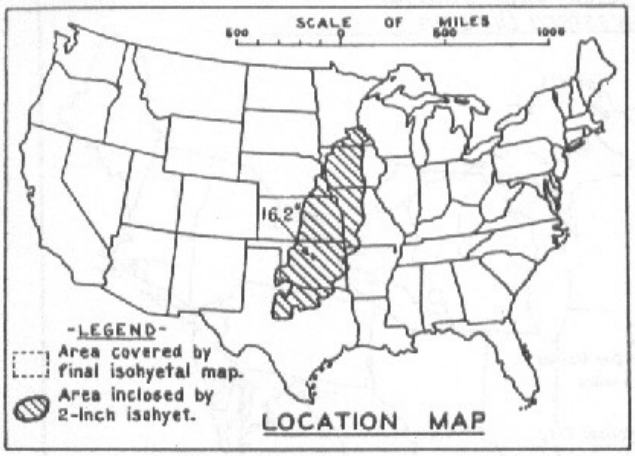
	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**12.6**	**13.4**	**13.4**	**15.3**	**15.9**	**16.1**	**19.5**	**20.0**	**20.4**
100 sq miles	**11.0**	**12.5**	**12.6**	**13.9**	**15.2**	**15.5**	**18.3**	**19.4**	**20.0**
200 sq miles	-	-	-	-	-	-	-	-	-
500 sq miles	**9.5**	**11.3**	**11.4**	**12.4**	**14.1**	**14.4**	**17.8**	**18.6**	**19.1**
1000 sq miles	**8.5**	**10.1**	**10.4**	**11.6**	**13.3**	**13.7**	**17.1**	**17.9**	**18.4**
2000 sq miles	**7.4**	**8.9**	**9.1**	**10.5**	**12.1**	**12.6**	**16.0**	**16.8**	**17.3**
5000 sq miles	**5.9**	**7.3**	**7.7**	**8.9**	**10.2**	**11.0**	**14.1**	**15.2**	**15.7**
10000 sq miles	**4.7**	**6.1**	**6.5**	**7.5**	**8.6**	**9.5**	**12.4**	**13.4**	**14.3**
20000 sq miles	**3.6**	**4.8**	**5.2**	**6.2**	**7.1**	**7.9**	**10.4**	**11.6**	**12.1**

Storm or Storm Center Name	**USACE SW 1-11-Meeker, OK**	
Storm Date(s)	10/19-23/1908	
Storm Type	General Storm	
Storm Location	35.50 N	96.90 W
Storm Center Elevation	900	
Precipitation Total & Duration (10 sq mi)	16.23 Inches in 126 hours, 11.4 in 24 hours	
Storm Representative SST	68.0 F	24
Storm Representative SST Location	33.43 N	94.45 W
In-place Maximum SST	75.5 F	
Moisture Inflow Vector	SE @ 200	
In-place Maximization Factor	1.00	
Temporal Transposition (Date)	5-Oct	
Transposition Dewpoint Location	35.93 N	83.05 W
Transposition Maximum SST	73.5 F	
Transposition Adjustment Factor	**0.93**	
Grid Point Elevation	600	
Inflow Barrier Height	600	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.34**	

Meeker, OK October 19, 1908 Moisture Inflow Analysis

WAR DEPARTMENT — CORPS OF ENGINEERS, U.S. ARMY

STORM STUDIES – PERTINENT DATA SHEET



LOCATION MAP

Storm of October 19-24, 1908
Assignment S W 1 - 11
Location Okla., Tex.,-Ia.
Study Prepared by:

Southwestern Division
Tulsa District Office

Part I Reviewed by H. M. Sec. of Weather Bureau, 11-12-40
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 7-15-45
Remarks: Center at:

Keeker, Okla.

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 2 sheets, scale 1:2,500,000

Precipitation data and mass curves: (Number of Sheets)

Form 5001-C (Hourly precip. data)	22
Form 5001-B (24-hour " ")	—
Form 5001-D (" " " ")	28
Misc. precip. records, meteorological data, etc.	—
Form 5002 (Mass rainfall curves)	35

PART II

Final isohyetal maps, in 1 sheet, scale 1:1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)	10
Form S-11 (Depth-area data from isohyetal map)	2
Form S-12 (Maximum depth-duration data)	11
Maximum duration-depth-area curves	1
Data relating to periods of maximum rainfall	2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48	60	72	90	126
10	9.4	10.0	10.0	11.4	11.8	12.0	14.5	14.9	15.2	15.8	16.2
100	8.2	9.3	9.4	10.3	11.3	11.5	13.6	14.4	14.9	15.4	15.9
500	7.1	8.4	8.5	9.2	10.5	10.7	13.2	13.8	14.2	14.6	15.1
1,000	6.3	7.5	7.7	8.6	9.9	10.2	12.7	13.3	13.7	14.0	14.5
2,000	5.5	6.6	6.8	7.8	9.0	9.4	11.9	12.5	12.9	13.3	13.7
5,000	4.4	5.4	5.7	6.6	7.6	8.2	10.5	11.3	11.7	12.1	12.5
10,000	3.5	4.5	4.8	5.6	6.4	7.1	9.2	10.0	10.6	11.0	11.4
20,000	2.7	3.6	3.9	4.6	5.3	5.9	7.7	8.6	9.0	9.6	10.1
50,000	1.6	2.4	2.8	3.4	3.8	4.3	5.6	6.2	6.6	7.2	8.0
80,000	1.0	1.7	2.1	2.7	3.0	3.4	4.4	4.9	5.4	5.9	6.8

Form S-2

670668 O - 45 - 7

WAR DEPARTMENT — CORPS OF ENGINEERS, U. S. ARMY

STORM STUDIES - ISOHYETAL MAP

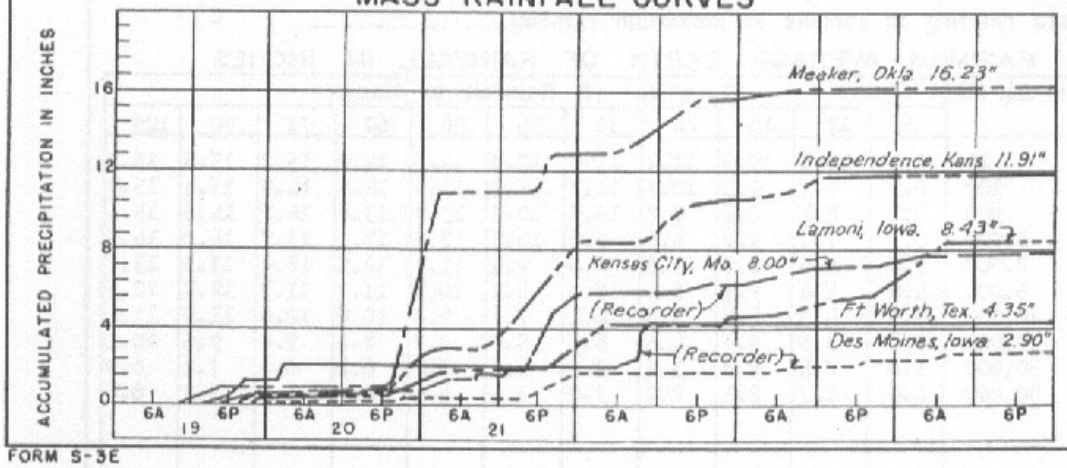
Storm of October 19-24, 1908 Assignment SW I-11

Study Prepared by: Tulsa, Okla. District
Southwestern Division

Storm Period 126 hours
from 9 AM Oct. 19
to 3 PM Oct. 24

SCALE
1/9,000,000
Polyconic Projection

MASS RAINFALL CURVES



FORM S-3E

Beaulieu, MN July 18, 1909
Transpositioned Grid Points: 1-3, 6-9, 12-16, 18-21
Storm Type: MCC

Storm Name:	**USACE- UMV 1-11A-Beaulieu, MN**
Storm Date:	**18-Jul-1909**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date	**15-Jul**	
	Lat	**Long**
Storm center location	**47.30 N**	**95.90 W**
Storm Rep dew point location	**43.32 N**	**98.08 W**
Transposition dewpoint location	**37.02 N**	**84.18 W**
Grid point location	**41.00 N**	**82.00 W**

Moisture Inflow Direction:	**SSW @ 30**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**1,300**	feet
Storm Duration	**6**	hours

The storm representative dew point is	**78.0 F**	with total precipitable water above sea level of				**3.29**	inches.
The in-place maximum dew point is	**81.5 F**	with total precipitable water above sea level of				**3.84**	inches.
The transpositioned maximum dew point is	**79.5 F**	with total precipitable water above sea level of				**3.52**	inches.
The in-place storm elevation is	**1,300**	which subtracts	**0.360**	inches of precipitable water at		**78.0 F**	
The in-place storm elevation is	**1,300**	which subtracts	**0.400**	inches of precipitable water at		**81.5 F**	
The transposition basin elevation at	**900**	which subtracts	**0.270**	inches of precipitable water at		**79.5 F**	
The inflow barrier/basin elevation height is	**900**	which subtracts	**0.270**	inches of precipitable water at		**79.5 F**	

The in-place storm maximization factor is	**1.17**
The transposition/elevation to basin factor is	**0.94**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.11**

Notes: DAD values taken from USACE UMV 1-11. Added 7° to USACE storm rep analyzed Td based on guidance from EPRI, Nebraska, and TRWD.

Observed Storm Depth-Area-Duration

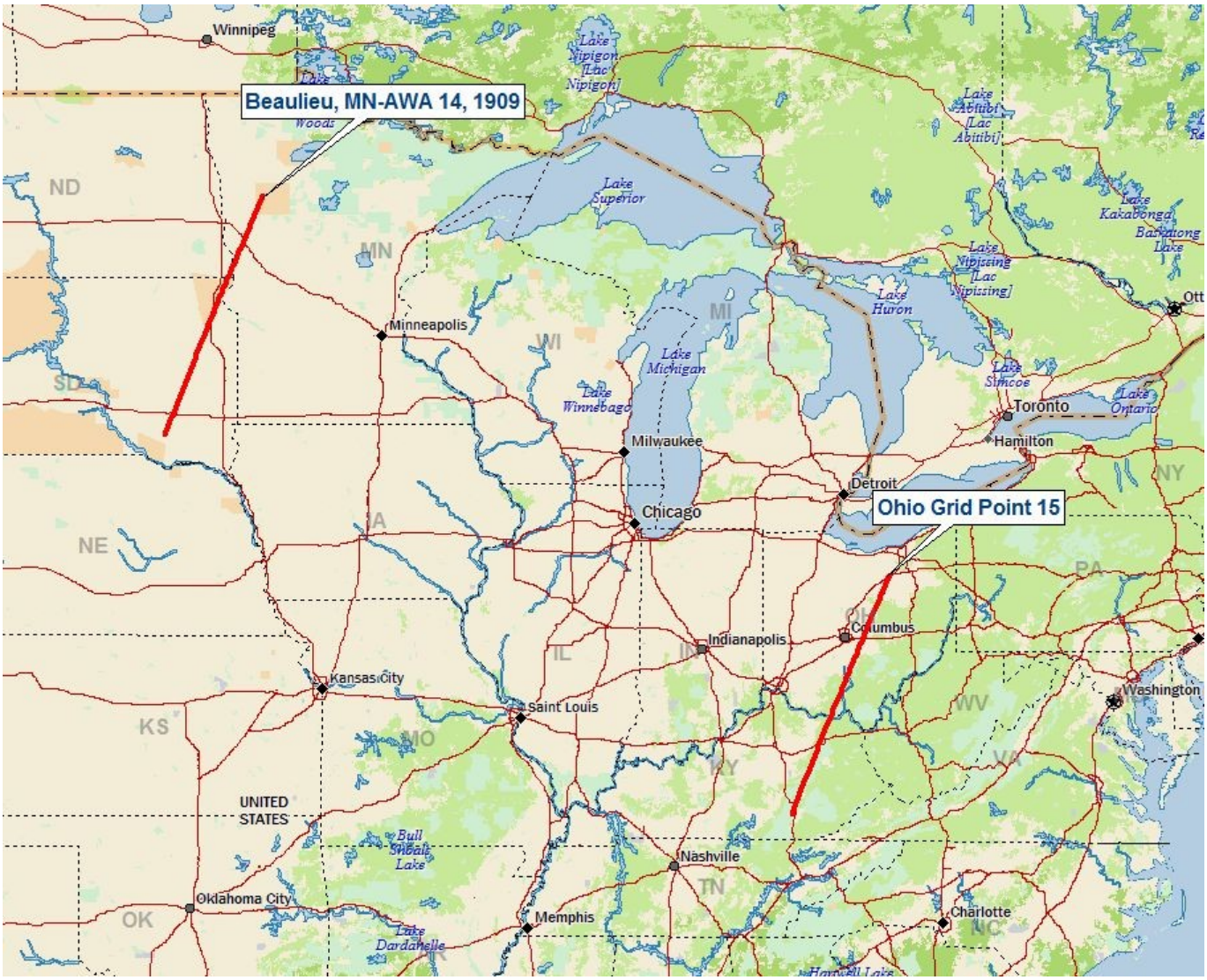
	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**10.5**	**10.7**	**10.8**	**11.5**	**11.7**	**11.8**	**11.8**	**12.0**	**12.1**
100 sq miles	**10.3**	**10.5**	**10.7**	**11.3**	**11.5**	**11.7**	**11.7**	**12.0**	**12.0**
200 sq miles	**10.1**	**10.4**	**10.5**	**11.1**	**11.3**	**11.5**	**11.5**	**11.8**	**11.8**
500 sq miles	**9.7**	**10.1**	**10.2**	**10.6**	**11.0**	**11.2**	**11.2**	**11.5**	**11.5**
1000 sq miles	**9.2**	**9.6**	**9.7**	**10.0**	**10.4**	**10.5**	**10.6**	**10.8**	**10.9**
2000 sq miles	**7.9**	**8.5**	**8.6**	**8.7**	**9.3**	**9.4**	**9.5**	**9.8**	**9.9**
5000 sq miles	**4.8**	**5.9**	**6.0**	**6.1**	**7.1**	**7.3**	**7.5**	**7.9**	**8.0**
10000 sq miles									
20000 sq miles									

Adjusted Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**11.6**	**11.9**	**12.0**	**12.8**	**13.0**	**13.1**	**13.1**	**13.3**	**13.4**
100 sq miles	**11.4**	**11.6**	**11.9**	**12.5**	**12.8**	**13.0**	**13.0**	**13.3**	**13.3**
200 sq miles	**11.2**	**11.5**	**11.6**	**12.3**	**12.5**	**12.8**	**12.8**	**13.1**	**13.1**
500 sq miles	**10.8**	**11.2**	**11.3**	**11.8**	**12.2**	**12.4**	**12.4**	**12.8**	**12.8**
1000 sq miles	**10.2**	**10.6**	**10.8**	**11.1**	**11.5**	**11.6**	**11.8**	**12.0**	**12.1**
2000 sq miles	**8.8**	**9.4**	**9.5**	**9.7**	**10.3**	**10.4**	**10.5**	**10.9**	**11.0**
5000 sq miles	**5.3**	**6.5**	**6.7**	**6.8**	**7.9**	**8.1**	**8.3**	**8.8**	**8.9**
10000 sq miles									
20000 sq miles									

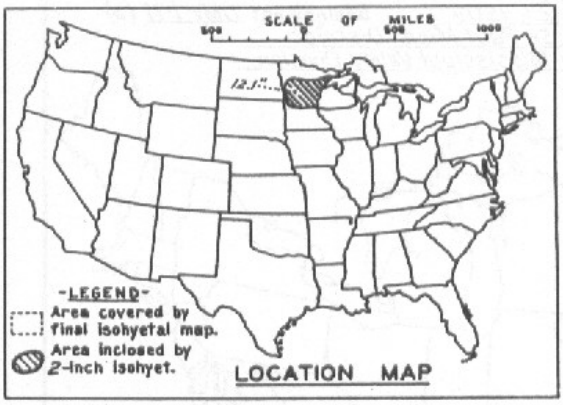
Storm or Storm Center Name	**USACE- UMV 1-11A-Beaulieu, MN**	
Storm Date(s)	18-Jul-1909	
Storm Type	MCC	
Storm Location	47.30 N	95.90 W
Storm Center Elevation	1,300	
Precipitation Total & Duration	13.20 Inches 72-hours USACE UMV 1-11	
Storm Representative Dewpoint	78.0 F	6
Storm Representative Dewpoint Location	43.32 N	98.08 W
Maximum Dewpoint	81.5 F	
Moisture Inflow Vector	SSW @ 300	
In-place Maximization Factor	1.17	
Temporal Transposition (Date)	15-Jul	
Transposition Dewpoint Location	37.02 N	84.18 W
Transposition Maximum Dewpoint	79.5 F	
Transposition Adjustment Factor	**0.94**	
Grid Point Elevation	900	
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.11**	

Beaulieu, MN July 18, 1909 Moisture Inflow Analysis



DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET (REV.)



LOCATION MAP

Storm of 18-23 July 1909
Assignment UMV 1-11 (a)
Location Northern Minn. & Wis.
Study Prepared by:
Upper Mississippi Valley Division
St. Paul District Office

Part I Reviewed by H. M. Sec. of Weather Bureau, 6/7/39
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 5/24/41
Remarks: Rainfall data only for Beaulieu, Minn. center Dewpt. 71° - Ref. Pt. 500 SSW Grid A-15

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 1 sheet, scale 1 : 1,000,000

Precipitation data and mass curves: (Number of Sheets)

Form 5001-C (Hourly precip. data)	4
Form 5001-B (24-hour " ")	-
Form 5001-D (" " " ")	8
Misc. precip. records, meteorological data, etc.	1
Form 5002 (Mass rainfall curves)	24

PART II

Final isohyetal maps, in 1 sheet, scale 1 : 1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)	4
Form S-11 (Depth-area data from isohyetal map)	2
Form S-12 (Maximum depth-duration data)	8
Maximum duration-depth-area curves	2
Data relating to periods of maximum rainfall	2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48	60	72	96	108
10	10.6	10.7	10.8	11.5	11.7	11.8	11.8	12.0	12.1	12.1	12.1
100	10.3	10.5	10.7	11.3	11.5	11.7	11.7	12.0	12.0	12.0	12.0
200	10.1	10.4	10.5	11.1	11.3	11.5	11.5	11.8	11.8	11.8	11.8
500	9.7	10.1	10.2	10.6	10.9	11.2	11.2	11.4	11.5	11.5	11.5
1,000	9.2	9.6	9.7	10.0	10.4	10.6	10.6	10.8	10.9	10.9	10.9
2,000	7.9	8.5	8.6	8.7	9.3	9.4	9.5	9.8	9.9	9.9	9.9
5,000	4.8	5.9	6.0	6.1	6.7	7.0	7.2	7.9	8.0	8.1	8.1

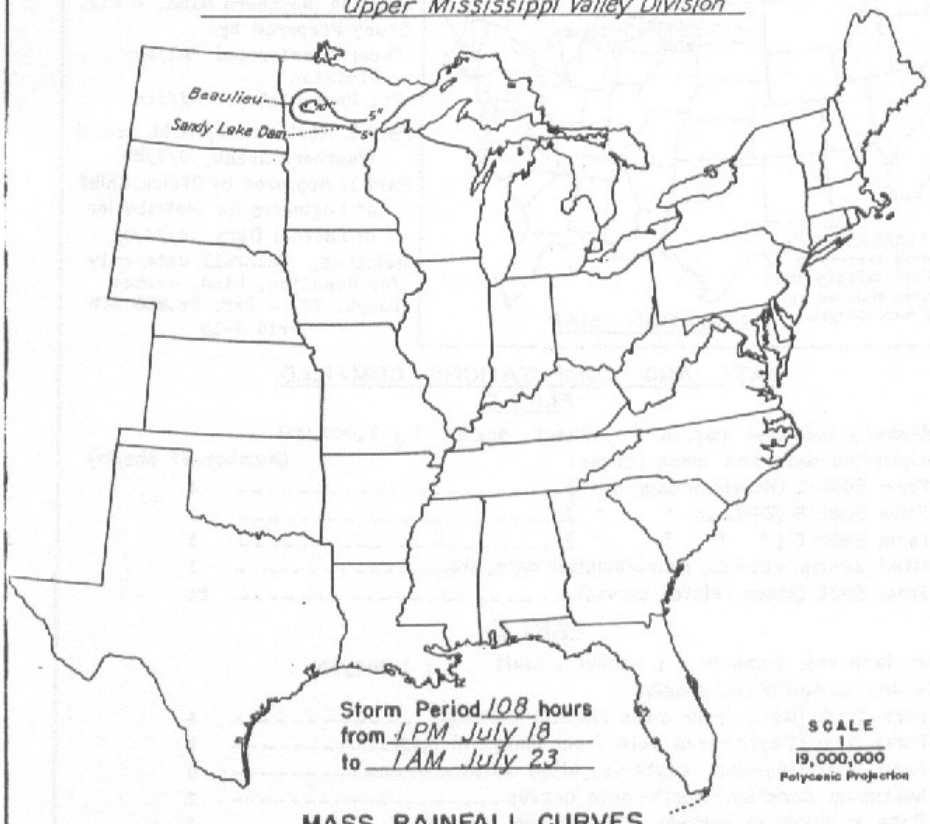
Form S-2

DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

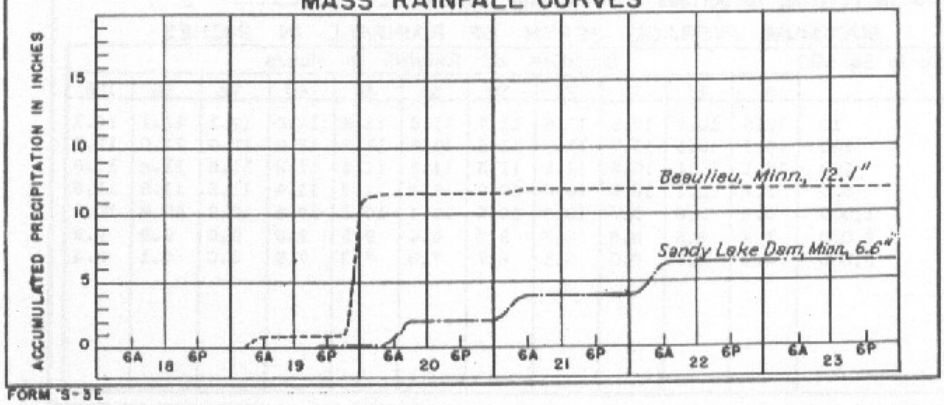
STORM STUDIES – ISOHYETAL MAP

Storm of July 18-23, 1909 Assignment UMV 1-11 (a)

Study Prepared by: St. Paul Minn. District
Upper Mississippi Valley Division



MASS RAINFALL CURVES



FORM S-3E

Ironwood, MI July 21, 1909
Transpositioned Grid Points: All
Storm Type: Synoptic

Storm Name:	**UMV 1-11b-Ironwood, MI**
Storm Date:	**July 18, 1909**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date	**15-Jul**	
	Lat	**Long**
Storm center location	**46.45 N**	**90.18 W**
Storm Rep Td location	**42.76 N**	**92.44 W**
Transposition Td location	**37.30 N**	**84.07W**
Grid point location	**41.00 N**	**82.00 W**

Moisture Inflow Direction:	**SSW @ 275**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**1,500**	feet
Storm Duration	**24**	hours

The storm representative Td is	**72.0 F**	with total precipitable water above sea level of			**2.47**	inches.
The in-place maximum Td is	**80.5 F**	with total precipitable water above sea level of			**3.68**	inches.
The transpositioned maximum Td is	**79.0 F**	with total precipitable water above sea level of			**3.44**	inches.
The in-place storm elevation is	**1,500**	which subtracts	**0.340**	inches of precipitable water at	**72.0 F**	
The in-place storm elevation is	**1,500**	which subtracts	**0.440**	inches of precipitable water at	**80.5 F**	
The transposition storm elevation at	**900**	which subtracts	**0.260**	inches of precipitable water at	**79.0 F**	
The moisture inflow barrier height is	**900**	which subtracts	**0.260**	inches of precipitable water at	**79.0 F**	

The in-place maximization factor is	**1.52**
The transposition factor is	**0.98**
The elevation/barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.49**

Notes: DAD values taken from USACE UMV 1-11b. Added 2° to USACE storm rep analyzed Td based on guidance from EPRI, Nebraska, and TRWD.

Observed Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**5.2**	**6.3**	**6.7**	**9.6**	**11.1**	**11.7**	**12.1**	**12.8**	**13.2**
100 sq miles	**5.1**	**6.2**	**6.6**	**9.4**	**10.8**	**11.4**	**11.8**	**12.5**	**12.9**
200 sq miles	**4.6**	**6.0**	**6.3**	**9.0**	**10.5**	**11.1**	**11.5**	**12.1**	**12.5**
500 sq miles	**3.9**	**5.5**	**5.8**	**7.9**	**9.8**	**10.1**	**10.7**	**11.2**	**11.5**
1000 sq miles	**3.2**	**5.0**	**5.3**	**6.9**	**9.0**	**9.3**	**9.7**	**10.3**	**10.5**
2000 sq miles	**2.8**	**4.4**	**4.6**	**6.0**	**7.9**	**8.2**	**8.7**	**9.2**	**9.5**
5000 sq miles	**2.3**	**3.6**	**3.8**	**5.0**	**6.5**	**6.8**	**7.2**	**7.8**	**8.0**
10000 sq miles	**2.1**	**3.2**	**3.4**	**4.2**	**5.4**	**5.6**	**6.0**	**6.5**	**6.7**
20000 sq miles	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Adjusted Storm Depth-Area-Duration

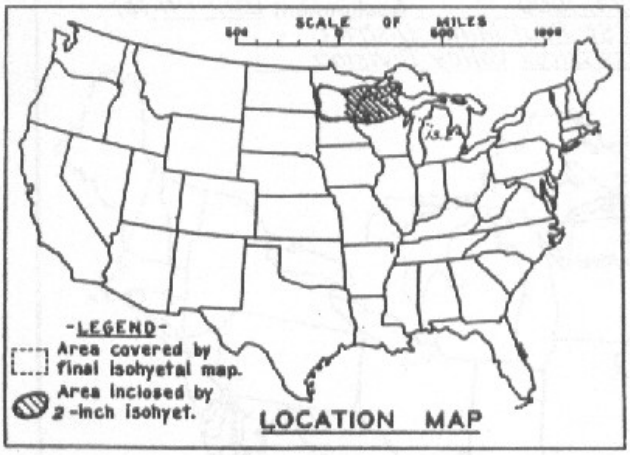
	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**7.8**	**9.4**	**10.0**	**14.3**	**16.6**	**17.5**	**18.1**	**19.1**	**19.7**
100 sq miles	**7.6**	**9.3**	**9.9**	**14.0**	**16.1**	**17.0**	**17.6**	**18.7**	**19.3**
200 sq miles	**6.9**	**9.0**	**9.4**	**13.4**	**15.7**	**16.6**	**17.2**	**18.1**	**18.7**
500 sq miles	**5.8**	**8.2**	**8.7**	**11.8**	**14.6**	**15.1**	**16.0**	**16.7**	**17.2**
1000 sq miles	**4.8**	**7.5**	**7.9**	**10.3**	**13.4**	**13.9**	**14.5**	**15.4**	**15.7**
2000 sq miles	**4.2**	**6.6**	**6.9**	**9.0**	**11.8**	**12.2**	**13.0**	**13.7**	**14.2**
5000 sq miles	**3.4**	**5.4**	**5.7**	**7.5**	**9.7**	**10.2**	**10.7**	**11.6**	**11.9**
10000 sq miles	**3.1**	**4.8**	**5.1**	**6.3**	**8.1**	**8.4**	**9.0**	**9.7**	**10.0**
20000 sq miles	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Storm or Storm Center Name	**UMV 1-11b-Ironwood, MI**	
Storm Date(s)	18-Jul-1909	
Storm Type	Synoptic	
Storm Location	46.45 N	90.18 W
Storm Center Elevation	1,500	
Precipitation Total & Duration	13.20 Inches 72-hours USACE UMV 1-11b	
Storm Representative Dewpoint	72.0 F	24
Storm Representative Dewpoint Location	42.76 N	92.44 W
Maximum Dewpoint	80.5 F	
Moisture Inflow Vector	SSW @ 275	
In-place Maximization Factor	1.52	
Temporal Transposition (Date)	15-Jul	
Transposition Dewpoint Location	37.30 N	84.07W
Transposition Maximum Td	79.0 F	
Transposition Adjustment Factor	**0.98**	
Grid Point Elevation	900	
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.49**	

Ironwood, MI July 21, 1909 Moisture Inflow Analysis

DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET (REV.)



LOCATION MAP

Storm of 18-23 July 1909
Assignment HMV 1-11-(b)
Location Northern Minn. & Wis.
Study Prepared by:
Upper Mississippi Valley Division
St. Paul District Office

Part I Reviewed by H. M. Sec. of Weather Bureau, 6/7/39
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 5/24/41
Remarks: Rainfall Data only for Ironwood, Mich. center Dewpt. 70° - Ref. Pt. 275 SSW Grid B-12

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 1 sheet, scale 1: 1,000,000

Precipitation data and mass curves: (Number of Sheets)

Form 5001-C (Hourly precip. data)	4
Form 5001-B (24-hour " ")	-
Form 5001-D (" " " ")	8
Misc. precip. records, meteorological data, etc.	1
Form 5002 (Mass rainfall curves)	24

PART II

Final isohyetal maps, in 1 sheet, scale 1: 1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)	4
Form S-11 (Depth-area data from isohyetal map)	2
Form S-12 (Maximum depth-duration data)	8
Maximum duration-depth-area curves	2
Data relating to periods of maximum rainfall	2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48	60	72	96	108
10	5.2	6.3	6.7	9.6	11.1	11.7	12.1	12.8	13.2	13.2	13.2
100	5.1	6.2	6.6	9.4	10.8	11.4	11.8	12.5	12.9	12.9	12.9
200	4.6	6.0	6.3	9.0	10.5	11.1	11.5	12.1	12.5	12.5	12.5
500	3.9	5.5	5.8	7.9	9.8	10.1	10.7	11.2	11.5	11.5	11.5
1,000	3.2	5.0	5.3	6.9	9.0	9.3	9.7	10.3	10.5	10.5	10.5
2,000	2.8	4.4	4.6	6.0	7.9	8.2	8.7	9.2	9.5	9.5	9.5
5,000	2.3	3.6	3.8	5.0	6.5	6.8	7.2	7.8	8.0	8.0	8.0
10,000	2.1	3.2	3.4	4.2	5.4	5.6	6.0	6.5	6.7	6.9	6.9

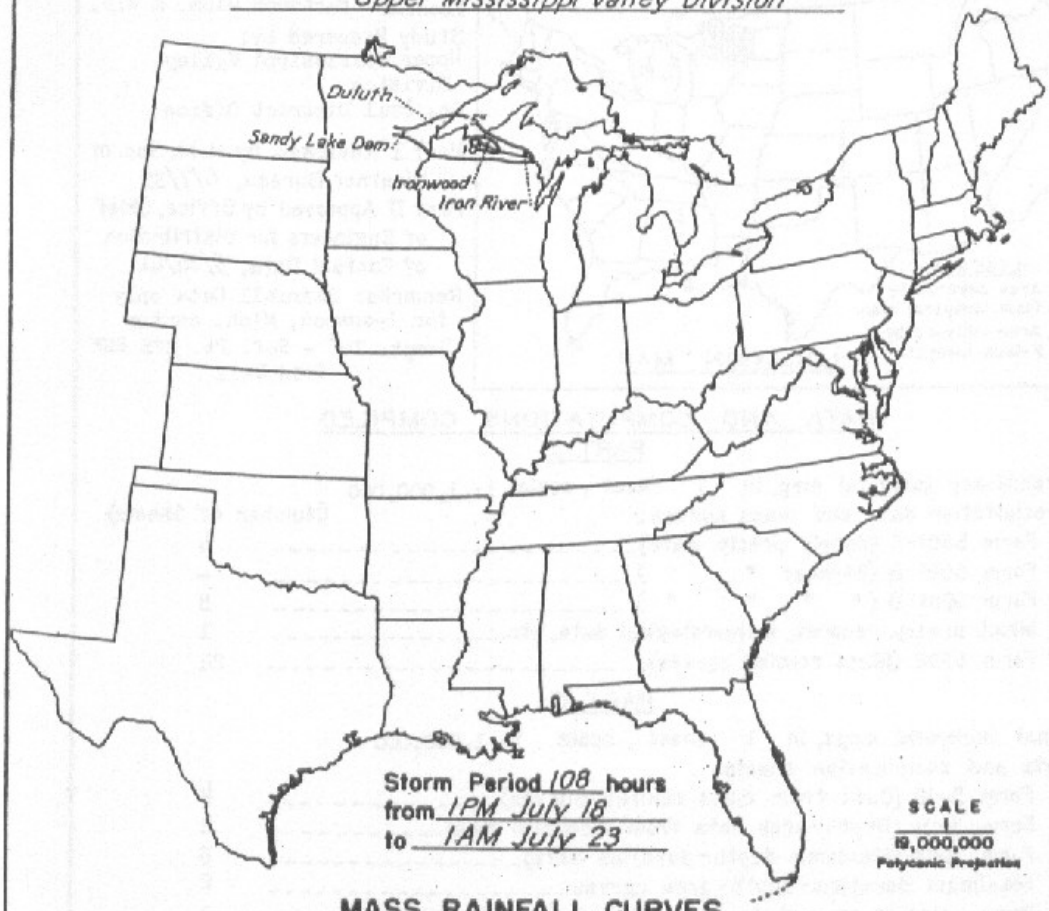
Form S-2

DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

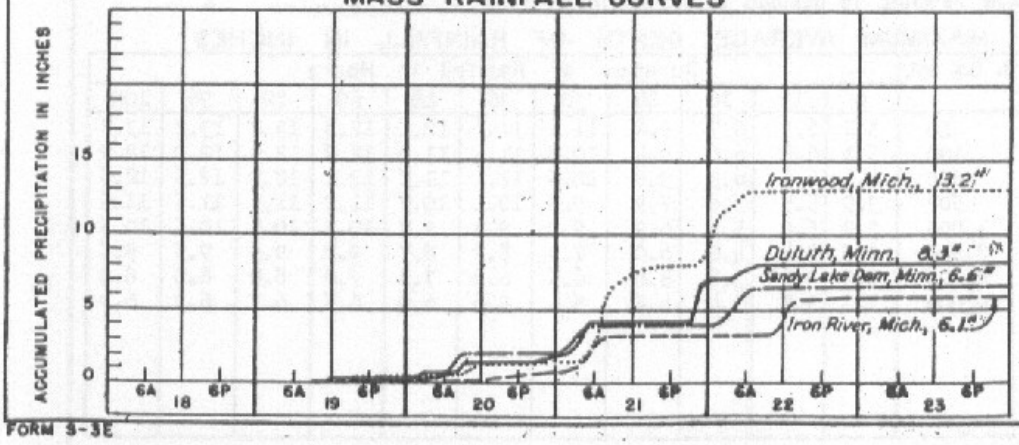
STORM STUDIES – ISOHYETAL MAP

Storm of July 18-23, 1909 Assignment UMV 1-11 (b)

Study Prepared by: St. Paul, Minn. District
Upper Mississippi Valley Division



MASS RAINFALL CURVES



FORM 3-3E

Cooper, MI August 31, 1914
Transpositioned Grid Points: All
Storm Type: MCC

Storm Name:	**USACE GL 2-16-Cooper, MI**
Storm Date:	**August 31, 1914**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date	**16-Aug**	
	Lat	**Long**
Storm center location	**42.38 N**	**85.61 W**
Storm Rep Td location	**40.10 N**	**89.00 W**
Transposition Td location	**38.72 N**	**85.39 W**
Grid point location	**41.00 N**	**82.00 W**

Moisture Inflow Direction:	**SW @ 250**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**900**	feet
Storm Duration	**6**	hours

The storm representative Td is	**75.0 F**	with total precipitable water above sea level of			**2.85**	inches.
The in-place maximum Td is	**80.0 F**	with total precipitable water above sea level of			**3.60**	inches.
The transpositioned maximum Td is	**79.5 F**	with total precipitable water above sea level of			**3.52**	inches.
The in-place storm elevation is	**900**	which subtracts	**0.230**	inches of precipitable water at	**75.0 F**	
The in-place storm elevation is	**900**	which subtracts	**0.270**	inches of precipitable water at	**80.0 F**	
The transposition storm elevation at	**900**	which subtracts	**0.270**	inches of precipitable water at	**79.5 F**	
The moisture inflow barrier height is	**900**	which subtracts	**0.270**	inches of precipitable water at	**79.5 F**	

The in-place maximization factor is	**1.27**
The transposition factor is	**0.98**
The elevation/barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.24**

Notes: DAD values taken from USACE GL 2-16. Storm representative dew point value was based on adding 7° to the USACE analysis using EPRI, Nebraska, and TRWD guidance.

Observed Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
10 sq miles	**12.6**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
100 sq miles	**11.3**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
200 sq miles	**10.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
500 sq miles	**7.6**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
1000 sq miles	**5.7**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
5000 sq miles	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
10000 sq miles	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
20000 sq miles	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Adjusted Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
10 sq miles	**15.6**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
100 sq miles	**14.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
200 sq miles	**12.4**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
500 sq miles	**9.4**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
1000 sq miles	**7.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
5000 sq miles	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
10000 sq miles	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
20000 sq miles	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Storm or Storm Center Name	**USACE GL 2-16-Cooper, MI**	
Storm Date(s)	31-Aug-1914	
Storm Type	MCS	
Storm Location	42.38 N	85.61 W
Storm Center Elevation	900	
Precipitation Total & Duration (10 sq mi)	12.60 Inches 6-hours USACE GL 2-16	
Storm Representative Td	75.0 F	6
Storm Representative Td Location	40.10 N	89.00 W
In-place Maximum Td	80.0 F	
Moisture Inflow Vector	SW @ 250	
In-place Maximization Factor	**1.27**	
Temporal Transposition (Date)	16-Aug	
Transposition Dewpoint Location	38.72 N	85.39 W
Transposition Maximum Td	79.5 F	
Transposition Adjustment Factor	**0.98**	
Grid Point Elevation	900	
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.24**	

Cooper, MI August 31, 1914 Moisture Inflow Analysis

WAR DEPARTMENT CORPS OF ENGINEERS, U. S. ARMY

STORM STUDIES - PERTINENT DATA SHEET

LOCATION MAP

Storm of 31 Aug.-1 Sept. 1914
Assignment GL 2-16
Location Michigan
Study Prepared by:
Great Lakes Division
Milwaukee District Office and
Hydrometeorological Section of
U. S. Weather Bureau.
Part I Reviewed by H. M. Sec. of Weather Bureau, 10/26/39
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 10/26/46
Remarks: Centers near
Cooper and Bloomingdale, Mich.

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 1 sheet, scale 1 : 2,500,000

Precipitation data and mass curves: (Number of Sheets)

Form 5001-C (Hourly precip. data)	8
Form 5001-B (24-hour " ")	5
Form 5001-D (" " " ")	-
Misc. precip. records, meteorological data, etc.	6
Form 5002 (Mass rainfall curves)	4

PART II

Final isohyetal maps, in 1 sheet, scale 1 : 1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)	2
Form S-11 (Depth-area data from isohyetal map)	-
Form S-12 (Maximum depth-duration data)	-
Maximum duration-depth-area curves	1
Data relating to periods of maximum rainfall	-

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6										
10	12.6										
50	12.0										
100	11.3										
200	10.0										
500	7.6										
800	6.3										
1,000	5.7										
1,200	5.2										

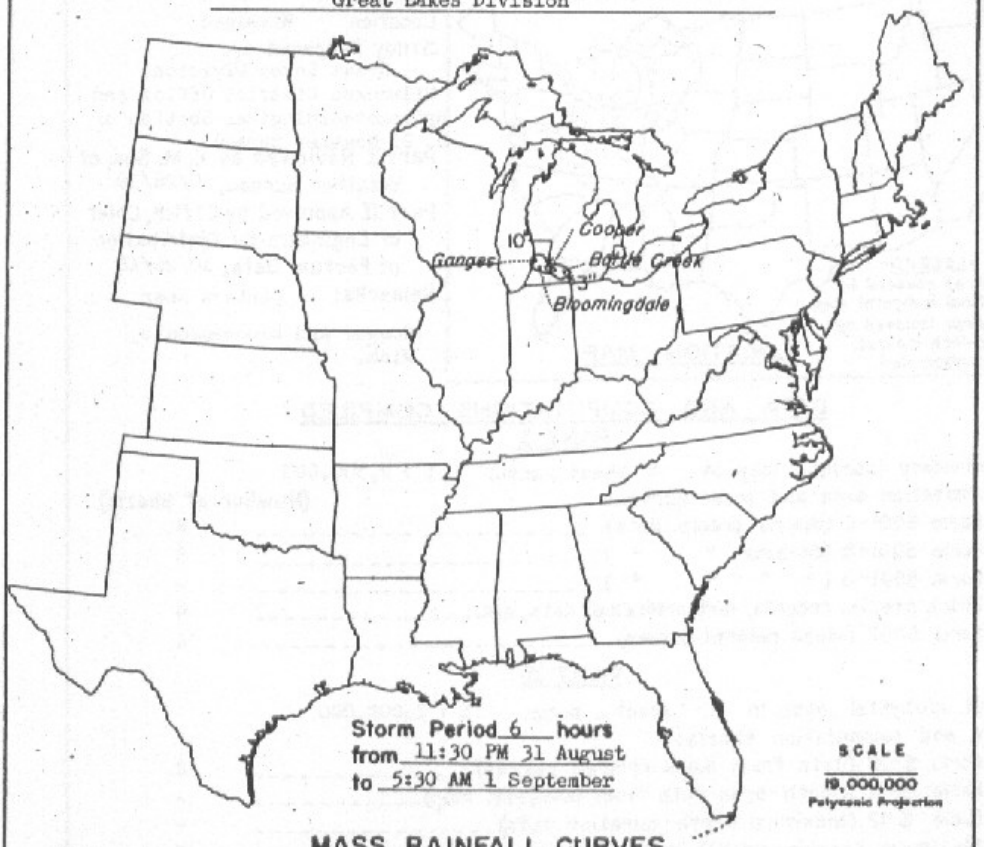
Form S-2

WAR DEPARTMENT — CORPS OF ENGINEERS, U. S. ARMY

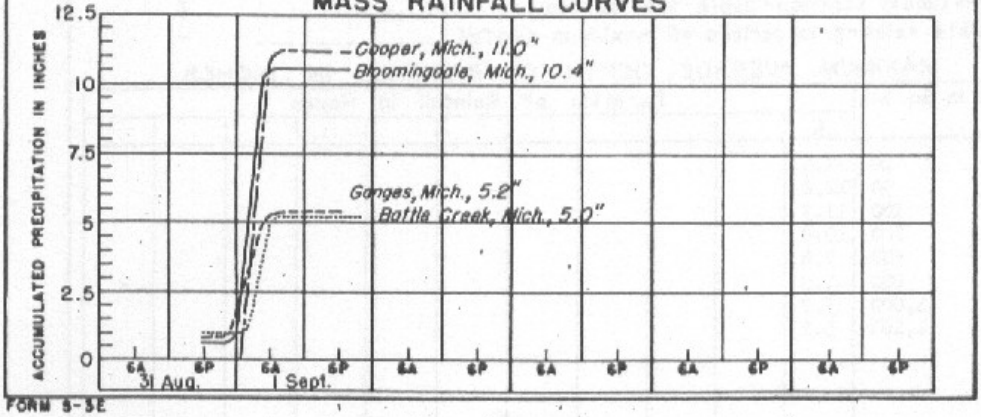
STORM STUDIES - ISOHYETAL MAP

Storm of Aug. 31-Sept. 1, 1914 Assignment GL 2-16

Study Prepared by: Milwaukee, Wisc. District
Great Lakes Division



MASS RAINFALL CURVES



FORM 5-3E

Neosho Falls, KS September 11, 1926
Transpositioned Grid Points: None
Storm Type: MCC/Synoptic

Storm Name:	**USACE SW 2-1-Neosho Falls, KS**
Storm Date:	**9/11-13/1926**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 1

Temporal Transposition Date	**25-Aug**	
	Lat	**Long**
Storm center location	**38.08N**	**95.70 W**
Storm Rep Td location	**31.35 N**	**93.80 W**
Transposition Td location	**31.27 N**	**83.60 W**
Grid point location	**38.00 N**	**85.00 W**

Moisture Inflow Direction:	**SSE @ 475**	miles
Grid Point Elevation	**600**	feet
Storm Elevation	**1,000**	feet
Storm Duration	**6**	hours

The storm representative dew point is	**75.0 F**	with total precipitable water above sea level of				**2.85**	inches.
The in-place maximum dew point is	**80.0 F**	with total precipitable water above sea level of				**3.60**	inches.
The transpositioned maximum dew point is	**79.5 F**	with total precipitable water above sea level of				**3.52**	inches.
The in-place storm elevation is	**1,000**	which subtracts	**0.250**	inches of precipitable water at		**75.0 F**	
The in-place storm elevation is	**1,000**	which subtracts	**0.290**	inches of precipitable water at		**80.0 F**	
The transposition basin elevation at	**600**	which subtracts	**0.180**	inches of precipitable water at		**79.5 F**	
The inflow barrier/basin elevation height is	**600**	which subtracts	**0.180**	inches of precipitable water at		**79.5 F**	

The in-place storm maximization factor is	**1.27**
The transposition/elevation to basin factor is	**1.01**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.28**

Notes: DAD values taken from USACE SW 2-1. Storm representative dew point value was based on maximum 6-hr Td values between September 1, 1926 at WBAN 93936 and 12945.

Observed Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**13.6**	**13.8**	**14.0**	**14.0**	**14.0**	**14.0**	**14.0**	**14.0**	**14.0**
10 sq miles	**13.4**	**13.7**	**13.9**	**13.9**	**13.9**	**13.9**	**13.9**	**13.9**	**13.9**
100 sq miles	**12.2**	**12.5**	**12.7**	**12.7**	**12.7**	**12.7**	**12.7**	**12.7**	**12.7**
200 sq miles	**11.4**	**11.7**	**11.9**	**12.0**	**12.0**	**12.0**	**12.0**	**12.0**	**12.0**
500 sq miles	**9.5**	**10.0**	**10.2**	**10.2**	**10.2**	**10.2**	**10.2**	**10.2**	**10.2**
1000 sq miles	**7.9**	**8.5**	**8.8**	**8.8**	**8.8**	**8.8**	**8.8**	**8.8**	**8.8**
5000 sq miles	**4.3**	**5.1**	**5.3**	**5.3**	**5.3**	**5.3**	**5.3**	**5.5**	**5.5**
10000 sq miles	**2.9**	**3.8**	**3.9**	**4.0**	**4.0**	**4.0**	**4.2**	**4.3**	**4.4**
20000 sq miles	**1.7**	**2.6**	**2.7**	**2.8**	**2.8**	**2.8**	**2.9**	**3.3**	**3.5**

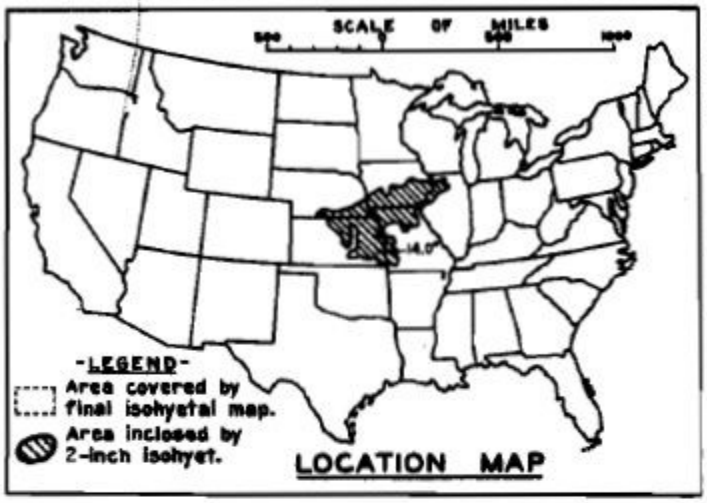
Adjusted Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**17.5**	**17.7**	**18.0**	**18.0**	**18.0**	**18.0**	**18.0**	**18.0**	**18.0**
10 sq miles	**17.2**	**17.6**	**17.9**	**17.9**	**17.9**	**17.9**	**17.9**	**17.9**	**17.9**
100 sq miles	**15.7**	**16.1**	**16.3**	**16.3**	**16.3**	**16.3**	**16.3**	**16.3**	**16.3**
200 sq miles	**14.6**	**15.0**	**15.3**	**15.4**	**15.4**	**15.4**	**15.4**	**15.4**	**15.4**
500 sq miles	**12.2**	**12.8**	**13.1**	**13.1**	**13.1**	**13.1**	**13.1**	**13.1**	**13.1**
1000 sq miles	**10.1**	**10.9**	**11.3**	**11.3**	**11.3**	**11.3**	**11.3**	**11.3**	**11.3**
5000 sq miles	**5.5**	**6.6**	**6.8**	**6.8**	**6.8**	**6.8**	**6.8**	**7.1**	**7.1**
10000 sq miles	**3.7**	**4.9**	**5.0**	**5.1**	**5.1**	**5.1**	**5.4**	**5.5**	**5.7**
20000 sq miles	**2.2**	**3.3**	**3.5**	**3.6**	**3.6**	**3.6**	**3.7**	**4.2**	**4.5**

Storm or Storm Center Name	**USACE SW 2-1-Neosho Falls, KS**	
Storm Date(s)	9/11-13/1926	
Storm Type	MCC-Thunderstorm Complex	
Storm Location	38.08N	95.70 W
Storm Center Elevation	1,000	
Precipitation Total & Duration	14.00 Inches 18-hours	
Storm Representative Td	75.0 F	6
Storm Representative Td Location	31.35 N	93.80 W
Maximum Td	80.0 F	
Moisture Inflow Vector	SSE @ 475	
In-place Maximization Factor	**0.00**	
Temporal Transposition (Date)	25-Aug	
Transposition Td Location	31.27 N	83.60 W
Transposition Maximum Td	79.5 F	
Transposition Adjustment Factor	**1.01**	
Grid Point Elevation	600	
Inflow Barrier Height	600	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.28**	

Neosho Falls, KS September 11, 1926 Moisture Inflow Analysis

STORM STUDIES - PERTINENT DATA SHEET



LOCATION MAP

Storm of September 11-16, 1926
Assignment S W 2 - 1
Location Kans. Nebr. Iowa Mo.
Study Prepared by:
Southwestern Division
Tulsa District Office

Part I Reviewed by H. M. Sec. of Weather Bureau, 1/31/41
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 6/5/45
Remarks: Center near Neosho Falls, Kans.

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 1 sheet, scale 1 : 2,500,000

Precipitation data and mass curves: (Number of Sheets)

Form 5001-C (Hourly precip. data)	8
Form 5001-B (24-hour " ")	-
Form 5001-D (" " " ")	6
Misc. precip. records, meteorological data, etc.	2
Form 5002 (Mass rainfall curves)	17

PART II

Final isohyetal maps, in 1 sheet, scale 1 : 1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)	10
Form S-11 (Depth-area data from isohyetal map)	2
Form S-12 (Maximum depth-duration data)	6
Maximum duration-depth-area curves	1
Data relating to periods of maximum rainfall	2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48	60	72	96	114
Max. Station	13.6	13.8	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
10	13.4	13.7	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9
100	12.2	12.5	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7
200	11.4	11.7	11.9	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
500	9.5	10.0	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.4	10.4
1,000	7.9	8.5	8.8	8.8	8.8	8.8	8.8	8.8	8.8	9.0	9.0
2,000	6.4	7.1	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.6	7.6
5,000	4.3	5.1	5.3	5.3	5.3	5.3	5.3	5.5	5.5	5.8	5.8
10,000	2.9	3.8	3.9	4.0	4.0	4.0	4.2	4.3	4.4	5.0	5.0
20,000	1.7	2.6	2.7	2.8	2.8	2.8	2.9	3.3	3.5	4.4	4.5
30,000	1.2	2.0	2.1	2.2	2.2	2.2	2.3	2.8	3.0	4.1	4.2

Form S-2

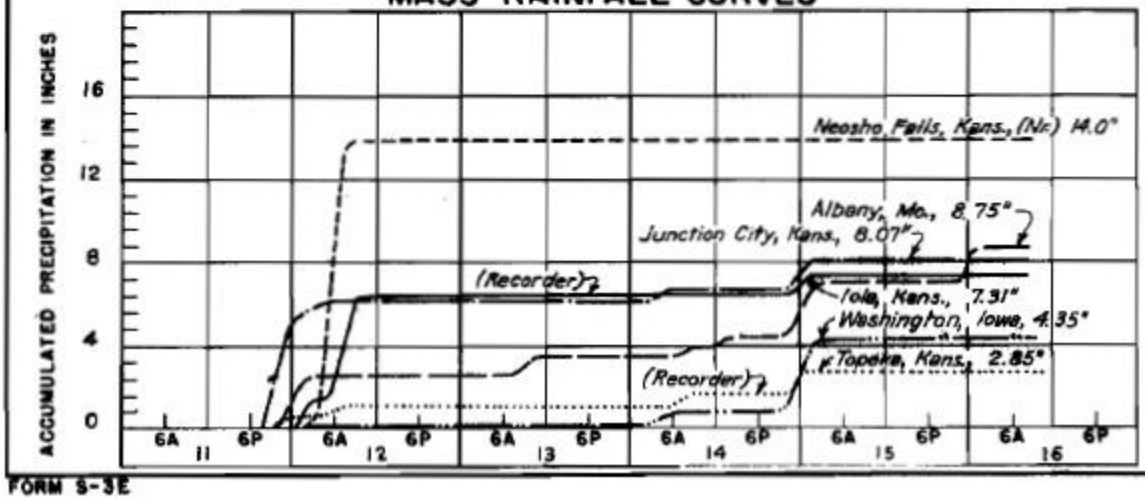
WAR DEPARTMENT — CORPS OF ENGINEERS, U. S. ARMY

STORM STUDIES - ISOHYETAL MAP

Storm of *September 11-16 1926* Assignment *SW 2-1*

Study Prepared by: *Tulsa, Okla. District*
Southwestern Divisions

MASS RAINFALL CURVES



FORM S-3E

Boyden, IA September 17, 1926
Transpositioned Grid Points: 1-3, 6-9, 12-15, 18-21
Storm Type: MCC

Storm Name:	**Boyden, IA MR4-24**
Storm Date:	**17-Sep-1926**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date **3-Sep**

	Lat	Long
Storm center location	**43.19 N**	**96.01 W**
Storm Rep Td location	**40.85 N**	**94.75 W**
Transposition Td location	**38.66 N**	**80.74 W**
Grid point location	**41.00 N**	**82.00 W**

Moisture Inflow Direction:	**SSE @ 175**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**1,400**	feet
Storm Duration	**12**	hours

The storm representative Td is	**77.0 F**	with total precipitable water above sea level of			**3.14**	inches.
The in-place maximum Td is	**78.0 F**	with total precipitable water above sea level of			**3.29**	inches.
The transpositioned maximum Td is	**76.5 F**	with total precipitable water above sea level of			**3.07**	inches.
The in-place storm elevation is	**1,400**	which subtracts	**0.370**	inches of precipitable water at	**77.0 F**	
The in-place storm elevation is	**1,400**	which subtracts	**0.380**	inches of precipitable water at	**78.0 F**	
The transposition basin elevation at	**900**	which subtracts	**0.240**	inches of precipitable water at	**76.5 F**	
The inflow barrier/basin elevation height is	**900**	which subtracts	**0.240**	inches of precipitable water at	**76.5 F**	

The in-place storm maximization factor is	**1.05**
The transposition/elevation to basin factor is	**0.97**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.02**

Notes: DAD values taken from USACE Storm Studies MR 4-24. Storm representative Td value was based on adding 7° to the USACE analysis following EPRI, Nebraska, and TRWD guidance.

Observed Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**18.4**	**23.8**	**24.0**	**24.0**	**24.0**	**24.0**	**24.0**		
10 sq miles	**15.1**	**20.7**	**21.7**	**21.7**	**21.7**	**21.7**	**21.7**		
100 sq miles	**12.8**	**17.1**	**17.8**	**17.8**	**17.8**	**17.8**	**17.8**		
200 sq miles	**11.7**	**15.8**	**16.6**	**16.6**	**16.6**	**16.6**	**16.6**		
500 sq miles	**9.4**	**12.6**	**13.3**	**13.3**	**13.3**	**13.3**	**13.3**		
1000 sq miles	**7.5**	**10.1**	**10.4**	**10.6**	**10.6**	**10.6**	**10.6**		
2000 sq miles	**5.9**	**8.0**	**8.2**	**8.6**	**8.6**	**8.6**	**8.6**		
5000 sq miles	**4.1**	**6.3**	**6.4**	**6.6**	**6.6**	**6.6**	**6.6**		
10000 sq miles	**3.0**	**5.2**	**5.4**	**5.5**	**5.6**	**5.6**	**5.6**		
20000 sq miles	**2.1**	**4.1**	**4.3**	**4.4**	**4.6**	**4.8**	**4.9**		

Adjusted Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**18.8**	**24.3**	**24.5**	**24.5**	**24.5**	**24.5**	**24.5**		
10 sq miles	**15.4**	**21.1**	**22.1**	**22.1**	**22.1**	**22.1**	**22.1**		
100 sq miles	**13.1**	**17.4**	**18.2**	**18.2**	**18.2**	**18.2**	**18.2**		
200 sq miles	**11.9**	**16.1**	**16.9**	**16.9**	**16.9**	**16.9**	**16.9**		
500 sq miles	**9.6**	**12.9**	**13.6**	**13.6**	**13.6**	**13.6**	**13.6**		
1000 sq miles	**7.6**	**10.3**	**10.6**	**10.8**	**10.8**	**10.8**	**10.8**		
2000 sq miles	**6.0**	**8.2**	**8.4**	**8.8**	**8.8**	**8.8**	**8.8**		
5000 sq miles	**4.2**	**6.4**	**6.5**	**6.7**	**6.7**	**6.7**	**6.7**		
10000 sq miles	**3.1**	**5.3**	**5.5**	**5.6**	**5.7**	**5.7**	**5.7**		
20000 sq miles	**2.1**	**4.2**	**4.4**	**4.5**	**4.7**	**4.9**	**5.0**		

Storm or Storm Center Name	**Boyden, IA MR4-24**	
Storm Date(s)	17-Sep-1926	
Storm Type	MCC	
Storm Location	43.19 N	96.01 W
Storm Center Elevation	1,400	
Precipitation Total & Duration	24.00 Inches 18-hours USACE Storm Studies MR 4-24	
Storm Representative Td	77.0 F	12
Storm Representative Td Location	40.85 N	94.75 W
Maximum Td	78.0 F	
Moisture Inflow Vector	SSE @ 175	
In-place Maximization Factor	**1.05**	
Temporal Transposition (Date)	3-Sep	
Transposition Td Location	38.66 N	80.74 W
Transposition Maximum Td	76.5 F	
Transposition Adjustment Factor	**0.97**	
Grid Point Elevation	900	
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.02**	

Boyden, IA September 17, 1926 Moisture Inflow Analysis

DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET

LOCATION MAP

Storm of 17-19 September 1926
Assignment MR 4-24
Location Ia, Minn, Nebr. S.D. & Wisc
Study Prepared by:
Missouri River Division
Omaha District Office

Part I Reviewed by H. M. Sec. of Weather Bureau, 8/5/47
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 12/23/47
Remarks: Centers near Boyden & Maurice, Ia. Dewpt. 70° - Ref. Pt. 175 SSE Grid C-15

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 2 sheets, scale 1:500,000

Precipitation data and mass curves: (Number of Sheets)

Form 5001-C (Hourly precip. data)	8
Form 5001-B (24-hour " ")	-
Form 5001-D (" " " ")	11
Miscl. precip. records, meteorological data, etc.	29
Form 5002 (Mass rainfall curves)	27

PART II

Final isohyetal maps, in 1 sheet, scale 1:1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)	3
Form S-11 (Depth-area data from isohyetal map)	2
Form S-12 (Maximum depth-duration data)	17
Maximum duration-depth-area curves	1
Data relating to periods of maximum rainfall	7

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48	54			
Max. Station	18.4	23.8	24.0	24.0	24.0	24.0	24.0	24.0			
10	15.1	20.7	21.7	21.7	21.7	21.7	21.7	21.7			
100	12.8	17.1	17.8	17.8	17.8	17.8	17.8	17.8			
200	11.7	15.8	16.6	16.6	16.6	16.6	16.6	16.6			
500	9.4	12.6	13.3	13.3	13.3	13.3	13.3	13.3			
1,000	7.5	10.1	10.4	10.6	10.6	10.6	10.6	10.6			
2,000	5.9	8.0	8.2	8.6	8.6	8.6	8.6	8.6			
5,000	4.1	6.3	6.4	6.6	6.6	6.6	6.6	6.6			
10,000	3.0	5.2	5.4	5.5	5.6	5.6	5.6	5.6			
20,000	2.1	4.1	4.3	4.4	4.6	4.8	4.9	4.9			
50,000	1.4	2.7	2.9	3.0	3.2	3.6	3.8	3.8			
63,000	1.2	2.4	2.6	2.7	2.9	3.3	3.5	3.5			

Form S-2

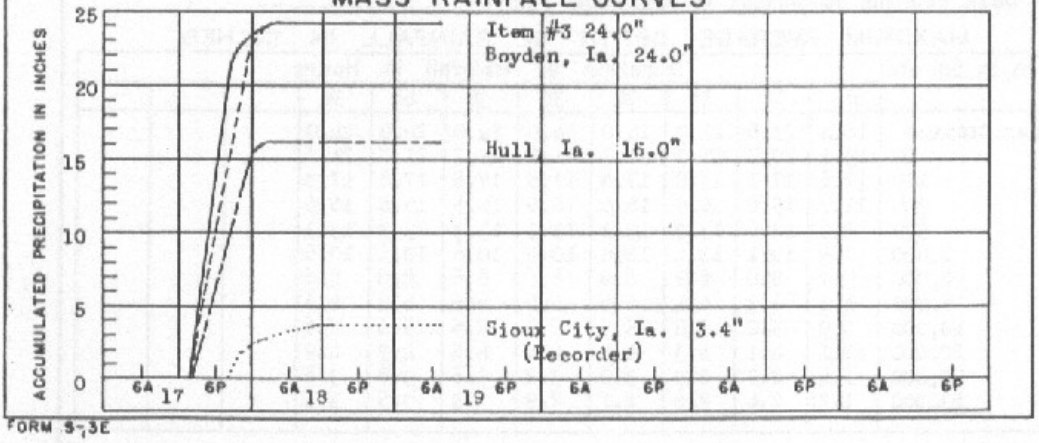
DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES – ISOHYETAL MAP

Storm of 17-19 September 1926 Assignment MR 4-24

Study Prepared by: Omaha, Nebr. District
Missouri River Division

MASS RAINFALL CURVES



FORM S-3E

Cheyenne, OK April 3, 1934
Transpositioned Grid Points: None
Storm Type: MCC

Storm Name:	**USACE SW 2-11-Cheyenne, OK**
Storm Date:	**03-Apr-1934**
AWA Analysis Date:	**10/11/2012**

Storm Adjustment for Ohio-In Place Only

Temporal Transposition Date	**15-Apr**	
	Lat	**Long**
Storm center location	**35.61 N**	**99.67 W**
Storm Rep Td location	**33.04 N**	**96.62 W**
Transposition Td location	**XX**	**XX**
Basin location	**XX**	**XX**

Moisture Inflow Direction:	**SE @ 250**	miles
Basin Elevation	**1,300**	feet
Storm Elevation	**1,990**	feet
Storm Duration	**12hr**	feet

The storm representative Td is	**71.0 F**	with total precipitable water above sea level of				**2.36**	inches.
The in-place maximum Td is	**73.0 F**	with total precipitable water above sea level of				**2.60**	inches.
The transpositioned maximum Td is	**XX**	with total precipitable water above sea level of				**X.XX**	inches.
The in-place storm elevation is	**1,990**	which subtracts	**0.44**	inches of precipitable water at		**71.0 F**	
The in-place storm elevation is	**1,990**	which subtracts	**0.45**	inches of precipitable water at		**73.0 F**	
The transposition basin elevation at	**XXXX**	which subtracts	**XX**	inches of precipitable water at		**XX**	
The inflow barrier/basin elevation height is	**XXXX**	which subtracts	**XX**	inches of precipitable water at		**XX**	

The in-place storm maximization factor is	**1.12**
The transposition/elevation to basin factor is	**#VALUE!**
The barrier adjustment factor is	**#VALUE!**
The total adjustment factor is	**#VALUE!**

Notes: DAD values taken from USACE Storm Studies SW 2-11.
Added 7° to storm rep Td.

Observed Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**17.3**	**20.8**	**21.3**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
100 sq miles	**14.4**	**17.1**	**17.7**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
200 sq miles	**13.3**	**15.7**	**16.4**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
500 sq miles	**11.5**	**13.5**	**14.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
1000 sq miles	**9.1**	**10.7**	**11.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
5000 sq miles	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
10000 sq miles	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
20000 sq miles	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Adjusted Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**
100 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**
200 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**
500 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**
1000 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**
5000 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**
10000 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**
20000 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**

Storm or Storm Center Name	**USACE SW 2-11-Cheyenne, OK**	
Storm Date(s)	3-Apr-1934	
Storm Type	MCC	
Storm Location	35.61 N	99.67 W
Storm Center Elevation	1,990	
Precipitation Total & Duration	23.00 Inches 12-hours USACE Storm Studies SW 2-11	
Storm Representative Td	71.0 F	12hr average added 7°F to Td as accepted by EPRI Michigan Wisconsin study
Storm Representative Td Location	33.04 N	96.62 W
Maximum Td	73.0 F	
Moisture Inflow Vector	SE @ 250	
In-place Maximization Factor	1.12	
Temporal Transposition (Date)	15-Apr	
Transposition Td Location	XX	XX
Transposition Maximum Td	XX	
Basin Elevation	1,300	
Transposition to Basin Adjustment Factor	#VALUE!	
Higher of Basin Elevation - Inflow Barrier Height	1,300	
Elevation Adjustment Factor	#VALUE!	
Total Adjustment Factor	#VALUE!	

DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET

LOCATION MAP

Storm of 3-4 April 1934
Assignment SW 2-11
Location Oklahoma and Texas
Study Prepared by:
Southwestern Division
Tulsa District Office

Part I Reviewed by H. M. Sec. of Weather Bureau, 7/22/46
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 8/19/47
Remarks: Center near Cheyenne, Oklahoma
Dewpt. 64°- Ref. Pt. 250 SE Grid G-17

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 1 sheet, scale 1:250,000

Precipitation data and mass curves: (Number of Sheets)

Form 5001-C (Hourly precip. data)	2
Form 5001-B (24-hour " ")	-
Form 5001-D (" " " ")	7
Misc. precip. records, meteorological data, etc. (Supplemental Folder)	112
Form 5002 (Mass rainfall curves)	21

PART II

Final isohyetal maps, in 1 sheet, scale 1:250,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)	3
Form S-11 (Depth-area data from isohyetal map)	2
Form S-12 (Maximum depth-duration data)	4
Maximum duration-depth-area curves	1
Data relating to periods of maximum rainfall	1

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18								
Max. Station	20.0	23.0	23.0								
10	17.3	20.8	21.3								
100	14.4	17.1	17.7								
200	13.3	15.7	16.4								
500	11.5	13.5	14.0								
1,000	9.1	10.7	11.1								
2,000	6.2	7.3	7.5								
2,200	5.8	6.9	7.1								

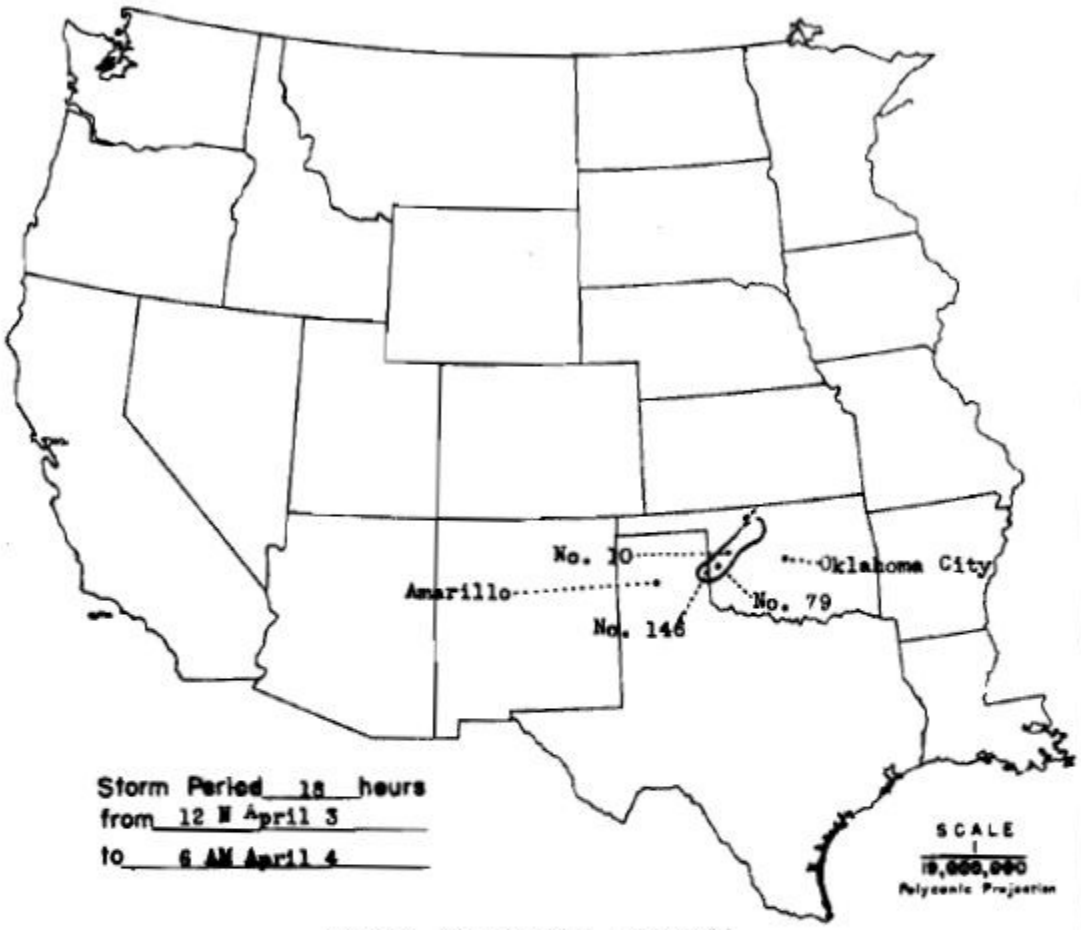
Form 5-2

DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES – ISOHYETAL MAP

Storm of 3-4 April 1934 — Assignment SW 2-11

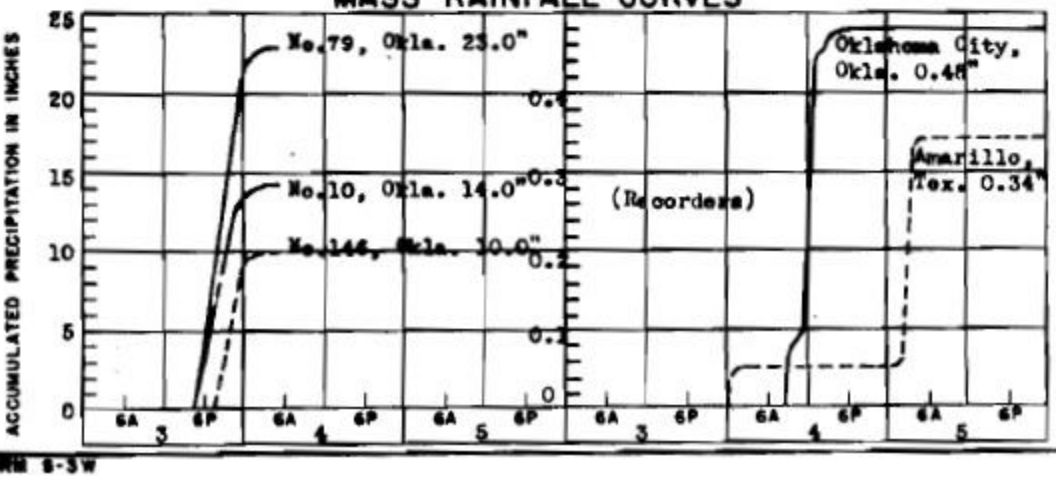
Study Prepared by: Tulsa, Okla. District
Southwestern Division



Storm Period 18 hours
from 12 M April 3
to 6 AM April 4

SCALE
1
19,000,000
Polyconic Projection

MASS RAINFALL CURVES



FORM 8-3W

Newcomerstown, OH August 6, 1935
Transpositioned Grid Points: All
Storm Type: MCC/Synoptic

Storm Name:	**USACE OR 9-11-Newcomerstown**
Storm Date:	**8/6-7/1935**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date	**20-Jul**	
	Lat	**Long**
Storm center location	**40.27 N**	**81.61 W**
Storm Rep SST location	**35.53 N**	**86.00 W**
Transposition SST location	**36.26 N**	**86.39 W**
Grid point location	**40.41 N**	**84.24 W**

Moisture Inflow Direction:	**SW @ 415**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**800**	feet
Storm Duration	**6**	hours

The storm representative SST is	**77.5 F**	with total precipitable water above sea level of			**3.22**	inches.
The in-place maximum SST is	**80.0 F**	with total precipitable water above sea level of			**3.60**	inches.
The transpositioned maximum SST is	**80.0 F**	with total precipitable water above sea level of			**3.60**	inches.
The in-place storm elevation is	**800**	which subtracts	**0.220**	inches of precipitable water at	**77.5 F**	
The in-place storm elevation is	**800**	which subtracts	**0.240**	inches of precipitable water at	**80.0 F**	
The transposition storm elevation at	**900**	which subtracts	**0.270**	inches of precipitable water at	**80.0 F**	
The moisture inflow barrier height is	**900**	which subtracts	**0.270**	inches of precipitable water at	**80.0 F**	

The in-place maximization factor is	**1.12**
The transposition factor is	**0.99**
The elevation/barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.11**

Notes: DAD values taken from USACE OR 9-11. Storm representative dew point value was based on maximum 6-hr Td values between August 4-6, 1935 at WBAN 93877 and 13882.

Observed Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**11.3**	**12.7**	**12.7**	**12.7**	**12.7**	**12.7**	**12.7**	-	-
10 sq miles	**9.6**	**11.6**	**11.7**	**11.8**	**11.8**	**11.8**	**11.8**	-	-
100 sq miles	**7.6**	**10.2**	**10.3**	**10.4**	**10.4**	**10.4**	**10.4**	-	-
200 sq miles	**7.0**	**9.6**	**9.8**	**9.9**	**9.9**	**9.9**	**9.9**	-	-
500 sq miles	**6.1**	**8.7**	**9.0**	**9.1**	**9.1**	**9.1**	**9.1**	-	-
1000 sq miles	**5.4**	**7.8**	**8.0**	**8.1**	**8.1**	**8.1**	**8.1**	-	-
2000 sq miles	**4.6**	**6.7**	**7.0**	**7.1**	**7.1**	**7.1**	**7.1**	-	-
5000 sq miles	**3.6**	**5.2**	**5.6**	**5.7**	**5.7**	**5.7**	**5.7**	-	-
10000 sq miles	**2.8**	**4.0**	**4.5**	**4.6**	**4.6**	**4.6**	**4.6**	-	-
20000 sq miles	-	-	-	-	-	-	-	-	-

Adjusted Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**12.6**	**14.1**	**14.1**	**14.1**	**14.1**	**14.1**	**14.1**	-	-
10 sq miles	**10.7**	**12.9**	**13.0**	**13.1**	**13.1**	**13.1**	**13.1**	-	-
100 sq miles	**8.5**	**11.3**	**11.5**	**11.6**	**11.6**	**11.6**	**11.6**	-	-
200 sq miles	**7.8**	**10.7**	**10.9**	**11.0**	**11.0**	**11.0**	**11.0**	-	-
500 sq miles	**6.8**	**9.7**	**10.0**	**10.1**	**10.1**	**10.1**	**10.1**	-	-
1000 sq miles	**6.0**	**8.7**	**8.9**	**9.0**	**9.0**	**9.0**	**9.0**	-	-
2000 sq miles	**5.1**	**7.4**	**7.8**	**7.9**	**7.9**	**7.9**	**7.9**	-	-
5000 sq miles	**4.0**	**5.8**	**6.2**	**6.3**	**6.3**	**6.3**	**6.3**	-	-
10000 sq miles	**3.1**	**4.4**	**5.0**	**5.1**	**5.1**	**5.1**	**5.1**	-	-
20000 sq miles	-	-	-	-	-	-	-	-	-

Storm or Storm Center Name	**USACE OR 9-11-Newcomerstown, OH**	
Storm Date(s)	8/6-7/1935	
Storm Type	MCC	
Storm Location	40.27 N	81.61 W
Storm Center Elevation	800	
Precipitation Total & Duration (10 sq mi)	12.7 inches in 12 hours	
Storm Representative SST	77.5 F	6
Storm Representative SST Location	35.53 N	86.00 W
In-place Maximum SST	80.0 F	
Moisture Inflow Vector	SW @ 415	
In-place Maximization Factor	**1.12**	
Temporal Transposition (Date)	20-Jul	
Transposition Dewpoint Location	36.26 N	86.39 W
Transposition Maximum SST	80.0 F	
Transposition Adjustment Factor	**0.99**	
Grid Point Elevation	900	
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.11**	

Newcomerstown, OH August 6, 1935 Moisture Inflow Analysis

WAR DEPARTMENT CORPS OF ENGINEERS, U.S. ARMY

STORM STUDIES - PERTINENT DATA SHEET

LOCATION MAP

Storm of 6-7 August 1935
Assignment O R 9 - 11
Location Ohio
Study Prepared by:
Ohio River Division
Pittsburgh District Office

Part I Reviewed by H. M. Sec. of Weather Bureau, 1/20/40
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 2/12/46
Remarks: Center near
Keene, Ohio

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 1 sheet, scale 1:2,500,000

Precipitation data and mass curves:	(Number of Sheets)
Form 5001-C (Hourly precip. data)	10
Form 5001-B (24-hour " ")	59
Form 5001-D (" " " ")	—
Misc. precip. records, meteorological data, etc.	—
Form 5002 (Mass rainfall curves)	59

PART II

Final isohyetal maps, in 1 sheet, scale 1:1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)	5
Form S-11 (Depth-area data from isohyetal map)	1
Form S-12 (Maximum depth-duration data)	14
Maximum duration-depth-area curves	1
Data relating to periods of maximum rainfall	2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48				
Max. Station	11.3	12.7	12.7	12.7	12.7	12.7	12.7				
10	9.6	11.6	11.7	11.8	11.8	11.8	11.8				
100	7.6	10.2	10.3	10.4	10.4	10.4	10.4				
200	7.0	9.6	9.8	9.9	9.9	9.9	9.9				
500	6.1	8.7	9.0	9.1	9.1	9.1	9.1				
1,000	5.4	7.8	8.0	8.1	8.1	8.1	8.1				
2,000	4.6	6.7	7.0	7.1	7.1	7.1	7.1				
5,000	3.6	5.2	5.6	5.7	5.7	5.7	5.7				
10,000	2.8	4.0	4.5	4.6	4.6	4.6	4.6				
19,300	2.1	2.9	3.4	3.5	3.5	3.5	3.5				

Form S-2

WAR DEPARTMENT — CORPS OF ENGINEERS, U. S. ARMY

STORM STUDIES – ISOHYETAL MAP

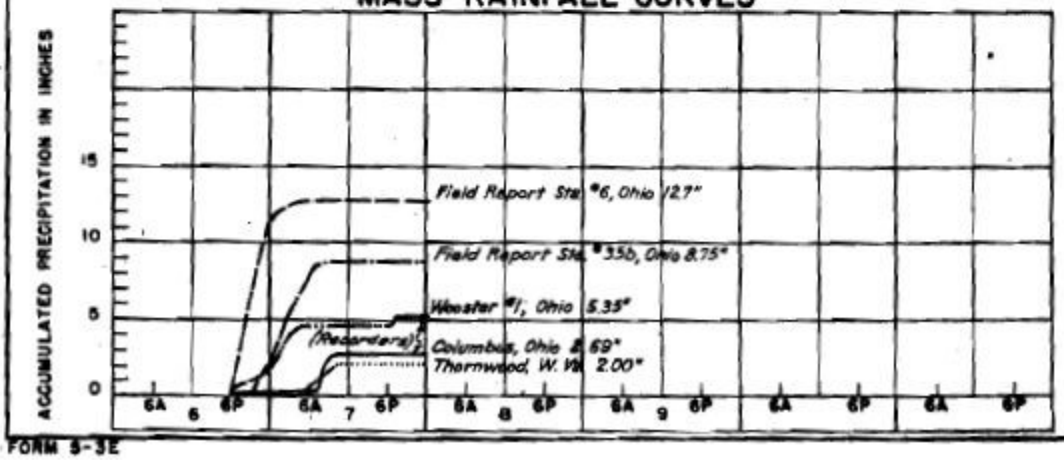
Storm of August 6-7, 1935 Assignment OR 9-11

Study Prepared by: Pittsburgh, Penna. District
Ohio River Division

Storm Period 48 hours
from 12:01 AM Aug 6
to 11:59 P.M. Aug 7

SCALE
1/ 19,000,000
Polyconic Projection

MASS RAINFALL CURVES



FORM 5-3E

Grant Township, OH June 3, 1940
Transpositioned Grid Points: 1-3, 6-8, 12-15, 18-19
Storm Type: MCC

Storm Name:	**USACE MR 4-5-Grant Township,**
Storm Date:	**June 3, 1940**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date	**18-Jun**	
	Lat	**Long**
Storm center location	**42.24 N**	**96.59 W**
Storm Rep Td location	**40.51 N**	**96.59 W**
Transposition Td location	**39.27 N**	**82.00 W**
Grid point location	**41.00 N**	**82.00W**

Moisture Inflow Direction:	**S @ 120**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**1,400**	feet
Storm Duration	**6**	hours

The storm representative Td is	**74.0 F**	with total precipitable water above sea level of				**2.73**	inches.
The in-place maximum Td is	**79.0 F**	with total precipitable water above sea level of				**3.44**	inches.
The transpositioned maximum Td is	**76.5 F**	with total precipitable water above sea level of				**3.07**	inches.
The in-place storm elevation is	**1,400**	which subtracts	**0.340**	inches of precipitable water at	**74.0 F**		
The in-place storm elevation is	**1,400**	which subtracts	**0.390**	inches of precipitable water at	**79.0 F**		
The transposition storm elevation at	**900**	which subtracts	**0.240**	inches of precipitable water at	**76.5 F**		
The moisture inflow barrier height is	**900**	which subtracts	**0.240**	inches of precipitable water at	**76.5 F**		

The in-place maximization factor is	**1.28**
The transposition factor is	**0.93**
The elevation/barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.18**

Notes: DAD values taken from USACE Storm Studies MR 4-5. Storm representative dew point value was based on adding 7° to the USACE analysis using EPRI, Nebraska, and TRWD guidance.

Observed Storm Depth-Area-Duration

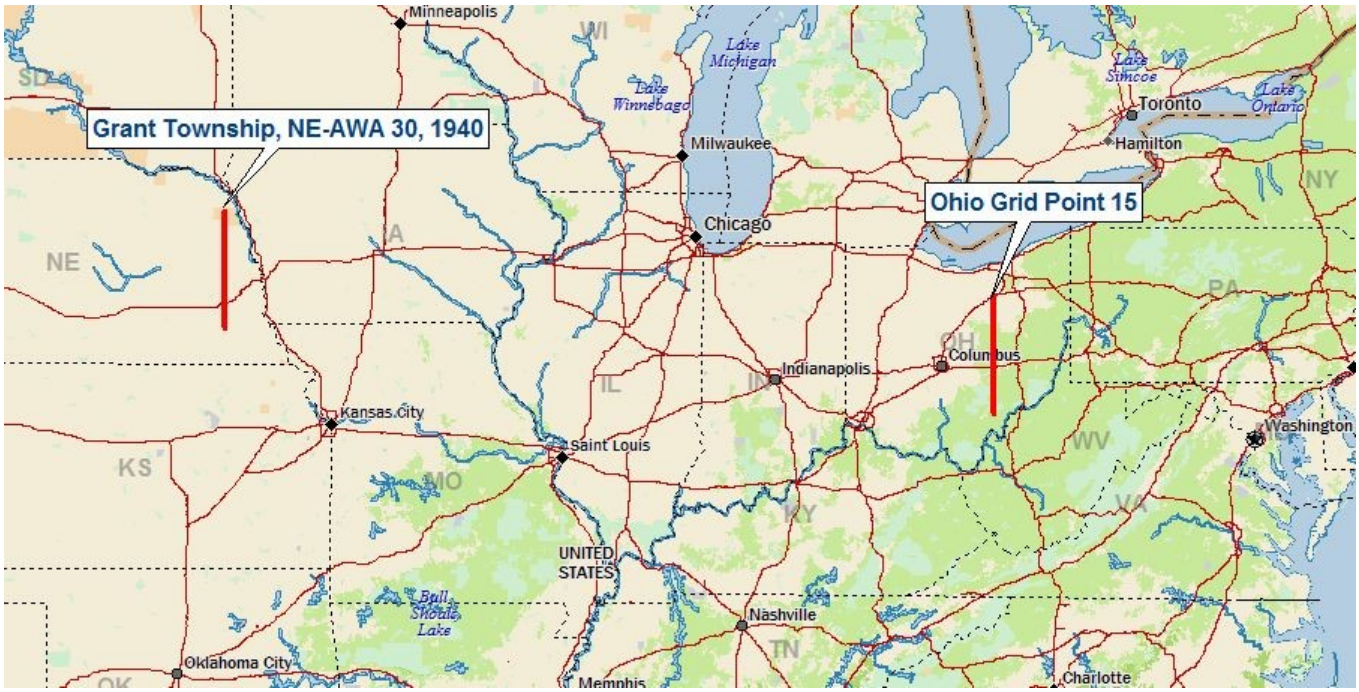
	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	-	-	-	-	-	-	-	-	-
10 sq miles	**13.0**	**13.0**	**13.0**	-	-	-	-	-	-
100 sq miles	**10.6**	**11.7**	**11.7**	-	-	-	-	-	-
200 sq miles	**9.6**	**11.2**	**11.2**	-	-	-	-	-	-
500 sq miles	**8.3**	**10.2**	**10.3**	-	-	-	-	-	-
1000 sq miles	**7.2**	**8.9**	**9.0**	-	-	-	-	-	-
2000 sq miles	**6.0**	**7.5**	**7.6**	-	-	-	-	-	-
5000 sq miles	**4.2**	**5.5**	**5.7**	-	-	-	-	-	-
10000 sq miles	**3.1**	**4.4**	**4.6**	-	-	-	-	-	-
20000 sq miles	**2.1**	**3.3**	**3.5**	-	-	-	-	-	-

Adjusted Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	-	-	-	-	-	-	-	-	-
10 sq miles	**15.4**	**15.4**	**15.4**	-	-	-	-	-	-
100 sq miles	**12.5**	**13.8**	**13.8**	-	-	-	-	-	-
200 sq miles	**11.3**	**13.2**	**13.2**	-	-	-	-	-	-
500 sq miles	**9.8**	**12.1**	**12.2**	-	-	-	-	-	-
1000 sq miles	**8.5**	**10.5**	**10.6**	-	-	-	-	-	-
2000 sq miles	**7.1**	**8.9**	**9.0**	-	-	-	-	-	-
5000 sq miles	**5.0**	**6.5**	**6.7**	-	-	-	-	-	-
10000 sq miles	**3.7**	**5.2**	**5.4**	-	-	-	-	-	-
20000 sq miles	**2.5**	**3.9**	**4.1**	-	-	-	-	-	-

Storm or Storm Center Name	**USACE MR 4-5-Grant Township, NE**	
Storm Date(s)	3-Jun-1940	
Storm Type	MCC	
Storm Location	42.24 N	96.59 W
Storm Center Elevation	1,400	
Precipitation Total & Duration (10 sq mi)	13.00 Inches 6-hours USACE Storm Studies MR 4-5	
Storm Representative Td	74.0 F	6
Storm Representative Td Location	40.51 N	96.59 W
In-place Maximum Td	79.0 F	
Moisture Inflow Vector	S @ 120	
In-place Maximization Factor	1.18	
Temporal Transposition (Date)	18-Jun	
Transposition Dewpoint Location	39.27 N	82.00 W
Transposition Maximum Td	76.5 F	
Transposition Adjustment Factor	**0.93**	
Grid Point Elevation	900	
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.18**	

Grant Township, OH June 3, 1940 Moisture Inflow Analysis



DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET

LOCATION MAP

Storm of 3-4 June 1940
Assignment MR 4-5
Location Nebr., Ia., Minn.
Study Prepared by:
Missouri River Division
Omaha District Office

Part I Reviewed by H. M. Sec. of Weather Bureau, 11/15/50
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 12/11/52
Remarks: Center at Grant Township, Nebr. Dewpt. 63°F - Ref. Pt. 120 S. Grid D-15

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 1 sheet, scale 1: 1,000,000

Precipitation data and mass curves:	(Number of Sheets)
Form 5001-C (Hourly precip. data)	9
Form 5001-B (24-hour " ")	-
Form 5001-D (" " ")	8
Misc. precip. records, meteorological data, etc.	12
Form 5002 (Mass rainfall curves)	24

PART II

Final isohyetal maps, in 1 sheet, scale 1: 1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)	3
Form S-11 (Depth-area data from isohyetal map)	1
Form S-12 (Maximum depth-duration data)	7
Maximum duration-depth-area curves	1
Data relating to periods of maximum rainfall	7

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	3	6	9	12	15	18	20				
10	8.3	13.0	13.0	13.0	13.0	13.0	13.0				
100	6.4	10.6	11.7	11.7	11.7	11.7	11.7				
200	5.5	9.6	11.1	11.2	11.2	11.2	11.2				
500	4.5	8.3	10.0	10.2	10.3	10.3	10.3				
1,000	3.8	7.2	8.8	8.9	9.0	9.0	9.0				
2,000	3.2	6.0	7.3	7.5	7.6	7.6	7.6				
5,000	2.4	4.2	5.3	5.5	5.7	5.7	5.7				
10,000	1.8	3.1	4.0	4.4	4.6	4.6	4.6				
20,000	1.2	2.1	2.8	3.3	3.5	3.5	3.5				

Form S-2

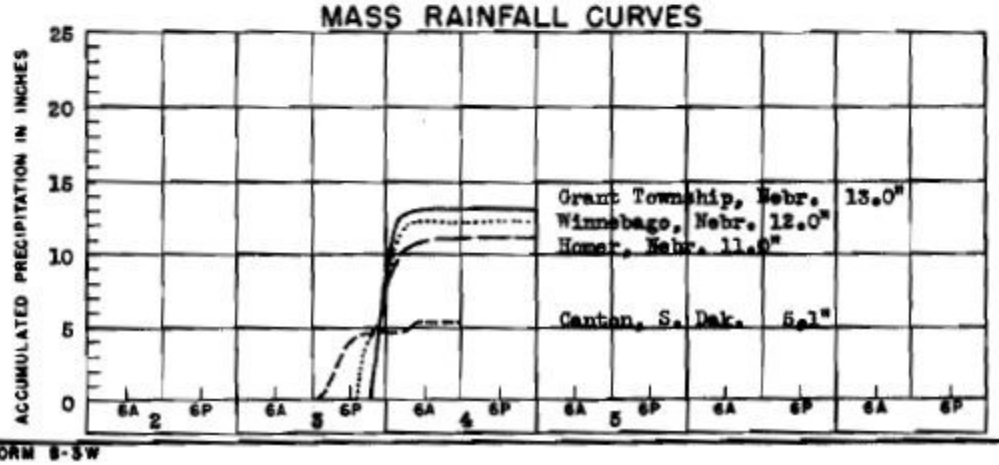
DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES – ISOHYETAL MAP

Storm of 3-4 June 1940 — Assignment MR 4-5

Study Prepared by: Omaha, Nebr. District
Missouri River Division

MASS RAINFALL CURVES



FORM 8-3W

Index, AR June 30, 1940
Transpositioned Grid Points: 1
Storm Type: MCC

Storm Name:	**USACE LMV 4-25-Index, AR**
Storm Date:	**30-Jun-1940**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 13

Temporal Transposition Date	**15-Jul**	
	Lat	**Long**
Storm center location	**33.55 N**	**94.04 W**
Storm Rep dew point location	**32.50 N**	**93.67 W**
Transposition dewpoint location	**39.95 N**	**83.63 W**
Grid point location	**40.41 N**	**84.24 W**

Moisture Inflow Direction:	**SSE @ 75**	miles
Grid Point Elevation	**700**	feet
Storm Elevation	**300**	feet
Storm Duration	**12**	hours

The storm representative dew point is	**77.0 F**	with total precipitable water above sea level of				**3.14**	inches.
The in-place maximum dew point is	**81.0 F**	with total precipitable water above sea level of				**3.76**	inches.
The transpositioned maximum dew point is	**78.5 F**	with total precipitable water above sea level of				**3.37**	inches.
The in-place storm elevation is	**300**	which subtracts	**0.080**	inches of precipitable water at		**77.0 F**	
The in-place storm elevation is	**300**	which subtracts	**0.090**	inches of precipitable water at		**81.0 F**	
The transposition basin elevation at	**700**	which subtracts	**0.200**	inches of precipitable water at		**78.5 F**	
The inflow barrier/basin elevation height is	**700**	which subtracts	**0.200**	inches of precipitable water at		**78.5 F**	

The in-place storm maximization factor is	**1.20**
The transposition/elevation to basin factor is	**0.86**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.03**

Notes: DAD values taken from USACE LMV 4-25. Storm representative dew point value was based on maximum 12hr Td values between June 30-July 1, 1940 at KBAD.

Observed Storm Depth-Area-Duration

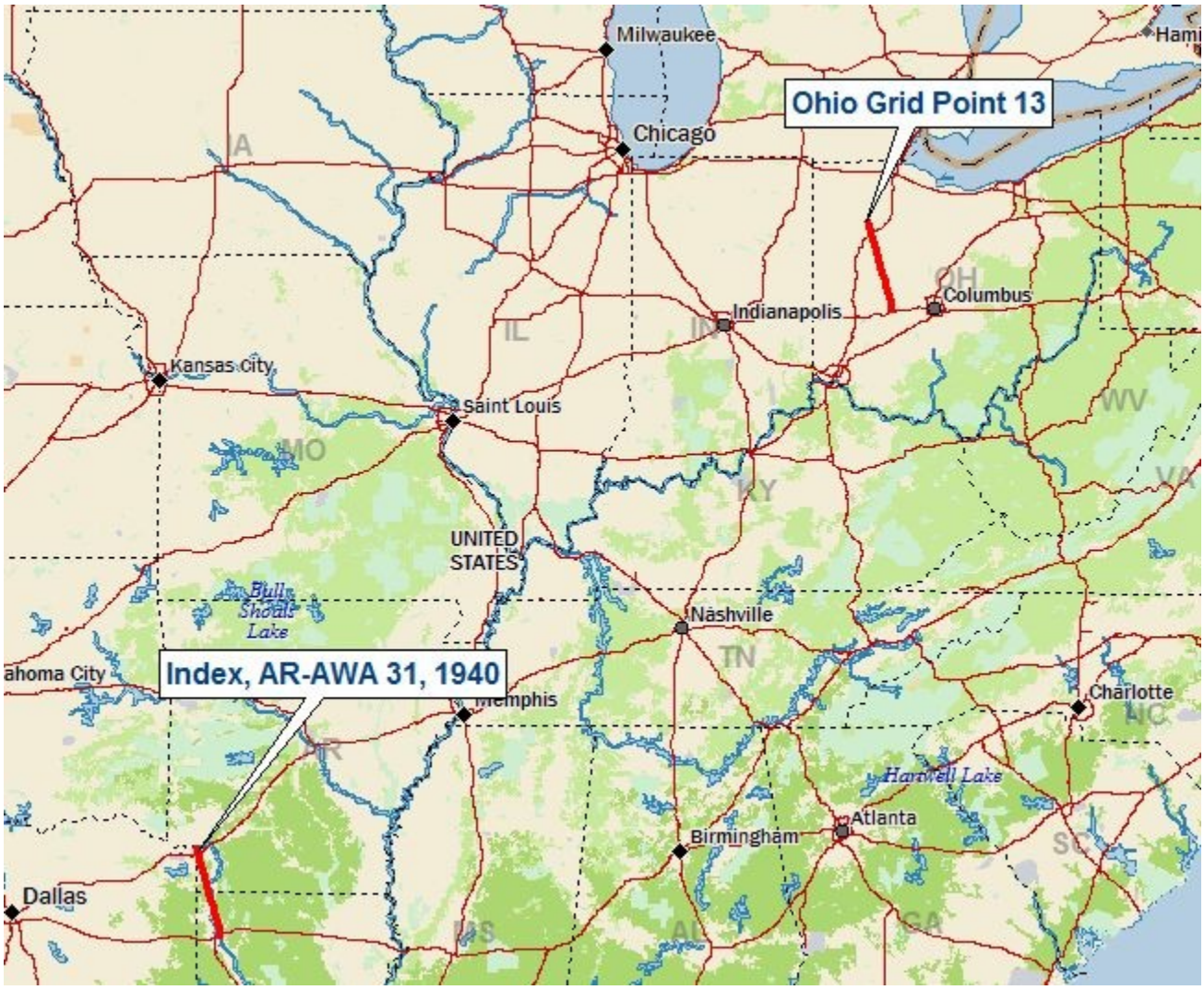
	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**8.5**	**10.4**	**10.9**	**10.9**	**11.2**	**11.5**	**11.5**	-	-
100 sq miles	**8.4**	**9.8**	**10.2**	**10.2**	**10.7**	**11.3**	**11.3**	-	-
200 sq miles	**8.3**	**9.5**	**9.9**	**10.0**	**10.4**	**10.9**	**11.0**	-	-
500 sq miles	**7.8**	**8.9**	**9.4**	**9.6**	**9.8**	**10.3**	**10.4**	-	-
1000 sq miles	**7.3**	**8.2**	**8.8**	**9.1**	**9.3**	**9.6**	**9.8**	-	-
2000 sq miles	**6.4**	**7.2**	**7.8**	**8.1**	**8.5**	**8.7**	**9.0**	-	-
5000 sq miles	**4.8**	**5.7**	**6.1**	**6.4**	**7.1**	**7.4**	**7.7**	-	-
10000 sq miles	**3.5**	**4.5**	**4.8**	**5.1**	**5.8**	**6.2**	**6.5**	-	-
20000 sq miles	**2.3**	**3.3**	**3.4**	**3.8**	**4.4**	**5.0**	**6.2**	-	-

Adjusted Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**8.8**	**10.8**	**11.3**	**11.3**	**11.6**	**11.9**	**11.9**	-	-
100 sq miles	**8.7**	**10.1**	**10.6**	**10.6**	**11.1**	**11.7**	**11.7**	-	-
200 sq miles	**8.6**	**9.8**	**10.2**	**10.3**	**10.8**	**11.3**	**11.4**	-	-
500 sq miles	**8.1**	**9.2**	**9.7**	**9.9**	**10.1**	**10.7**	**10.8**	-	-
1000 sq miles	**7.6**	**8.5**	**9.1**	**9.4**	**9.6**	**9.9**	**10.1**	-	-
2000 sq miles	**6.6**	**7.4**	**8.1**	**8.4**	**8.8**	**9.0**	**9.3**	-	-
5000 sq miles	**5.0**	**5.9**	**6.3**	**6.6**	**7.3**	**7.7**	**8.0**	-	-
10000 sq miles	**3.6**	**4.7**	**5.0**	**5.3**	**6.0**	**6.4**	**6.7**	-	-
20000 sq miles	**2.4**	**3.4**	**3.5**	**3.9**	**4.6**	**5.2**	**6.4**	-	-

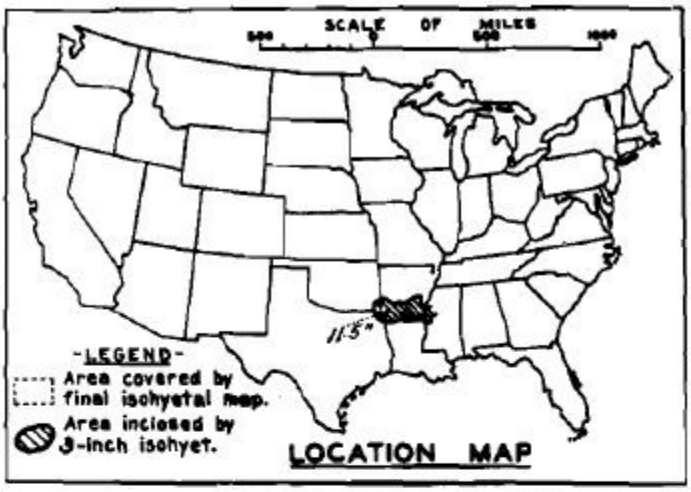
Storm or Storm Center Name	**USACE LMV 4-25-Index, AR**	
Storm Date(s)	30-Jun-1940	
Storm Type	MCC	
Storm Location	33.55 N	94.04 W
Storm Center Elevation	300	
Precipitation Total & Duration	11.5 Inches 36-hours USACE LMV 4-25	
Storm Representative Dewpoint	77.0 F	12
Storm Representative Dewpoint Location	32.50 N	93.67 W
Maximum Dewpoint	81.0 F	
Moisture Inflow Vector	SSE @ 75	
In-place Maximization Factor	**1.20**	
Temporal Transposition (Date)	15-Jul	
Transposition Dewpoint Location	39.95 N	83.63 W
Transposition Maximum Dewpoint	78.5 F	
Transposition Adjustment Factor	**0.86**	
Grid Point Elevation	700	
Inflow Barrier Height	700	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.03**	

Index, AR June 30, 1940 Moisture Inflow Analysis



DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET



LOCATION MAP

Storm of 30 June-2 July 1940
Assignment LMV 4-25
Location Ark., La. & Miss.
Study Prepared by:
Lower Mississippi Valley Division
Vicksburg District Office
Part I Reviewed by H. M. Sec. of Weather Bureau, 11/14/41
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 3/2/48
Remarks: Center at Index, Ark.
Dewpt. 75°- Ref. Pt. 190 S Grid H-14

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 1 sheet, scale 1:1,000,000

Precipitation data and mass curves: (Number of Sheets)

Form 5001-C (Hourly precip. data)	55
Form 5001-B (24-hour " ")	38
Form 5001-D (" " " ")	-
Misc. precip. records, meteorological data, etc.	5
Form 5002 (Mass rainfall curves)	42

PART II

Final isohyetal maps, in 1 sheet, scale 1:1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)	5
Form S-11 (Depth-area data from isohyetal map)	1
Form S-12 (Maximum depth-duration data)	6
Maximum duration-depth-area curves	1
Data relating to periods of maximum rainfall	2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48				
10	8.5	10.4	10.9	10.9	11.2	11.5	11.5				
100	8.4	9.8	10.2	10.2	10.7	11.3	11.3				
200	8.3	9.5	9.9	10.0	10.4	10.9	11.0				
500	7.8	8.9	9.4	9.6	9.8	10.3	10.4				
1,000	7.3	8.2	8.8	9.1	9.3	9.6	9.8				
2,000	6.4	7.2	7.8	8.1	8.5	8.7	9.0				
5,000	4.8	5.7	6.1	6.4	7.1	7.4	7.7				
10,000	3.5	4.5	4.8	5.1	5.8	6.2	6.5				
20,000	2.3	3.3	3.4	3.8	4.4	5.0	6.2				

Form S-2

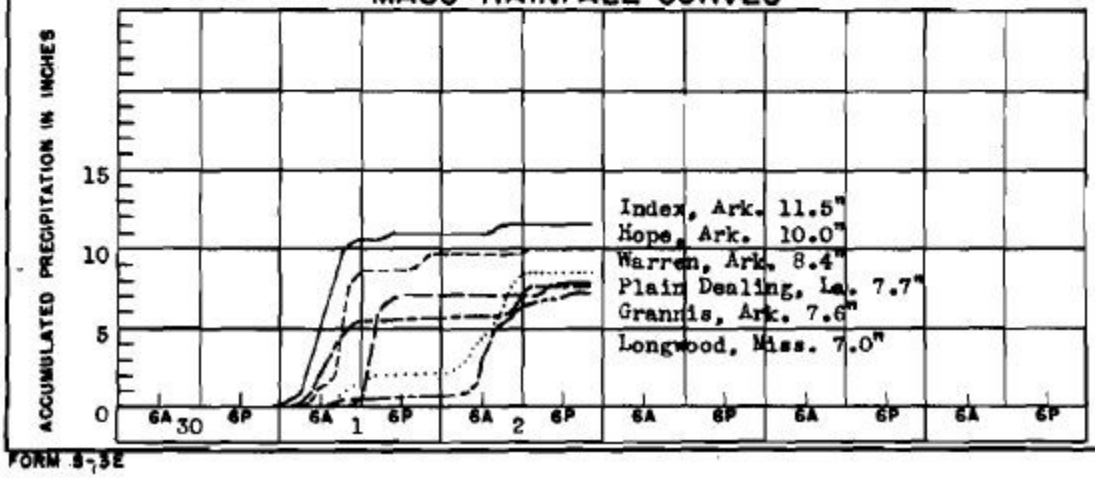
DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES - ISOHYETAL MAP

Storm of 30 June - 2 July 1940 — Assignment LMV 4-25

Study Prepared by: Vicksburg, Miss. District
Lower Mississippi Valley Division

MASS RAINFALL CURVES



FORM 8-7.3E

Hallett, OK September 2, 1940
Transpositioned Grid Points: None
Storm Type: MCC

Storm Name:	**USACE SW 2-18-Hallett, OK**
Storm Date:	**9/2-4/1940**
AWA Analysis Date:	**10/11/2012**

Storm Adjustment for In Place Only

Temporal Transposition Date **17-Aug**

	Lat	Long
Storm center location	**36.23 N**	**96.57 W**
Storm Rep Td location	**32.90 N**	**93.15 W**
Transposition Td location	**37.17 N**	**80.20 W**
Basin location	**40.50 N**	**83.80 W**

Moisture Inflow Direction:	**SE @ 300**	miles
Basin Elevation	**1,050**	feet
Storm Elevation	**900**	feet
Storm Duration	**12**	hours

The storm representative Td is	**77.5 F**	with total precipitable water above sea level of			**3.22**	inches.
The in-place maximum Td is	**79.5 F**	with total precipitable water above sea level of			**3.52**	inches.
The transpositioned maximum Td is	**78.5 F**	with total precipitable water above sea level of			**3.37**	inches.
The in-place storm elevation is	**900**	which subtracts	**0.250**	inches of precipitable water at	**77.5 F**	
The in-place storm elevation is	**900**	which subtracts	**0.270**	inches of precipitable water at	**79.5 F**	
The transposition storm elevation at	**XX**	which subtracts	**XX**	inches of precipitable water at	**XX**	
The moisture inflow barrier height is	**XX**	which subtracts	**XX**	inches of precipitable water at	**XX**	

The in-place maximization factor is	**1.10**
The transposition factor is	**#VALUE!**
The elevation/barrier adjustment factor is	**#VALUE!**
The total adjustment factor is	**#VALUE!**

Notes: Reanalyzed the storm rep Td using hourly surface obs in the region. Used KBAD, Shreveprot, LA to derive the 12 hour average storm rep Td.

Observed Storm Depth-Area-Duration

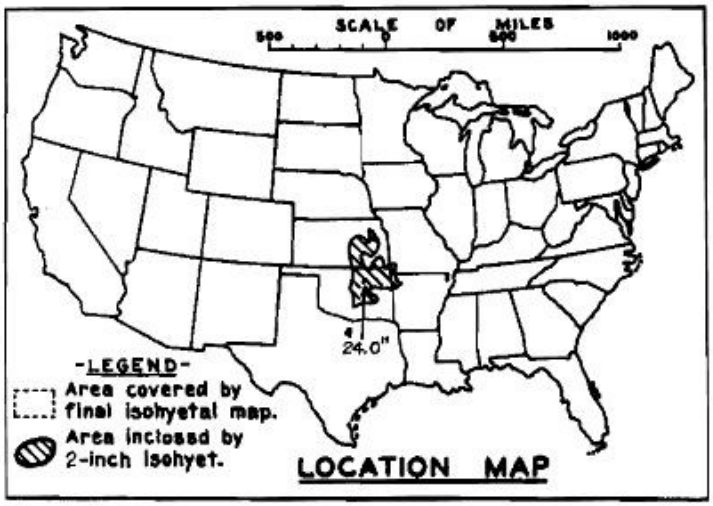
	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**18.9**	**24.0**	**24.0**	**24.0**	**24.0**	**24.0**	**24.0**	-	-
10 sq miles	**18.4**	**23.4**	**23.6**	**23.6**	**23.6**	**23.6**	**23.6**	-	-
100 sq miles	**14.7**	**19.2**	**19.4**	**19.6**	**19.7**	**19.8**	**19.8**	-	-
200 sq miles	**12.5**	**17.6**	**17.8**	**18.0**	**18.1**	**18.2**	**18.3**	-	-
500 sq miles	**9.7**	**15.4**	**15.6**	**15.7**	**15.8**	**16.1**	**16.2**	-	-
1000 sq miles	**7.9**	**13.3**	**13.4**	**13.6**	**13.7**	**14.0**	**14.1**	-	-
2000 sq miles	**6.2**	**10.3**	**10.5**	**10.7**	**10.9**	**11.1**	**11.3**	-	-
5000 sq miles	**4.3**	**7.3**	**7.4**	**7.5**	**7.7**	**7.8**	**7.9**	-	-
10000 sq miles	**3.0**	**5.3**	**5.4**	**5.5**	**5.6**	**5.7**	**5.8**	-	-
20000 sq miles	**2.0**	**3.9**	**4.1**	**4.2**	**4.3**	**4.4**	**4.5**	-	-

Adjusted Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	-	-
10 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	-	-
100 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	-	-
200 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	-	-
500 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	-	-
1000 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	-	-
2000 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	-	-
5000 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	-	-
10000 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	-	-
20000 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	-	-

Storm or Storm Center Name	**USACE SW 2-18-Hallett, OK**		
Storm Date(s)	9/2-4/1940		
Storm Type	MCC		
Storm Location	36.23 N	96.57 W	
Storm Center Elevation	900		
Precipitation Total & Duration (10 sq mi)	24.00 inches in 12 hours		
Storm Representative Td	77.5 F	12	
Storm Representative Td Location	32.90 N	93.15 W	A
In-place Maximum Td	79.5 F		79.5
Moisture Inflow Vector	SE @ 300		
In-place Maximization Factor	1.10		
Temporal Transposition (Date)	17-Aug		
Transposition Dewpoint Location	37.17 N	80.20 W	Jul
Transposition Maximum Td	78.5 F		78.5
Transposition Adjustment Factor	**#VALUE!**		
Average Basin Elevation	1,050	1074 actual	
Highest Elevation in Basin	1,449		
Inflow Barrier Height	1,050		
Elevation Adjustment Factor	**#VALUE!**		
Total Adjustment Factor	**#VALUE!**		

STORM STUDIES - PERTINENT DATA SHEET



LOCATION MAP

Storm of September 2 - 6, 1940
Assignment S W 2 - 18
Location Okla. Kans. Mo. & Ark.
Study Prepared by:
Southwestern Division
Tulsa District Office

Part I Reviewed by H. M. Sec. of Weather Bureau, 8/18/41
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 3/25/43
Remarks: Centers at; Hallett, Okla. and Lebo, Kans.

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 2 sheet, scale 1 : 1,000,000

Precipitation data and mass curves: (Number of Sheets)

Form 5001-C (Hourly precip. data)	38
Form 5001-B (24-hour " ")	-
Form 5001-D (" " " ")	23
Misc. precip. records, meteorological data, etc.	1
Form 5002 (Mass rainfall curves)	49

PART II

Final isohyetal maps, in 1 sheet, scale 1 : 1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)	9
Form S-11 (Depth-area data from isohyetal map)	3
Form S-12 (Maximum depth-duration data)	11
Maximum duration-depth-area curves	1
Data relating to periods of maximum rainfall	2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48	54	90		
Max. Station	18.9	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0		
10	18.4	23.4	23.6	23.6	23.6	23.6	23.6	23.6	23.6		
100	14.7	19.2	19.4	19.6	19.7	19.8	19.8	19.8	19.8		
200	12.5	17.6	17.8	18.0	18.1	18.2	18.3	18.3	18.3		
500	9.7	15.4	15.6	15.7	15.8	16.1	16.2	16.2	16.2		
1,000	7.9	13.3	13.4	13.6	13.7	14.0	14.1	14.1	14.1		
2,000	6.2	10.3	10.5	10.7	10.9	11.1	11.3	11.3	11.3		
5,000	4.3	7.3	7.4	7.5	7.7	7.8	7.9	8.0	8.0		
10,000	3.0	5.3	5.4	5.5	5.6	5.7	5.8	5.9	5.9		
15,000	2.4	4.4	4.5	4.7	4.7	4.8	4.9	5.1	5.1		
20,000	2.0	3.9	4.1	4.2	4.3	4.4	4.5	4.6	4.6		

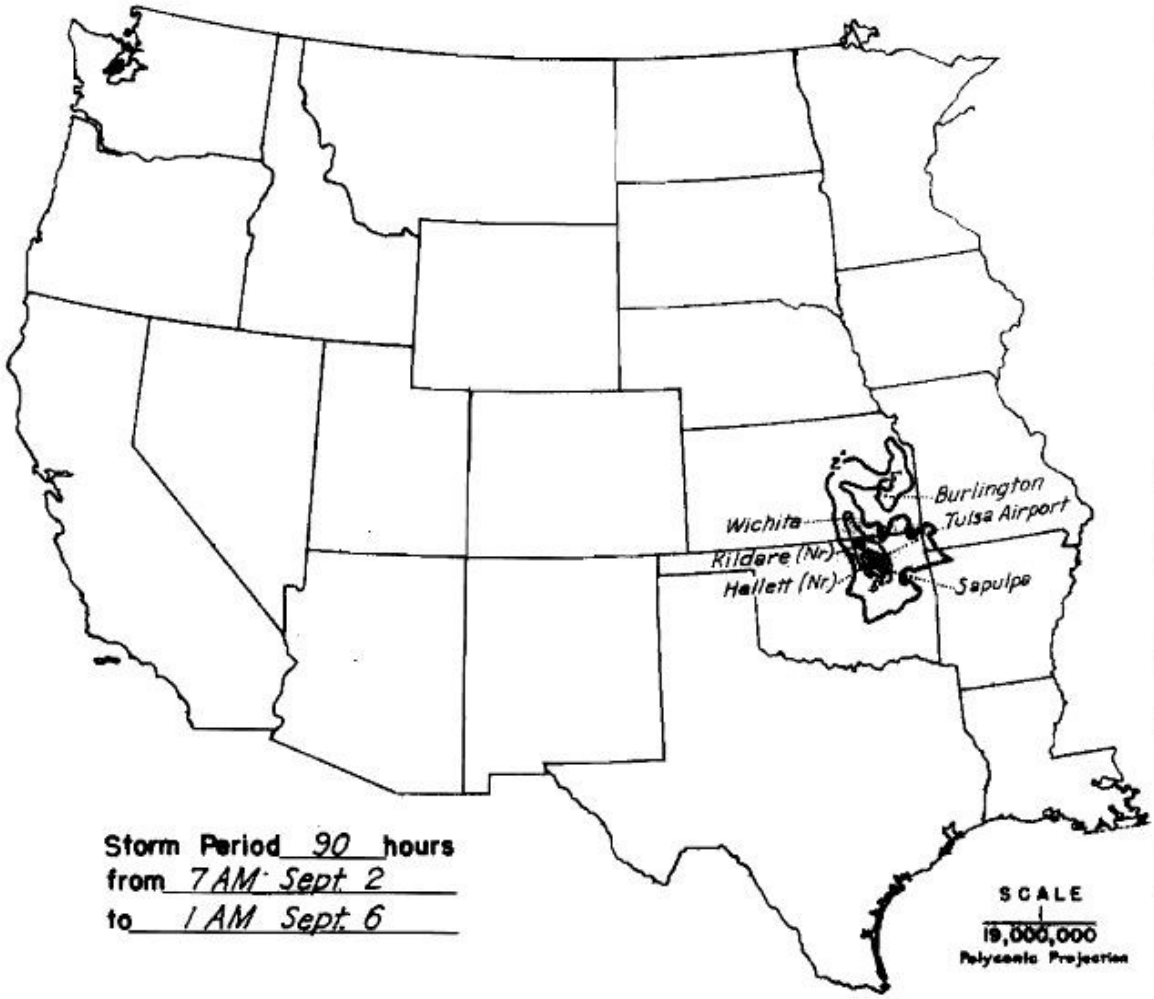
Form S-2

WAR DEPARTMENT — CORPS OF ENGINEERS, U. S. ARMY

STORM STUDIES – ISOHYETAL MAP

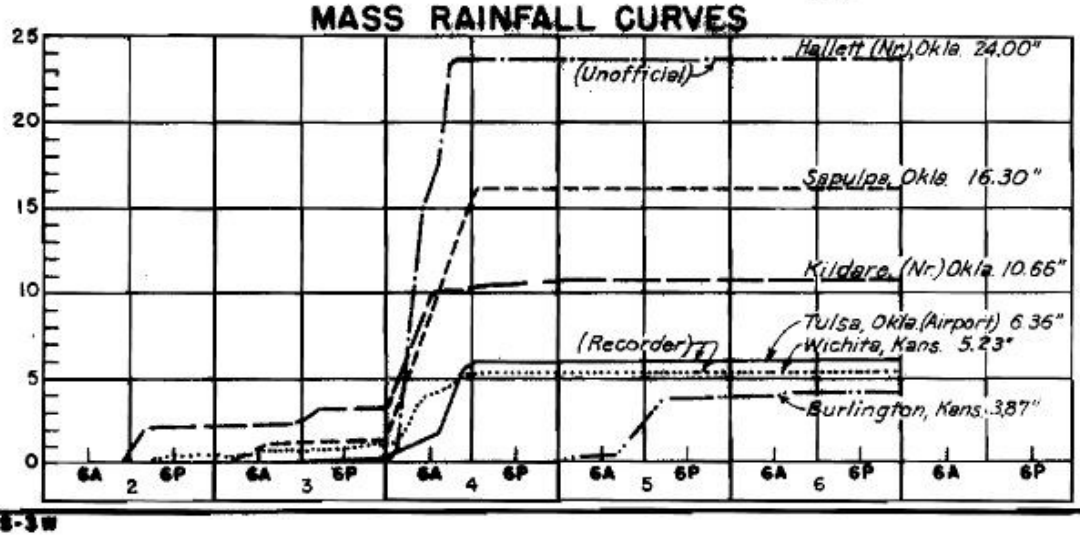
Storm of *September 2-6, 1940* Assignment *SW 2-18*

Study Prepared by: *Tulsa, Okla. District*
Southwestern Division



Storm Period *90* hours
from *7 AM Sept. 2*
to *1 AM Sept. 6*

MASS RAINFALL CURVES



FORM E-3W

Hayward, WI August 28, 1941
Transpositioned Grid Points: 1-7, 10-23
Storm Type: Synoptic/Convective

Storm Name:	**USACE UMV 1-22-Hayward, WI**
Storm Date:	**8/28-30/1941**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 13

Temporal Transposition Date	**15-Aug**	
	Lat	**Long**
Storm center location	**46.01 N**	**91.48 W**
Storm Rep Td location	**42.99 N**	**89.78 W**
Transposition Td location	**37.98 N**	**82.30 W**
Grid point location	**41.00 N**	**84.00 W**

Moisture Inflow Direction:	**SSE @ 225**	miles
Grid Point Elevation	**700**	feet
Storm Elevation	**1,200**	feet
Storm Duration	**24**	hours

The storm representative Td is	**73.0 F**	with total precipitable water above sea level of				**2.60**	inches.
The in-place maximum Td is	**79.0 F**	with total precipitable water above sea level of				**3.44**	inches.
The transpositioned maximum Td is	**77.5 F**	with total precipitable water above sea level of				**3.22**	inches.
The in-place storm elevation is	**1,200**	which subtracts	**0.280**	inches of precipitable water at		**73.0 F**	
The in-place storm elevation is	**1,200**	which subtracts	**0.340**	inches of precipitable water at		**79.0 F**	
The transposition basin elevation at	**700**	which subtracts	**0.190**	inches of precipitable water at		**77.5 F**	
The inflow barrier/basin elevation height is	**700**	which subtracts	**0.190**	inches of precipitable water at		**77.5 F**	

The in-place storm maximization factor is	**1.30**
The transposition/elevation to basin factor is	**0.98**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.27**

Notes: DAD values taken from USACE UMV 1-22. Storm representative Td value was based on adding 2°F to the USACE analyzed storm rep Td following EPRI, Nebraska, and TRWD studies.

Observed Storm Depth-Area-Duration

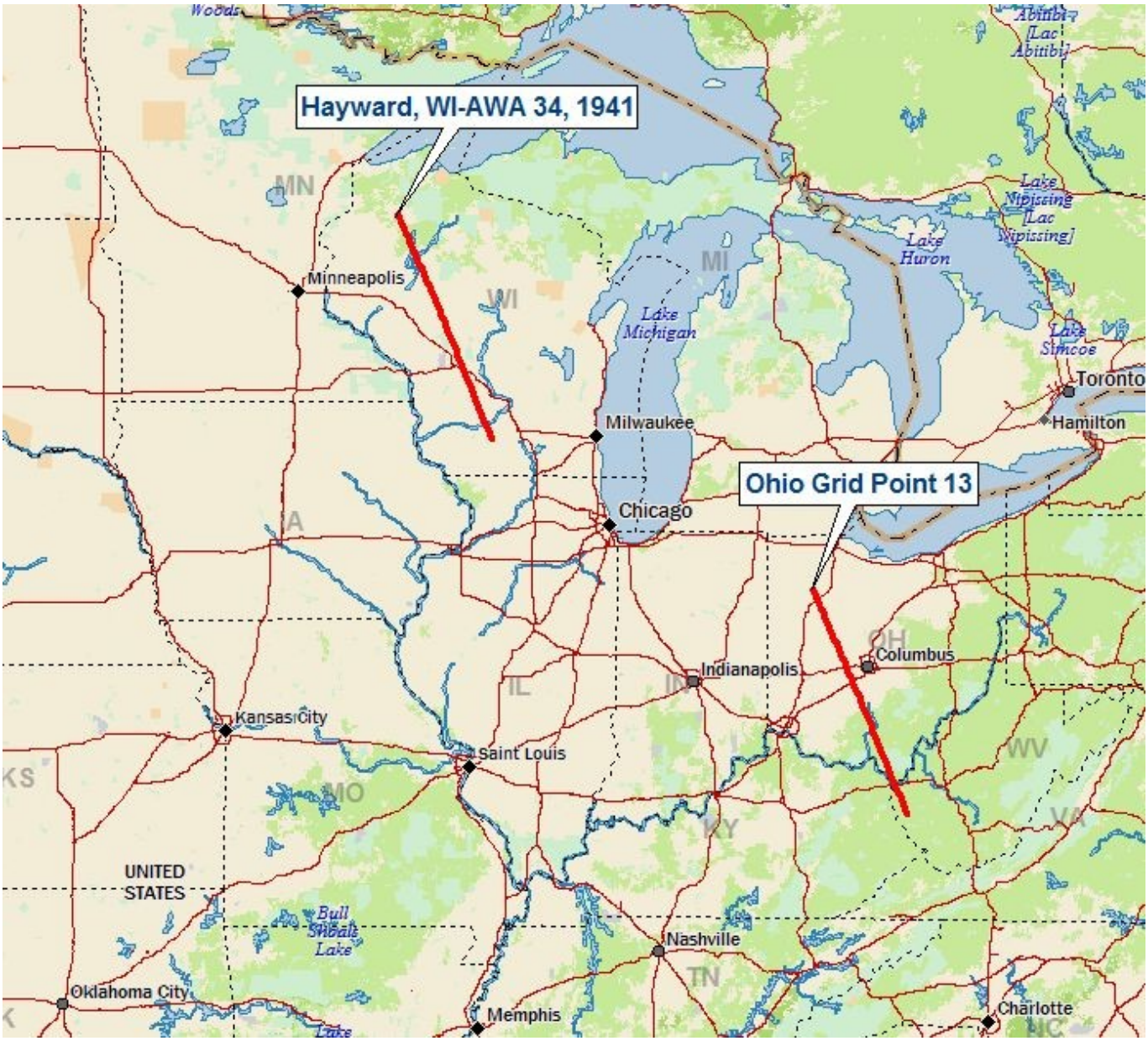
	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**8.5**	**11.5**	**12.4**	**12.4**	**13.3**	**13.8**	**14.4**	**15.0**	**15.0**
100 sq miles	**8.1**	**11.0**	**11.8**	**11.8**	**12.7**	**13.3**	**13.8**	**14.3**	**14.5**
200 sq miles	**7.8**	**10.6**	**11.3**	**11.3**	**12.3**	**13.0**	**13.4**	**13.9**	**14.1**
500 sq miles	**6.8**	**9.5**	**10.2**	**10.3**	**11.2**	**12.0**	**12.5**	**12.9**	**13.1**
1000 sq miles	**5.6**	**8.2**	**9.0**	**9.1**	**10.0**	**10.9**	**11.5**	**11.9**	**12.0**
2000 sq miles	**4.3**	**6.9**	**7.7**	**7.9**	**8.8**	**9.7**	**10.4**	**10.8**	**10.9**
5000 sq miles	**3.0**	**5.2**	**5.9**	**6.3**	**7.2**	**8.1**	**8.9**	**9.3**	**9.5**
10000 sq miles	**2.1**	**3.8**	**4.6**	**5.1**	**5.9**	**6.0**	**7.8**	**8.2**	**8.4**
20000 sq miles	**1.5**	**2.7**	**3.4**	**3.8**	**4.7**	**5.5**	**6.5**	**7.1**	**7.3**

Adjusted Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**10.8**	**14.6**	**15.7**	**15.7**	**16.9**	**17.5**	**18.3**	**19.0**	**19.0**
100 sq miles	**10.3**	**14.0**	**15.0**	**15.0**	**16.1**	**16.9**	**17.5**	**18.1**	**18.4**
200 sq miles	**9.9**	**13.4**	**14.3**	**14.3**	**15.6**	**16.5**	**17.0**	**17.6**	**17.9**
500 sq miles	**8.6**	**12.1**	**12.9**	**13.1**	**14.2**	**15.2**	**15.9**	**16.4**	**16.6**
1000 sq miles	**7.1**	**10.4**	**11.4**	**11.5**	**12.7**	**13.8**	**14.6**	**15.1**	**15.2**
2000 sq miles	**5.5**	**8.8**	**9.8**	**10.0**	**11.2**	**12.3**	**13.2**	**13.7**	**13.8**
5000 sq miles	**3.8**	**6.6**	**7.5**	**8.0**	**9.1**	**10.3**	**11.3**	**11.8**	**12.1**
10000 sq miles	**2.7**	**4.8**	**5.8**	**6.5**	**7.5**	**7.6**	**9.9**	**10.4**	**10.7**
20000 sq miles	**1.9**	**3.4**	**4.3**	**4.8**	**6.0**	**7.0**	**8.2**	**9.0**	**9.3**

Storm or Storm Center Name	**USACE UMV 1-22-Hayward, WI**	
Storm Date(s)	8/28-30/1941	
Storm Type	Synoptic	
Storm Location	46.01 N	91.48 W
Storm Center Elevation	1,200	
Precipitation Total & Duration	15.00 Inches 72-hours USACE UMV 1-22	
Storm Representative Td	73.0 F	
Storm Representative Td Location	42.99 N	89.78 W
Maximum Td	79.0 F	
Moisture Inflow Vector	SSE @ 225	
In-place Maximization Factor	**1.30**	
Temporal Transposition (Date)	15-Aug	
Transposition Td Location	37.98 N	82.30 W
Transposition Maximum Td	77.5 F	
Transposition Adjustment Factor	**0.98**	
Grid Point Elevation	700	
Inflow Barrier Height	700	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.30**	

Hayward, WI August 28, 1941 Moisture Inflow Analysis



WAR DEPARTMENT — CORPS OF ENGINEERS, U. S. ARMY

STORM STUDIES - PERTINENT DATA SHEET

LOCATION MAP

Storm of August 28 - 31, 1941
Assignment U M V 1 - 22
Location Northern Wisconsin and Minn.
Study Prepared by: Upper Mississippi Valley Division
St. Paul District Office
Part I Reviewed by H. M. Sec. of Weather Bureau, 3/24/42
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 4/11/45
Remarks: Center at: Haywood and Moose Lake, Wisc.

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 4 sheet, scale 1 : 1,000,000

Precipitation data and mass curves: (Number of Sheets)

Form 5001-C (Hourly precip. data)	33
Form 5001-B (24-hour " ")	-
Form 5001-D (" " " ")	14
Misc. precip. records, meteorological data, etc.	3
Form 5002 (Mass rainfall curves)	42

PART II

Final isohyetal maps, in 1 sheet, scale 1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)	6
Form S-11 (Depth-area data from isohyetal map)	2
Form S-12 (Maximum depth-duration data)	8
Maximum duration-depth-area curves	1
Data relating to periods of maximum rainfall	2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48	60	72	78	
10	8.5	11.5	12.4	12.4	13.3	13.8	14.4	15.0	15.0	15.0	
100	8.1	11.0	11.8	11.8	12.7	13.3	13.8	14.3	14.5	14.5	
200	7.8	10.6	11.3	11.3	12.3	13.0	13.4	13.9	14.1	14.1	
500	6.8	9.5	10.2	10.3	11.2	12.0	12.5	12.9	13.1	13.1	
1,000	5.6	8.2	9.0	9.1	10.0	10.9	11.5	11.9	12.0	12.0	
2,000	4.3	6.9	7.7	7.9	8.8	9.7	10.4	10.8	10.9	10.9	
5,000	3.0	5.2	5.9	6.3	7.2	8.1	8.9	9.3	9.5	9.5	
10,000	2.1	3.8	4.6	5.1	5.9	6.8	7.8	8.2	8.4	8.4	
20,000	1.5	2.7	3.4	3.8	4.7	5.5	6.5	7.1	7.3	7.3	
50,000	0.9	1.6	2.1	2.5	3.1	3.6	4.5	5.1	5.2	5.2	
60,000	0.8	1.4	1.9	2.2	2.8	3.3	4.1	4.5	4.7	4.7	

Form S-2

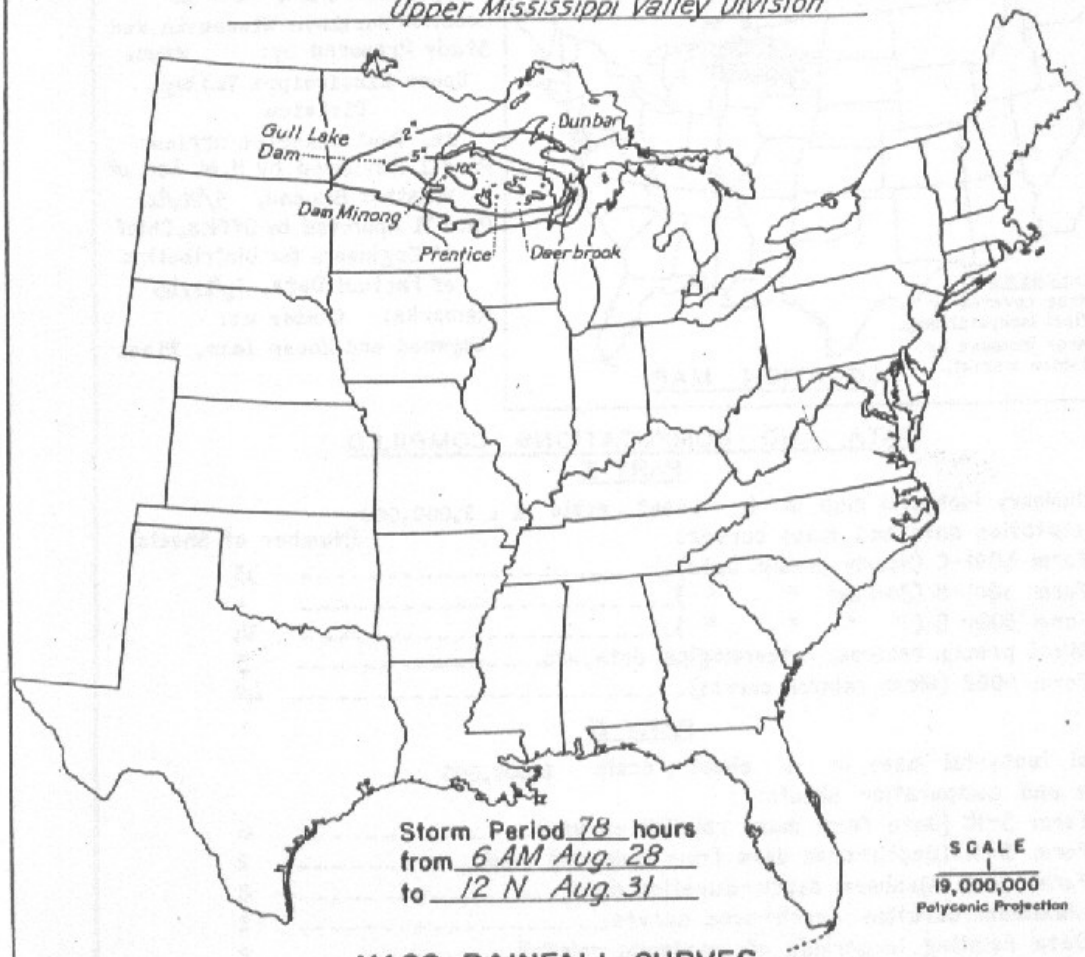
WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY

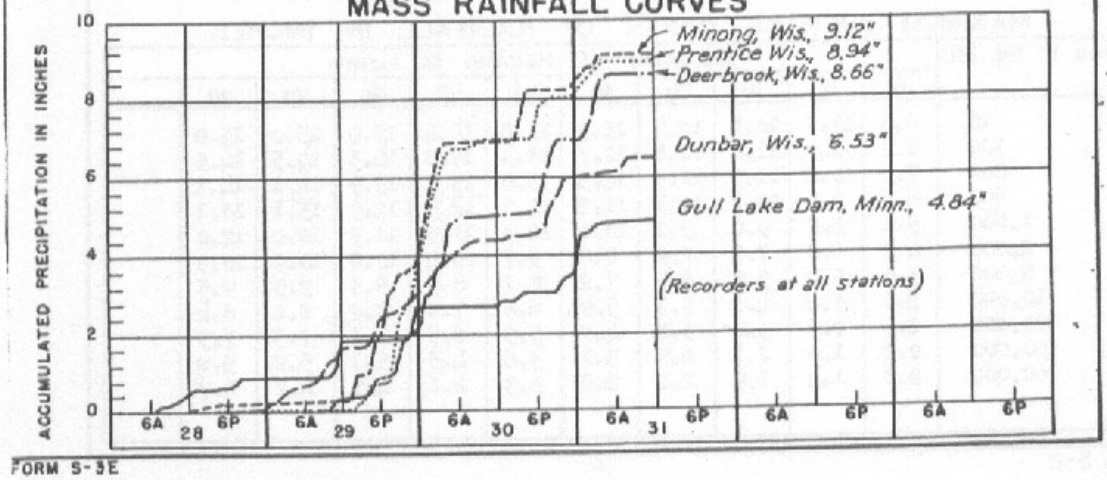
STORM STUDIES – ISOHYETAL MAP

Storm of August 28-31, 1941 Assignment UMV 1-22

Study Prepared by: St. Paul, Minn. District
Upper Mississippi Valley Division



MASS RAINFALL CURVES



FORM S-3E

Warner, OK May 6, 1943
Transpositioned Grid Points: 1
Storm Type: Synoptic

Storm Name:	**USACE SW 2-20-Warner, OK**
Storm Date:	**5/6-10/1943**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 1

Temporal Transposition Date	**24-May**	
	Lat	**Long**
Storm center location	**35.49 N**	**95.31 W**
Storm Rep Td location	**33.20 N**	**95.00 W**
Transposition Td location	**35.71 N**	**85.19 W**
Grid point location	**40.41 N**	**84.24 W**

Moisture Inflow Direction:	**SSE @ 225**	miles
Grid Point Elevation	**600**	feet
Storm Elevation	**600**	feet
Storm Duration	**24**	hrs

The storm representative Td is	**72.0 F**	with total precipitable water above sea level of				**2.47**	inches.
The in-place maximum Td is	**77.0 F**	with total precipitable water above sea level of				**3.14**	inches.
The transpositioned maximum Td is	**75.0 F**	with total precipitable water above sea level of				**2.85**	inches.
The in-place storm elevation is	600	which subtracts	**0.140**	inches of precipitable water at		**72.0 F**	
The in-place storm elevation is	600	which subtracts	**0.160**	inches of precipitable water at		**77.0 F**	
The transposition storm elevation at	600	which subtracts	**0.150**	inches of precipitable water at		**75.0 F**	
The moisture inflow barrier height is	600	which subtracts	**0.150**	inches of precipitable water at		**75.0 F**	

The in-place maximization factor is	**1.28**
The transposition factor is	**0.91**
The elevation/barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.16**

Notes: Added 2° to the USACE storm rep Td based on EPRI, Nebraska, and TRWD guidance for a synoptic storm going from 12hr persisting to average Td.

Observed Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**10.0**	**12.5**	**15.0**	**17.6**	**20.0**	**21.8**	**24.6**	**25.0**	**25.0**
10 sq miles	**9.9**	**12.3**	**14.6**	**17.2**	**19.5**	**21.5**	**24.4**	**24.9**	**24.9**
100 sq miles	**8.7**	**10.8**	**12.4**	**14.9**	**17.1**	**19.3**	**21.8**	**22.5**	**22.5**
200 sq miles	**7.4**	**9.5**	**11.4**	**13.8**	**16.0**	**18.3**	**20.6**	**21.3**	**21.3**
500 sq miles	**5.4**	**7.6**	**10.0**	**12.3**	**14.5**	**16.7**	**18.6**	**19.4**	**19.4**
1000 sq miles	**4.3**	**6.3**	**9.0**	**11.1**	**13.3**	**15.4**	**17.1**	**18.0**	**18.0**
2000 sq miles	**3.6**	**5.4**	**8.0**	**9.9**	**12.1**	**14.0**	**15.5**	**16.5**	**16.5**
5000 sq miles	**3.0**	**4.5**	**6.8**	**8.3**	**10.5**	**12.1**	**13.4**	**14.4**	**14.4**
10000 sq miles	**2.6**	**3.9**	**5.8**	**7.2**	**9.1**	**10.4**	**11.7**	**12.6**	**12.6**
20000 sq miles	**2.1**	**3.3**	**4.9**	**6.1**	**7.6**	**8.7**	**10.0**	**10.7**	**10.8**

Adjusted Storm Depth-Area-Duration

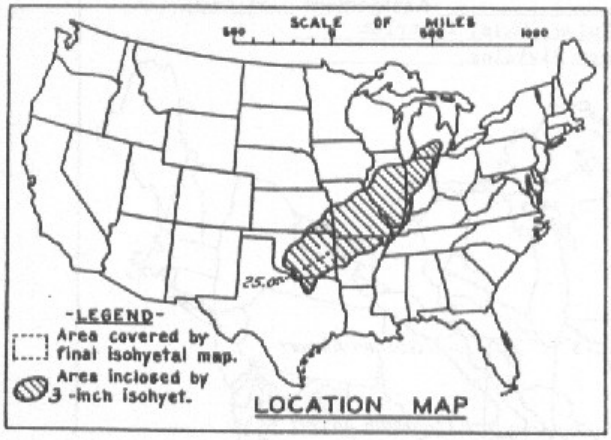
	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**11.6**	**14.5**	**17.4**	**20.4**	**23.2**	**25.3**	**28.5**	**29.0**	**29.0**
10 sq miles	**11.5**	**14.3**	**16.9**	**19.9**	**22.6**	**24.9**	**28.3**	**28.9**	**28.9**
100 sq miles	**10.1**	**12.5**	**14.4**	**17.3**	**19.8**	**22.4**	**25.3**	**26.1**	**26.1**
200 sq miles	**8.6**	**11.0**	**13.2**	**16.0**	**18.5**	**21.2**	**23.9**	**24.7**	**24.7**
500 sq miles	**6.3**	**8.8**	**11.6**	**14.3**	**16.8**	**19.4**	**21.6**	**22.5**	**22.5**
1000 sq miles	**5.0**	**7.3**	**10.4**	**12.9**	**15.4**	**17.8**	**19.8**	**20.9**	**20.9**
2000 sq miles	**4.2**	**6.3**	**9.3**	**11.5**	**14.0**	**16.2**	**18.0**	**19.1**	**19.1**
5000 sq miles	**3.5**	**5.2**	**7.9**	**9.6**	**12.2**	**14.0**	**15.5**	**16.7**	**16.7**
10000 sq miles	**3.0**	**4.5**	**6.7**	**8.3**	**10.5**	**12.1**	**13.6**	**14.6**	**14.6**
20000 sq miles	**2.4**	**3.8**	**5.7**	**7.1**	**8.8**	**10.1**	**11.6**	**12.4**	**12.5**

Storm or Storm Center Name	**USACE SW 2-20-Warner, OK**	
Storm Date(s)	5/6-10/1943	
Storm Type	General Storm	
Storm Location	35.49 N	95.31 W
Storm Center Elevation	600	
Precipitation Total & Duration (10 sq mi)	24.00 inches in 12 hours	
Storm Representative Td	72.0 F	24
Storm Representative Td Location	33.20 N	95.00 W
In-place Maximum Td	77.0 F	
Moisture Inflow Vector	SSE @ 225	
In-place Maximization Factor	**1.28**	
Temporal Transposition (Date)	24-May	
Transposition Td Location	35.71 N	85.19 W
Transposition Maximum Td	75.0 F	
Transposition Adjustment Factor	**0.91**	
Grid Point Elevation	600	
Inflow Barrier Height	600	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.16**	

Warner, OK May 6, 1943 Moisture Inflow Analysis

DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET



LOCATION MAP

Storm of 6-12 May 1943
Assignment SW 2-20
Location N.Texas to Great Lakes
Study Prepared by:
Southwestern Division
Tulsa District Office

Part I Reviewed by H. M. Sec. of Weather Bureau, 4-14-45
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 7-17-47
Remarks: Center at Warner, Oklahoma
Dewpt. 70° - Ref. Pt. 225 SSE
Grid G-15

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 1 sheet, scale 1:1,000,000

Precipitation data and mass curves: (Number of Sheets)

Form 5001-C (Hourly precip. data)	553
Form 5001-B (24-hour " ")	-
Form 5001-D (" " " ")	178
Miscl. precip. records, meteorological data, etc.	80
Form 5002 (Mass rainfall curves)	281

PART II

Final isohyetal maps, in 1 sheet, scale 1:1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)	42
Form S-11 (Depth-area data from isohyetal map)	12
Form S-12 (Maximum depth-duration data)	12
Maximum duration-depth-area curves	1
Data relating to periods of maximum rainfall	2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										120/
	6	12	18	24	30	36	48	60	72	96	144
Max. Station	10.0	12.5	15.0	17.6	20.0	21.8	24.6	25.0	25.0	25.0	25.0
10	9.9	12.3	14.6	17.2	19.5	21.5	24.4	24.9	24.9	24.9	24.9
100	8.7	10.8	12.4	14.9	17.1	19.3	21.8	22.5	22.5	22.5	22.5
200	7.4	9.5	11.4	13.8	16.0	18.3	20.6	21.3	21.3	21.3	21.3
500	5.4	7.6	10.0	12.3	14.5	16.7	18.6	19.4	19.4	19.4	19.4
1,000	4.3	6.3	9.0	11.1	13.3	15.4	17.1	18.0	18.0	18.0	18.0
2,000	3.6	5.4	8.0	9.9	12.1	14.0	15.5	16.5	16.5	16.5	16.5
5,000	3.0	4.5	6.8	8.3	10.5	12.1	13.4	14.4	14.4	14.4	14.4
10,000	2.6	3.9	5.8	7.2	9.1	10.4	11.7	12.6	12.6	12.8	12.8
20,000	2.1	3.3	4.9	6.1	7.6	8.7	10.0	10.7	10.8	11.1	11.1
50,000	1.6	2.5	3.7	4.6	5.7	6.5	7.7	8.1	8.3	8.8	8.9
100,000	1.1	1.9	2.7	3.4	4.2	4.9	5.8	6.2	6.4	7.0	7.3
212,000	0.6	1.1	1.7	2.2	2.6	3.0	3.7	4.2	4.4	5.0	5.5

Form S-2

53838 O -49 — 17

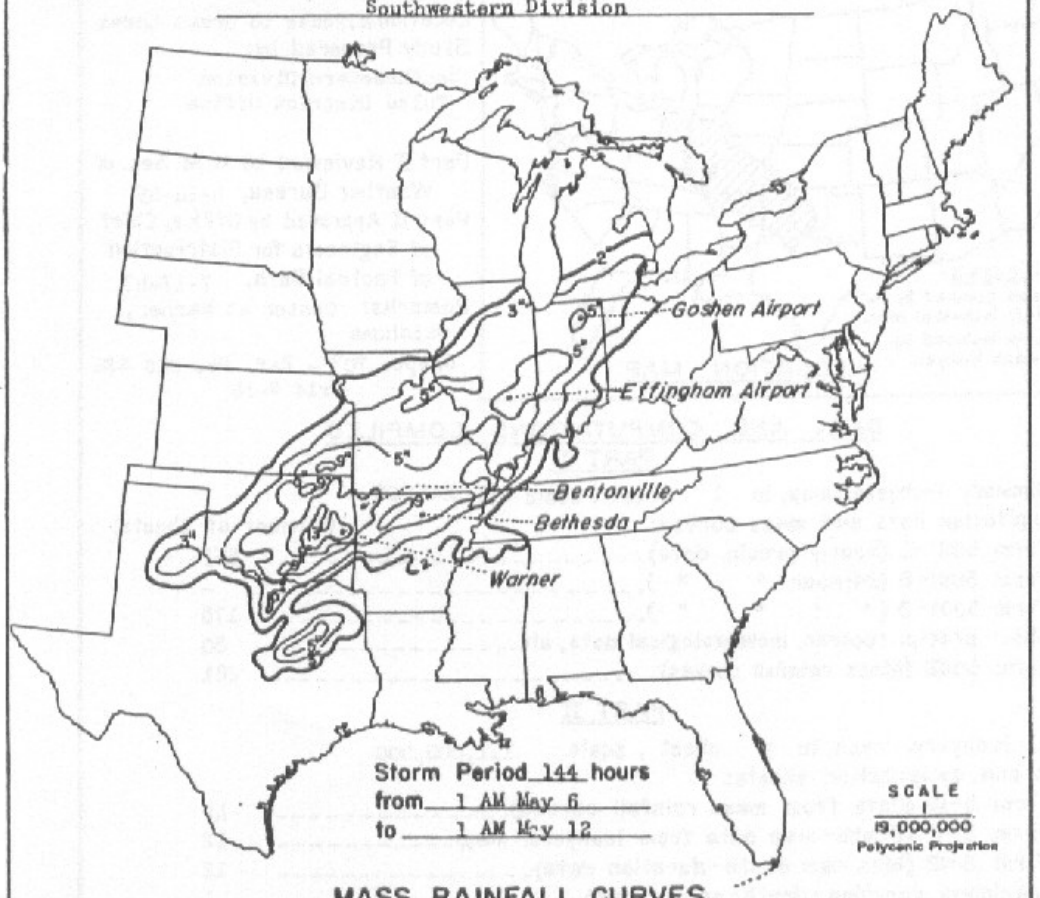
DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES – ISOHYETAL MAP

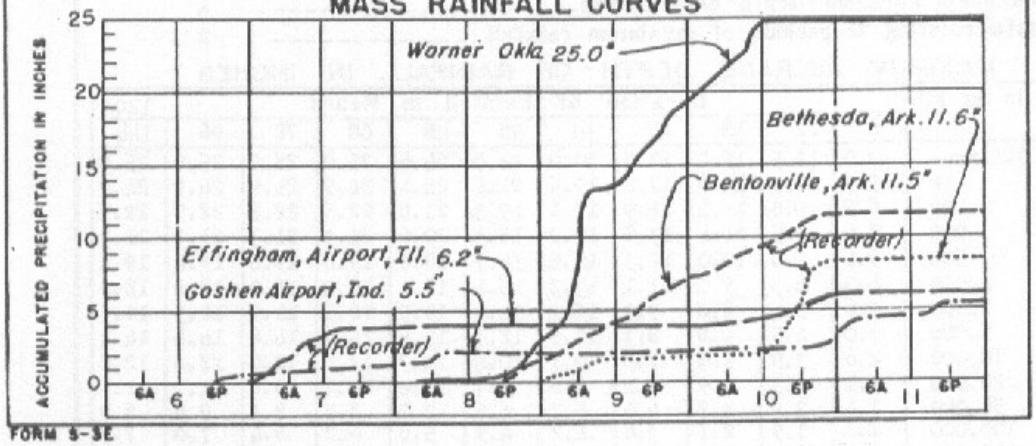
Storm of 6-12 May 1943 Assignment SW 2-20

Study Prepared by: Tulsa, Okla. District

Southwestern Division



MASS RAINFALL CURVES



FORM S-3E

Mounds, OK May 16, 1943
Transpositioned Grid Points: 1
Storm Type: Synoptic/Convective

Storm Name:	**USACE SW 2-21-Mounds, OK**
Storm Date:	**5/15-20/1943**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 1

Temporal Transposition Date **1-Jun**

	Lat	Long
Storm center location	**35.88 N**	**96.06 W**
Storm Rep Td location	**33.84 N**	**96.98 W**
Transposition Td location	**35.96 N**	**86.42 W**
Grid point location	**40.41 N**	**84.24 W**

Moisture Inflow Direction:	**SSW @ 150**	miles
Grid Point Elevation	**600**	feet
Storm Elevation	**800**	feet
Storm Duration	**6**	hours

The storm representative Td is	**73.0 F**	with total precipitable water above sea level of				**2.60**	inches.
The in-place maximum Td is	**78.5 F**	with total precipitable water above sea level of				**3.37**	inches.
The transpositioned maximum Td is	**76.5 F**	with total precipitable water above sea level of				**3.07**	inches.
The in-place storm elevation is	**800**	which subtracts	**0.19**	inches of precipitable water at		**73.0 F**	
The in-place storm elevation is	**800**	which subtracts	**0.230**	inches of precipitable water at		**78.5 F**	
The transposition storm elevation at	**600**	which subtracts	**0.160**	inches of precipitable water at		**76.5 F**	
The moisture inflow barrier height is	**600**	which subtracts	**0.160**	inches of precipitable water at		**76.5 F**	

The in-place maximization factor is	**1.30**
The transposition factor is	**0.93**
The elevation/barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.21**

Notes: Storm rep Td re-analyzed using hourly surface observations. KADM, KFWH, and KGVT used to derive the 6 hour average storm rep Td.

Observed Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**16.2**	**17.0**	**17.0**	**17.0**	-	**17.0**	**17.0**	**17.0**	**17.0**
10 sq miles	**15.9**	**16.7**	**16.7**	**16.7**	-	**16.7**	**16.7**	**16.7**	**16.7**
100 sq miles	**14.2**	**14.8**	**14.9**	**14.9**	-	**14.9**	**14.9**	**15.0**	**15.4**
200 sq miles	**13.0**	**13.5**	**13.9**	**13.9**	-	**13.9**	**13.9**	**13.9**	**14.4**
500 sq miles	**9.2**	**10.6**	**11.1**	**11.1**	-	**11.5**	**12.0**	**13.7**	**14.4**
1000 sq miles	**6.2**	**7.9**	**8.4**	**8.5**	-	**10.0**	**10.8**	**13.2**	**13.8**
2000 sq miles	**4.0**	**5.3**	**6.3**	**6.6**	-	**9.2**	**10.0**	**12.6**	**13.2**
5000 sq miles	**3.0**	**3.6**	**4.9**	**5.4**	-	**8.3**	**8.9**	**11.5**	**12.1**
10000 sq miles	**2.6**	**3.1**	**4.2**	**4.8**	-	**7.3**	**8.0**	**10.2**	**10.7**
20000 sq miles	**2.1**	**2.6**	**3.5**	**4.2**	-	**6.2**	**6.9**	**8.6**	**9.1**

Adjusted Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**19.6**	**20.5**	**20.5**	**20.5**	-	**20.5**	**20.5**	**20.5**	**20.5**
10 sq miles	**19.2**	**20.2**	**20.2**	**20.2**	-	**20.2**	**20.2**	**20.2**	**20.2**
100 sq miles	**17.1**	**17.9**	**18.0**	**18.0**	-	**18.0**	**18.0**	**18.1**	**18.6**
200 sq miles	**15.7**	**16.3**	**16.8**	**16.8**	-	**16.8**	**16.8**	**16.8**	**17.4**
500 sq miles	**11.1**	**12.8**	**13.4**	**13.4**	-	**13.9**	**14.5**	**16.5**	**17.4**
1000 sq miles	**7.5**	**9.5**	**10.1**	**10.3**	-	**12.1**	**13.0**	**15.9**	**16.7**
2000 sq miles	**4.8**	**6.4**	**7.6**	**8.0**	-	**11.1**	**12.1**	**15.2**	**15.9**
5000 sq miles	**3.6**	**4.3**	**5.9**	**6.5**	-	**10.0**	**10.7**	**13.9**	**14.6**
10000 sq miles	**3.1**	**3.7**	**5.1**	**5.8**	-	**8.8**	**9.7**	**12.3**	**12.9**
20000 sq miles	**2.5**	**3.1**	**4.2**	**5.1**	-	**7.5**	**8.3**	**10.4**	**11.0**

Storm or Storm Center Name	**USACE SW 2-21-Mounds, OK**	
Storm Date(s)	5/15-20/1943	
Storm Type	MCC	
Storm Location	35.88 N	96.06 W
Storm Center Elevation	800	
Precipitation Total & Duration (10 sq mi)	17.0 inches in 12 hours	
Storm Representative Td	73.0 F	
Storm Representative Td Location	33.84 N	96.98 W
In-place Maximum Td	78.5 F	
Moisture Inflow Vector	SSW @ 150	
In-place Maximization Factor		
Temporal Transposition (Date)	1-Jun	
Transposition Dewpoint Location	35.96 N	86.42 W
Transposition Maximum Td	76.5 F	
Transposition Adjustment Factor		
Grid Point Elevation	600	
Inflow Barrier Height	**600**	
Elevation Adjustment Factor		
Total Adjustment Factor	**1.21**	

Mounds, OK May 16, 1943 Moisture Inflow Analysis

DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET

Storm of 12-20 May 1943
Assignment SW 2-21
Location Oklahoma to Great Lakes
Study Prepared by:
Southwestern Division
Tulsa District Office

Part I Reviewed by H. M. Sec. of Weather Bureau, 10/9/46
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 8/15/49
Remarks: Center near Mounds, Okla.
Dewpt. 71° - Ref. Pt. 60 ESE Grid G-15

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 1 sheet, scale 1: 1,000,000

Precipitation data and mass curves: (Number of Sheets)

Form 5001-C (Hourly precip. data)	531
Form 5001-B (24-hour " ")	--
Form 5001-D (" " " ")	147
Misc. precip. records, meteorological data, etc.	10
Form 5002 (Mass rainfall curves)	251

PART II

Final isohyetal maps, in 1 sheet, scale 1: 1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)	44
Form S-11 (Depth-area data from isohyetal map)	8
Form S-12 (Maximum depth-duration data)	12
Maximum duration-depth-area curves	1
Data relating to periods of maximum rainfall	1

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										144/
	6	12	18	24	36	48	60	72	96	120	192
Max. Station	16.2	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
10	15.9	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.8	16.9	16.9
100	14.2	14.8	14.9	14.9	14.9	14.9	15.0	15.4	15.6	15.9	15.9
200	13.0	13.5	13.9	13.9	13.9	13.9	13.9	14.4	15.0	15.5	15.5
500	9.2	10.6	11.1	11.1	11.5	12.0	13.7	14.4	14.6	14.9	14.9
1,000	6.2	7.9	8.4	8.5	10.0	10.8	13.2	13.8	14.1	14.9	14.9
2,000	4.0	5.3	6.3	6.6	9.2	10.0	12.6	13.2	13.5	13.7	13.7
5,000	3.0	3.6	4.9	5.4	8.3	8.9	11.5	12.1	12.4	12.5	12.6
10,000	2.6	3.1	4.2	4.8	7.3	8.0	10.2	10.7	11.0	11.3	11.4
20,000	2.1	2.6	3.5	4.2	6.2	6.9	8.6	9.1	9.4	9.8	10.1
50,000	1.6	2.0	2.6	3.4	4.6	5.3	6.6	7.0	7.4	7.8	8.2
100,000	1.1	1.5	2.0	2.6	3.5	4.1	5.0	5.4	5.8	6.4	6.8
200,000	0.7	1.0	1.3	1.7	2.3	2.7	3.5	3.8	4.3	4.9	5.2

Form S-2

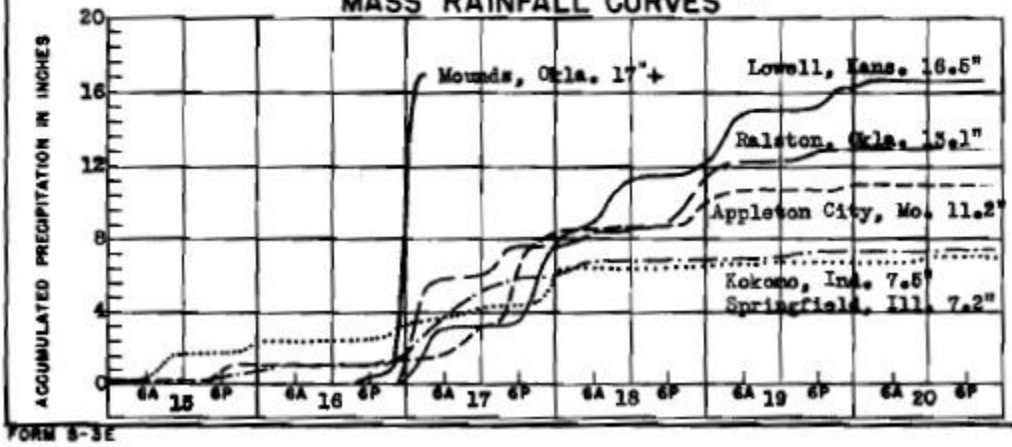
DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES - ISOHYETAL MAP

Storm of 12-20 May 1945 — Assignment SW 2-21

Study Prepared by: Tulsa, Okla. District
Southwestern Division

MASS RAINFALL CURVES



FORM 5-3E

Stanton, NE June 10, 1944
Transpositioned Grid Points: 1-3, 6-8, 12-15, 18-19
Storm Type: NCC

Storm Name:	**USACE MR-6-15-Stanton, NE**
Storm Date:	**6/10-11/1944**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date	**25-Jun**	
	Lat	**Long**
Storm center location	**41.87 N**	**97.05 W**
Storm Rep Td location	**34.40 N**	**99.50 W**
Transposition Td location	**33.50 N**	**84.50 W**
Grid point location	**41.00 N**	**82.00 W**

Moisture Inflow Direction:	**SSW @ 530**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**1,700**	feet
Storm Duration	**6**	feet

The storm representative Td is	**76.0 F**	with total precipitable water above sea level of			**2.99**	inches.
The in-place maximum Td is	**80.0 F**	with total precipitable water above sea level of			**3.60**	inches.
The transpositioned maximum Td is	**78.5 F**	with total precipitable water above sea level of			**3.37**	inches.
The in-place storm elevation is	**1,700**	which subtracts	**0.430**	inches of precipitable water at	**76.0 F**	
The in-place storm elevation is	**1,700**	which subtracts	**0.480**	inches of precipitable water at	**80.0 F**	
The transposition basin elevation at	**900**	which subtracts	**0.260**	inches of precipitable water at	**78.5 F**	
The inflow barrier/basin elevation height is	**900**	which subtracts	**0.260**	inches of precipitable water at	**78.5 F**	

The in-place storm maximization factor is	**1.22**
The transposition/elevation to basin factor is	**1.00**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.21**

Notes: DAD values taken from USACE Storm Studies MR 6-15. Storm representative Td value was based on maximum 6-hr Td values between June 10, 1944 at mid-point of KCDS, KLTS and KFDR.

Observed Storm Depth-Area-Duration

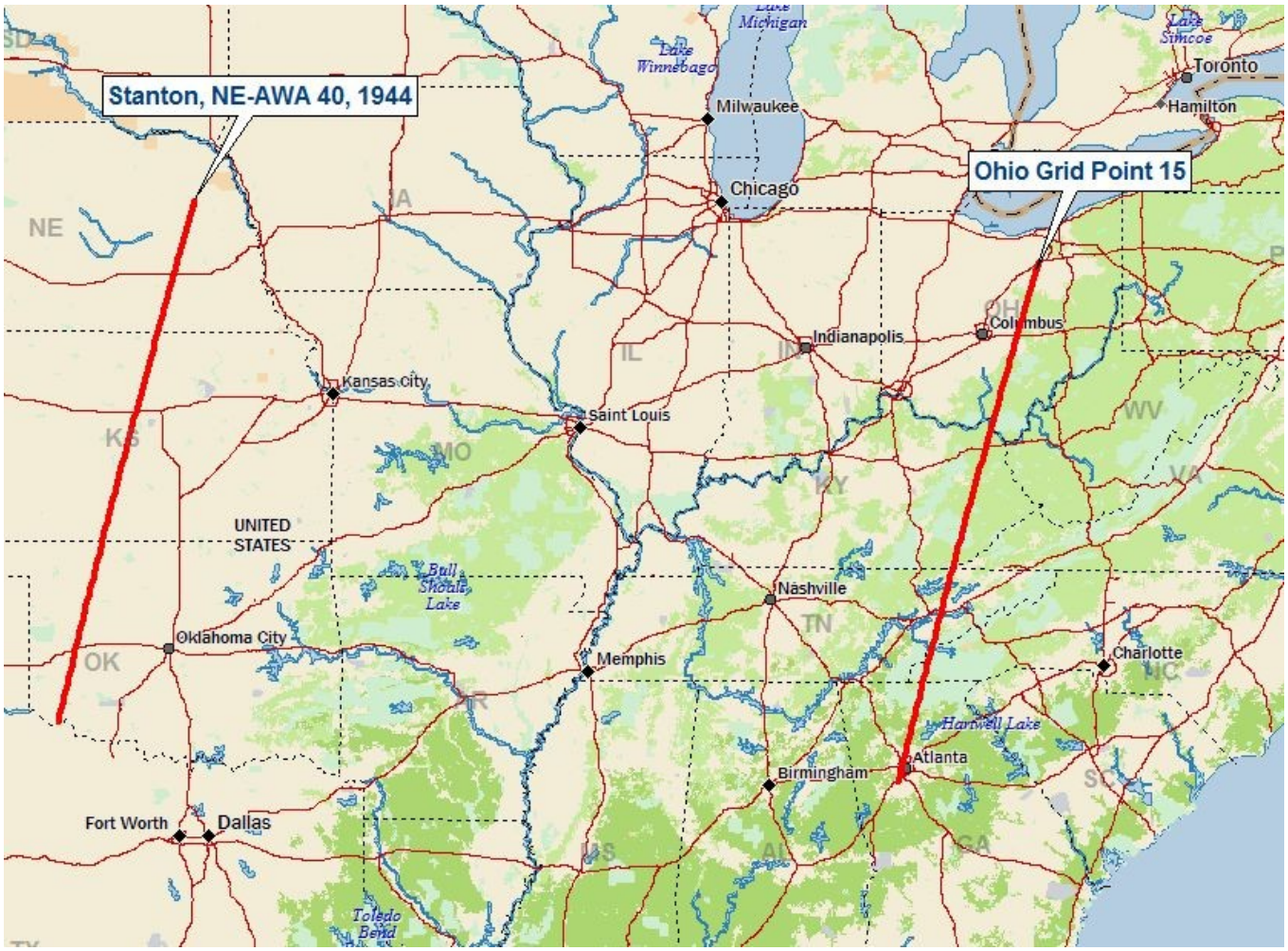
	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**15.5**	**15.8**	**15.8**	**15.8**	**15.8**	**15.8**	**16.8**	**17.3**	**17.3**
10 sq miles	**13.4**	**15.3**	**15.3**	**15.3**	**15.3**	**15.3**	**16.2**	**16.4**	**16.7**
100 sq miles	**11.7**	**13.6**	**13.6**	**13.6**	**13.6**	**13.7**	**14.8**	**14.9**	**15.1**
200 sq miles	**11.1**	**12.9**	**12.9**	**12.9**	**12.9**	**13.1**	**14.1**	**14.3**	**14.4**
500 sq miles	**9.8**	**11.3**	**11.5**	**11.5**	**11.5**	**11.6**	**12.5**	**12.7**	**12.8**
1000 sq miles	**7.8**	**9.0**	**9.3**	**9.3**	**9.3**	**9.4**	**10.1**	**10.4**	**10.4**
2000 sq miles	**5.9**	**6.9**	**7.1**	**7.1**	**7.2**	**7.3**	**7.8**	**8.1**	**8.1**
5000 sq miles	**3.4**	**4.0**	**4.2**	**4.6**	**4.7**	**4.9**	**5.3**	**5.5**	**5.7**
10000 sq miles	**2.2**	**2.5**	**2.7**	**3.5**	**3.9**	**4.1**	**4.5**	**4.7**	**4.9**
20000 sq miles	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Adjusted Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**18.8**	**19.2**	**19.2**	**19.2**	**19.2**	**19.2**	**20.4**	**21.0**	**21.0**
10 sq miles	**16.3**	**18.6**	**18.6**	**18.6**	**18.6**	**18.6**	**19.6**	**19.9**	**20.3**
100 sq miles	**14.2**	**16.5**	**16.5**	**16.5**	**16.5**	**16.6**	**18.0**	**18.1**	**18.3**
200 sq miles	**13.5**	**15.6**	**15.6**	**15.6**	**15.6**	**15.9**	**17.1**	**17.3**	**17.5**
500 sq miles	**11.9**	**13.7**	**13.9**	**13.9**	**13.9**	**14.1**	**15.2**	**15.4**	**15.5**
1000 sq miles	**9.5**	**10.9**	**11.3**	**11.3**	**11.3**	**11.4**	**12.3**	**12.6**	**12.6**
2000 sq miles	**7.2**	**8.4**	**8.6**	**8.6**	**8.7**	**8.9**	**9.5**	**9.8**	**9.8**
5000 sq miles	**4.1**	**4.9**	**5.1**	**5.6**	**5.7**	**5.9**	**6.4**	**6.7**	**6.9**
10000 sq miles	**2.7**	**3.0**	**3.3**	**4.2**	**4.7**	**5.0**	**5.5**	**5.7**	**5.9**
20000 sq miles	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

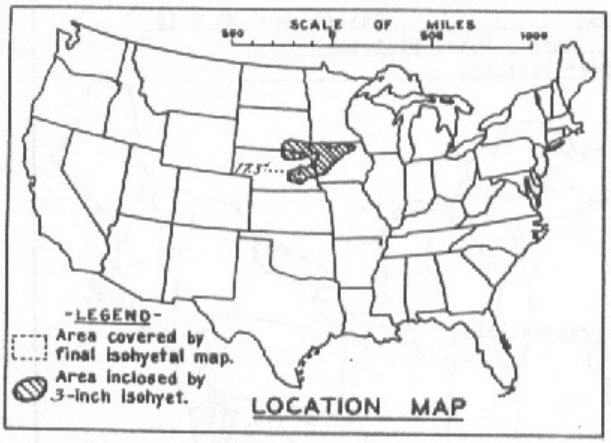
Storm or Storm Center Name	**USACE MR-6-15-Stanton, NE**	
Storm Date(s)	6/10-11/1944	
Storm Type	MCC	
Storm Location	41.87 N	97.05 W
Storm Center Elevation	1,700	
Precipitation Total & Duration	17.3 Inches 60-hours USACE Storm Studies MR 6-15	
Storm Representative Td	76.0 F	6
Storm Representative Td Location	34.40 N	99.50 W
Maximum Td	80.0 F	
Moisture Inflow Vector	SSW @ 530	
In-place Maximization Factor	**1.22**	
Temporal Transposition (Date)	25-Jun	
Transposition Td Location	33.50 N	84.50 W
Transposition Maximum Td	78.5 F	
Transposition Adjustment Factor	**1.00**	
Grid Point Elevation	900	
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.21**	

Stanton, NE June 10, 1944 Moisture Inflow Analysis



DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET



LOCATION MAP

Storm of 10-13 June 1944
Assignment MR 6-15
Location Ia., Nebr., S. Dak.
Study Prepared by:
Missouri River Division
Omaha District Office

Part I Reviewed by H. M. Sec. of Weather Bureau, 8/7/46
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 2/10/48
Remarks: Center near Stanton, Nebr.
Dewpt. 70°- Ref. Pt. 125 SSE Grid D-16

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 2 sheets, scale 1:500,000

Precipitation data and mass curves: (Number of Sheets)

Form 5001-C (Hourly precip. data)	56
Form 5001-B (24-hour " ")	-
Form 5001-D (" " " ")	19
Misc. precip. records, meteorological data, etc.	11
Form 5002 (Mass rainfall curves)	34

PART II

Final isohyetal maps, in 1 sheet, scale 500,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)	3
Form S-11 (Depth-area data from isohyetal map)	2
Form S-12 (Maximum depth-duration data)	13
Maximum duration-depth-area curves	1
Data relating to periods of maximum rainfall	5

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48	60	72	78	
Max.Sta.	15.5	15.8	15.8	15.8	15.8	15.8	16.8	17.3	17.3	17.3	
10	13.4	15.3	15.3	15.3	15.3	15.3	16.2	16.4	16.7	16.7	
100	11.7	13.6	13.6	13.6	13.6	13.7	14.8	14.9	15.1	15.1	
200	11.1	12.9	12.9	12.9	12.9	13.1	14.1	14.3	14.4	14.4	
500	9.8	11.3	11.5	11.5	11.5	11.6	12.5	12.7	12.8	12.8	
1,000	7.8	9.0	9.3	9.3	9.3	9.4	10.1	10.4	10.4	10.4	
2,000	5.9	6.9	7.1	7.1	7.2	7.3	7.8	8.1	8.1	8.1	
5,000	3.4	4.0	4.2	4.6	4.7	4.9	5.3	5.5	5.7	5.8	
10,000	2.2	2.5	2.7	3.5	3.9	4.1	4.5	4.7	4.9	5.0	
16,000	1.8	2.0	2.2	2.9	3.5	3.7	4.1	4.3	4.5	4.6	

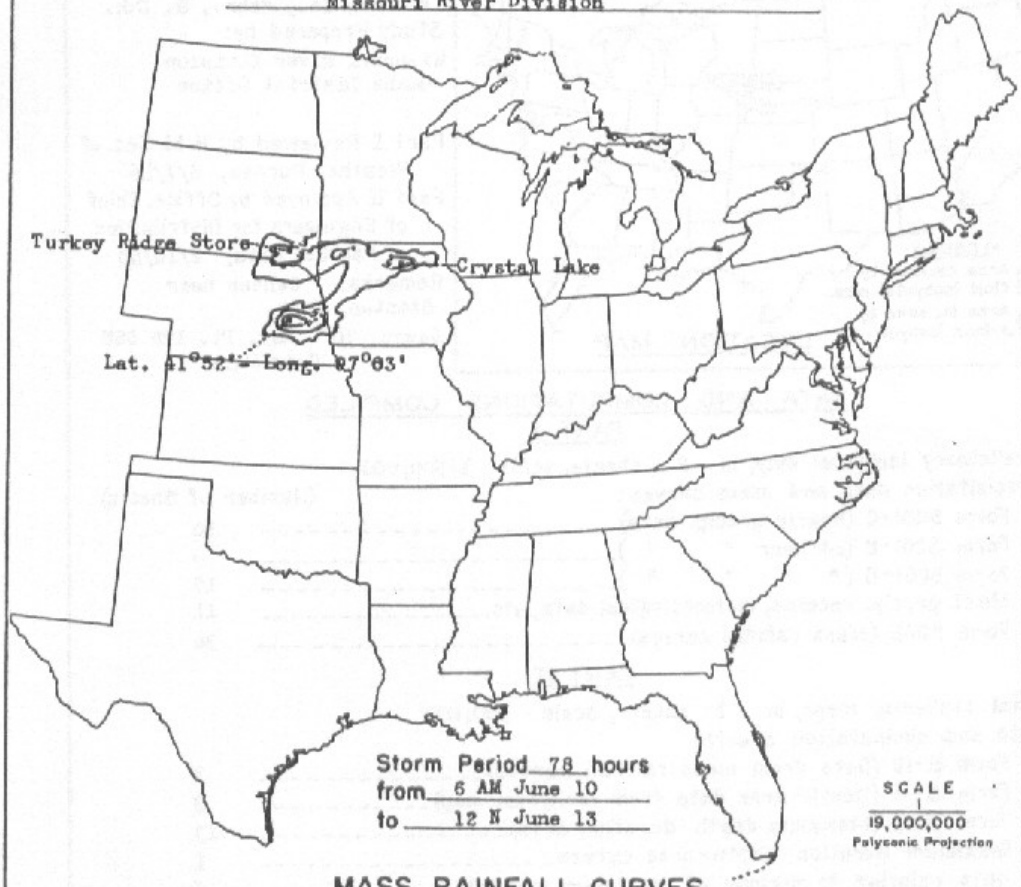
Form S-2

DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

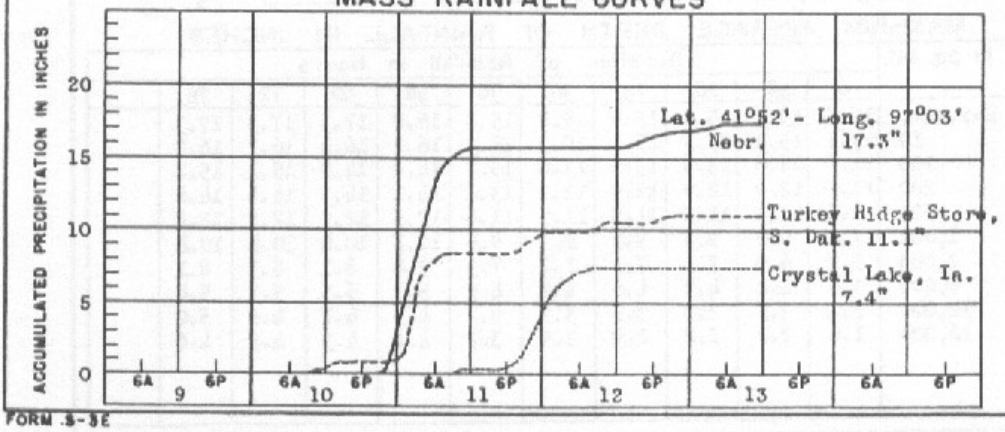
STORM STUDIES - ISOHYETAL MAP

Storm of 10-13 June 1944 Assignment MR 6-15

Study Prepared by: Omaha, Nebr. District
Missouri River Division



MASS RAINFALL CURVES



FORM 3-3E

Cole Camp, MO August 12, 1946
Transpositioned Grid Points: All
Storm Type: Synoptic/Convective

Storm Name:	**USACE MR 7-2A-Cole Camp, MO**
Storm Date:	**8/12-15/1946**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 13

Temporal Transposition Date **1-Aug**

	Lat	Long
Storm center location	**38.46 N**	**93.20 W**
Storm Rep Td location	**32.55 N**	**93.00 W**
Transposition Td location	**35.09 N**	**83.80 W**
Grid point location	**41.00 N**	**84.00 W**

Moisture Inflow Direction:	**S @ 410**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**1,000**	feet
Storm Duration	**24**	hours

The storm representative Td is	**76.0 F**	with total precipitable water above sea level of				**2.99**	inches.
The in-place maximum Td is	**80.5 F**	with total precipitable water above sea level of				**3.68**	inches.
The transpositioned maximum Td is	**78.5 F**	with total precipitable water above sea level of				**3.37**	inches.
The in-place storm elevation is	**1,000**	which subtracts	**0.260**	inches of precipitable water at		**76.0 F**	
The in-place storm elevation is	**1,000**	which subtracts	**0.300**	inches of precipitable water at		**80.5 F**	
The transposition storm elevation at	**700**	which subtracts	**0.200**	inches of precipitable water at		**78.5 F**	
The moisture inflow barrier height is	**700**	which subtracts	**0.200**	inches of precipitable water at		**78.5 F**	

The in-place maximization factor is	**1.24**
The transposition factor is	**0.94**
The elevation/barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.16**

Notes: DAD values taken from HMR 51 DAD Table Storm Index N. 80-USACE MR 7-2B. Storm representative Td value was based on maximum 24-hr Td values between August 10-11, 1946 at KBAD and KMLU.

Observed Storm Depth-Area-Duration

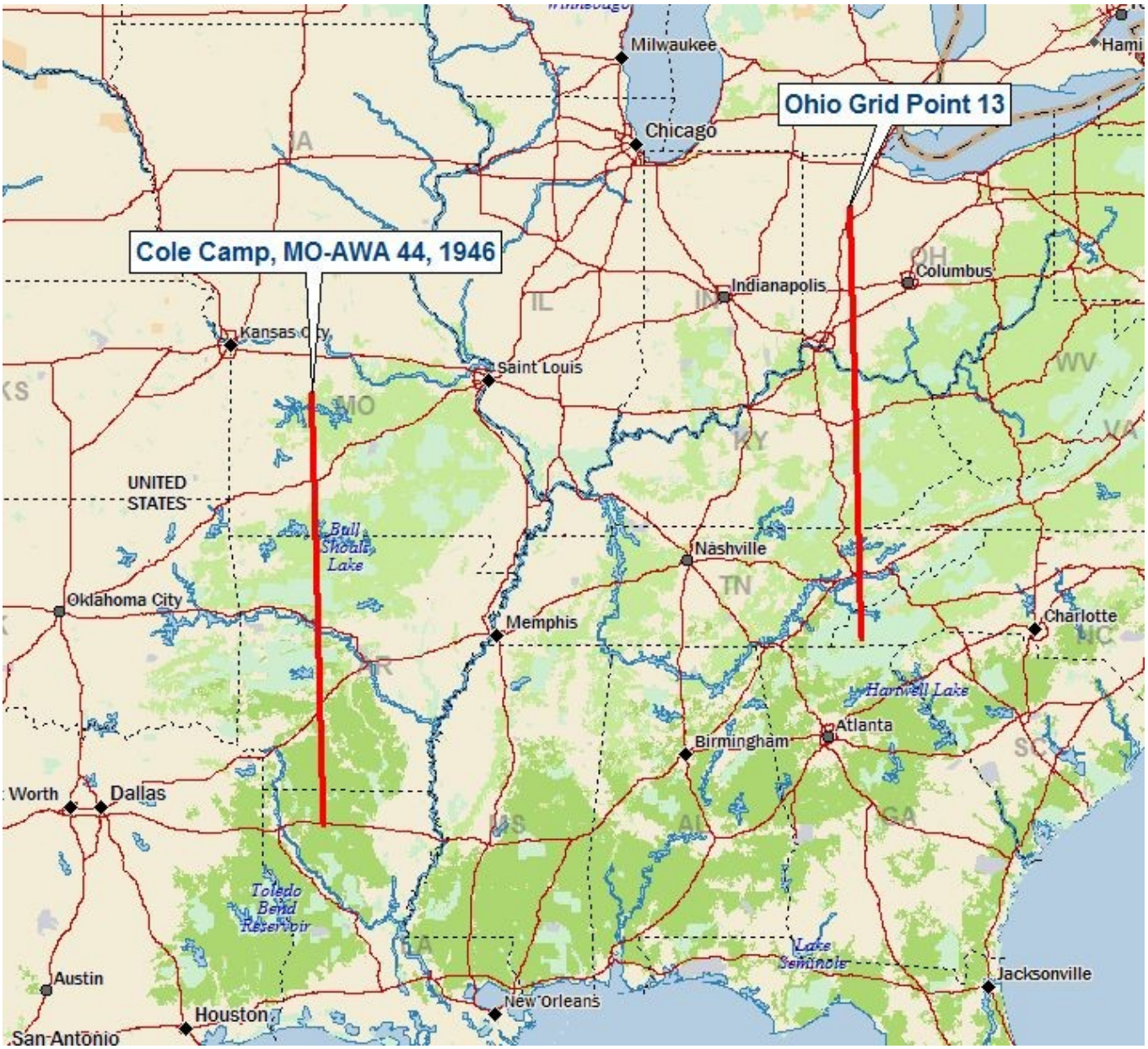
	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**10.6**	**11.0**	**11.1**	**15.0**	**17.4**	**18.5**	**19.0**	**19.4**	**19.4**
100 sq miles	**9.0**	**9.9**	**10.0**	**13.4**	**16.0**	**17.0**	**18.3**	**18.6**	**18.6**
200 sq miles	**8.3**	**9.2**	**9.4**	**12.4**	**15.0**	**16.1**	**17.4**	**17.7**	**17.7**
500 sq miles	**7.0**	**7.9**	**8.0**	**10.4**	**12.9**	**14.1**	**15.5**	**15.9**	**15.9**
1000 sq miles	**5.5**	**6.6**	**7.0**	**8.3**	**10.9**	**12.0**	**13.7**	**14.1**	**14.1**
2000 sq miles	**4.2**	**5.5**	**6.3**	**6.8**	**9.4**	**10.4**	**11.8**	**12.3**	**12.3**
5000 sq miles	**3.3**	**4.7**	**5.6**	**5.9**	**7.8**	**8.6**	**9.6**	**10.0**	**10.1**
10000 sq miles	**2.8**	**4.2**	**5.0**	**5.4**	**6.5**	**7.2**	**8.1**	**8.4**	**8.7**
20000 sq miles	**2.3**	**3.4**	**4.2**	**4.5**	**5.1**	**5.7**	**6.6**	**6.9**	**7.2**

Adjusted Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**12.3**	**12.8**	**12.9**	**17.4**	**20.2**	**21.4**	**22.0**	**22.5**	**22.5**
100 sq miles	**10.4**	**11.5**	**11.6**	**15.5**	**18.5**	**19.7**	**21.2**	**21.6**	**21.6**
200 sq miles	**9.6**	**10.7**	**10.9**	**14.4**	**17.4**	**18.7**	**20.2**	**20.5**	**20.5**
500 sq miles	**8.1**	**9.2**	**9.3**	**12.1**	**15.0**	**16.3**	**18.0**	**18.4**	**18.4**
1000 sq miles	**6.4**	**7.7**	**8.1**	**9.6**	**12.6**	**13.9**	**15.9**	**16.3**	**16.3**
2000 sq miles	**4.9**	**6.4**	**7.3**	**7.9**	**10.9**	**12.1**	**13.7**	**14.3**	**14.3**
5000 sq miles	**3.8**	**5.4**	**6.5**	**6.8**	**9.0**	**10.0**	**11.1**	**11.6**	**11.7**
10000 sq miles	**3.2**	**4.9**	**5.8**	**6.3**	**7.5**	**8.3**	**9.4**	**9.7**	**10.1**
20000 sq miles	**2.7**	**3.9**	**4.9**	**5.2**	**5.9**	**6.6**	**7.7**	**8.0**	**8.3**

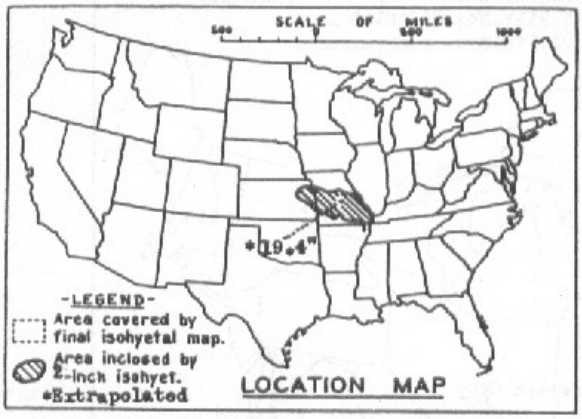
Storm or Storm Center Name	**USACE MR 7-2A-Cole Camp, MO**	
Storm Date(s)	8/12-15/1946	
Storm Type	General Storm	
Storm Location	38.46 N	93.20 W
Storm Center Elevation	1,000	
Precipitation Total & Duration (10 sq mi)	19.40 Inches in 60-hours	
Storm Representative Td	76.0 F	24
Storm Representative Td Location	32.55 N	93.00 W
In-place Maximum Td	80.5 F	
Moisture Inflow Vector	S @ 410	
In-place Maximization Factor	**1.24**	
Temporal Transposition (Date)	1-Aug	
Transposition Td Location	35.09 N	83.80 W
Transposition Maximum Td	78.5 F	
Transposition Adjustment Factor	**0.94**	
Grid Point Elevation	900	
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.16**	

Cole Camp, MO August 12, 1946 Moisture Inflow Analysis



DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET



LOCATION MAP

Storm of 12-15 August 1946
Assignment MR 7-2A
Location Kansas & Missouri
Study Prepared by:
Missouri River Division
Kansas City District

Part I Reviewed by H. M. Sec. of Weather Bureau, 8/30/48
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 3/20/50
Remarks: Center near Cole Camp, Mo.
Dewpt. 74° - Ref. Pt. 140'S
Grid F-14

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 1 sheet, scale 1: 1,000,000

Precipitation data and mass curves:	(Number of Sheets)
Form 5001-C (Hourly precip. data)	64
Form 5001-B (24-hour " ")	-
Form 5001-D (" " " ")	18
Miscl. precip. records, meteorological data, etc.	30
Form 5002 (Mass rainfall curves)	51

PART II

Final isohyetal maps, in 1 sheet, scale 1: 1,000,000

Data and computation sheets:	
Form S-10 (Data from mass rainfall curves)	6
Form S-11 (Depth-area data from isohyetal map)	2
Form S-12 (Maximum depth-duration data)	16
Maximum duration-depth-area curves	1
Data relating to periods of maximum rainfall	2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48	60	72	78	
10	10.6	11.0	11.1	15.0	17.4	18.5	19.0	19.4	19.4	19.4	
100	9.0	9.9	10.0	13.4	16.0	17.0	18.3	18.6	18.6	18.6	
200	8.3	9.2	9.4	12.4	15.0	16.1	17.4	17.7	17.7	17.7	
500	7.0	7.9	8.0	10.4	12.9	14.1	15.5	15.9	15.9	15.9	
1,000	5.5	6.6	7.0	8.3	10.9	12.0	13.7	14.1	14.1	14.1	
2,000	4.2	5.5	6.3	6.8	9.4	10.4	11.8	12.3	12.3	12.3	
5,000	3.3	4.7	5.6	5.9	7.8	8.6	9.6	10.0	10.1	10.1	
10,000	2.8	4.2	5.0	5.4	6.5	7.2	8.1	8.4	8.7	8.7	
20,000	2.3	3.4	4.2	4.5	5.1	5.7	6.6	6.9	7.2	7.2	
45,000	1.4	2.3	2.7	2.9	3.3	3.9	4.5	4.8	5.0	5.0	

Form S-2

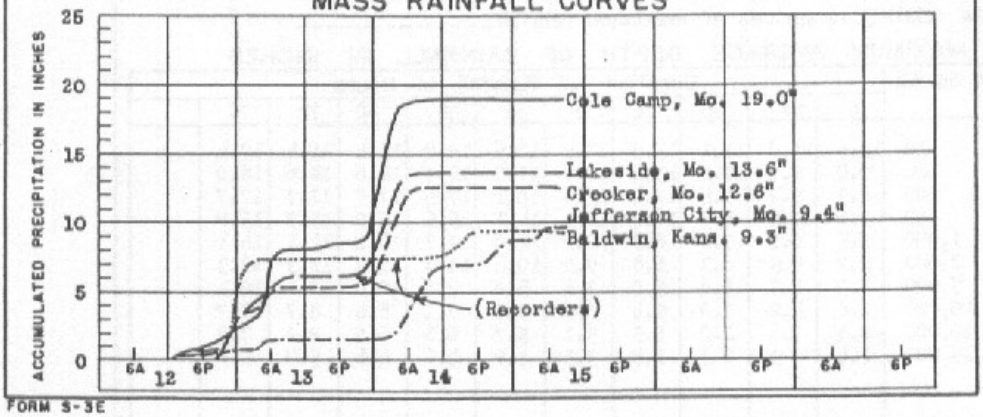
DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES - ISOHYETAL MAP

Storm of 12-15 August 1946 Assignment MR 7-2A

Study Prepared by: Kansas City, Mo. District
Missouri River Division

MASS RAINFALL CURVES



FORM S-3E

Collinsville, IL August 12, 1946
Transpositioned Grid Points: All
Storm Type: Synoptic/Convective

Storm Name:	**USACE MR 7-2B-Collinsville, IL**
Storm Date:	**8/12-15/1946**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date	**1-Aug**	
	Lat	**Long**
Storm center location	**38.67 N**	**89.98 W**
Storm Rep Td location	**32.55 N**	**93.00 W**
Transposition Td location	**34.90 N**	**85.10 W**
Grid point location	**41.00 N**	**82.00 W**

Moisture Inflow Direction:	**SSW @ 455**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**500**	feet
Storm Duration	**24**	hours

The storm representative Td is	**76.0 F**	with total precipitable water above sea level of			**2.99**	inches.
The in-place maximum Td is	**80.5 F**	with total precipitable water above sea level of			**3.68**	inches.
The transpositioned maximum Td is	**79.0 F**	with total precipitable water above sea level of			**3.44**	inches.
The in-place storm elevation is	**500**	which subtracts	**0.130**	inches of precipitable water at	**76.0 F**	
The in-place storm elevation is	**500**	which subtracts	**0.150**	inches of precipitable water at	**80.5 F**	
The transposition storm elevation at	**900**	which subtracts	**0.260**	inches of precipitable water at	**79.0 F**	
The moisture inflow barrier height is	**900**	which subtracts	**0.260**	inches of precipitable water at	**79.0 F**	

The in-place maximization factor is	**1.23**
The transposition factor is	**0.90**
The elevation/barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.11**

Notes: DAD values taken from HMR 51 DAD Table Storm Index N. 80-USACE MR 7-2B. Storm representative Td value was based on maximum 24-hr Td values between August 10-11, 1946 at KBAD and KMLU.

Observed Storm Depth-Area-Duration

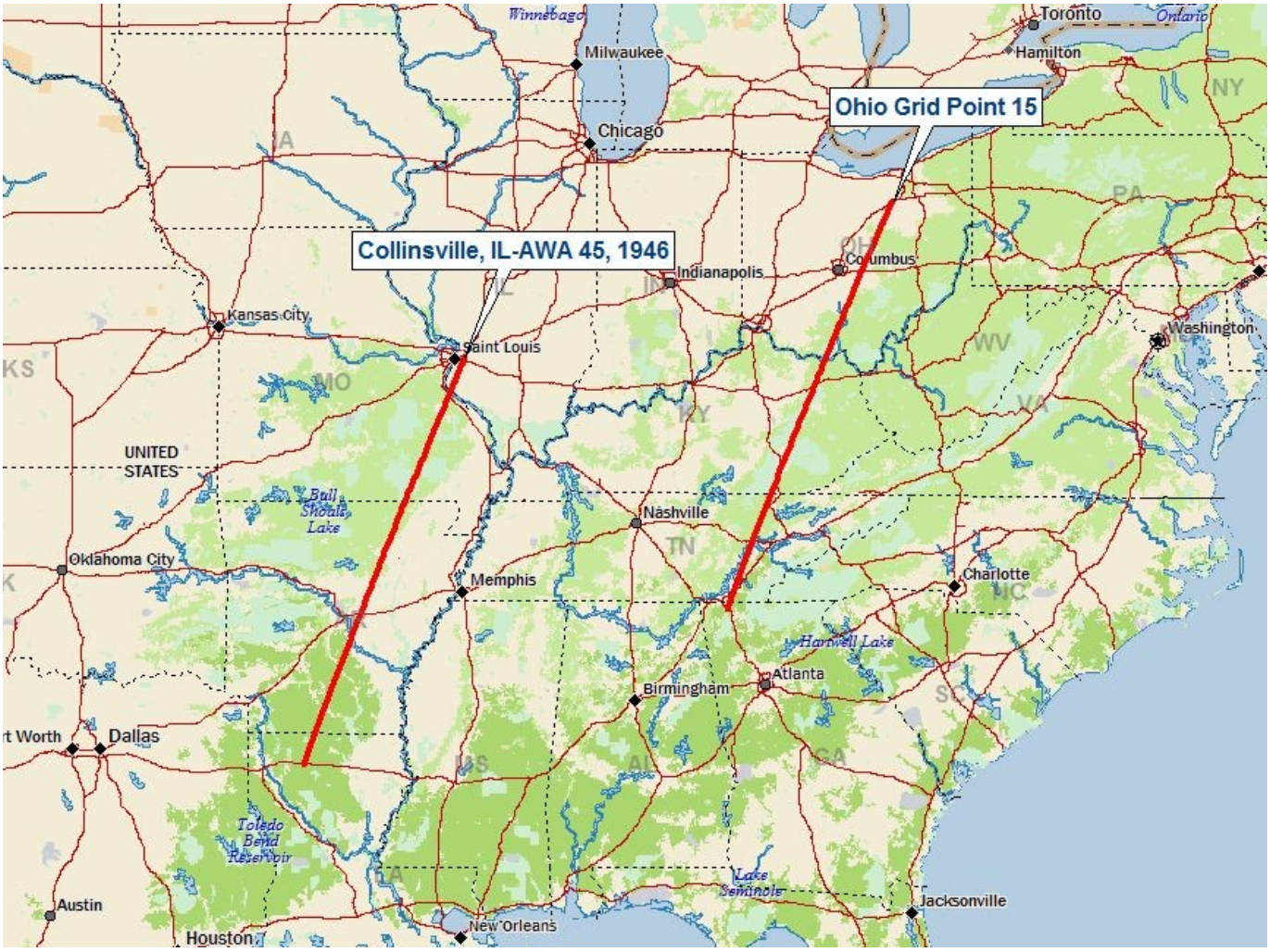
	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**6.4**	**10.2**	**12.6**	**12.7**	**14.1**	**18.0**	**18.1**	**18.6**	**18.7**
10 sq miles	**6.0**	**9.8**	**12.1**	**12.1**	**13.7**	**17.5**	**17.6**	**18.3**	**18.3**
100 sq miles	**5.6**	**8.8**	**10.9**	**11.1**	**13.2**	**16.6**	**16.7**	**17.5**	**17.6**
200 sq miles	**5.4**	**8.3**	**10.5**	**10.6**	**13.0**	**16.2**	**16.3**	**17.2**	**17.3**
500 sq miles	**5.2**	**7.7**	**9.7**	**9.9**	**12.8**	**15.5**	**15.6**	**16.7**	**16.9**
1000 sq miles	**4.9**	**7.0**	**8.9**	**9.0**	**12.6**	**14.7**	**14.8**	**15.9**	**16.0**
2000 sq miles	**4.3**	**6.1**	**7.6**	**7.8**	**11.2**	**13.3**	**13.4**	**14.3**	**14.3**
5000 sq miles	**3.3**	**4.8**	**5.9**	**6.0**	**8.6**	**10.4**	**10.6**	**11.3**	**11.4**
10000 sq miles	**2.4**	**3.7**	**4.5**	**4.6**	**6.6**	**8.0**	**8.2**	**8.7**	**8.8**
20000 sq miles	**1.5**	**2.5**	**3.1**	**3.2**	**4.6**	**5.6**	**5.8**	**6.0**	**6.1**

Adjusted Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**7.1**	**11.3**	**14.0**	**14.1**	**15.7**	**20.0**	**20.1**	**20.7**	**20.8**
10 sq miles	**6.7**	**10.9**	**13.5**	**13.5**	**15.2**	**19.5**	**19.6**	**20.3**	**20.3**
100 sq miles	**6.2**	**9.8**	**12.1**	**12.3**	**14.7**	**18.5**	**18.6**	**19.5**	**19.6**
200 sq miles	**6.0**	**9.2**	**11.7**	**11.8**	**14.5**	**18.0**	**18.1**	**19.1**	**19.2**
500 sq miles	**5.8**	**8.6**	**10.8**	**11.0**	**14.2**	**17.2**	**17.3**	**18.6**	**18.8**
1000 sq miles	**5.4**	**7.8**	**9.9**	**10.0**	**14.0**	**16.3**	**16.5**	**17.7**	**17.8**
2000 sq miles	**4.8**	**6.8**	**8.5**	**8.7**	**12.5**	**14.8**	**14.9**	**15.9**	**15.9**
5000 sq miles	**3.7**	**5.3**	**6.6**	**6.7**	**9.6**	**11.6**	**11.8**	**12.6**	**12.7**
10000 sq miles	**2.7**	**4.1**	**5.0**	**5.1**	**7.3**	**8.9**	**9.1**	**9.7**	**9.8**
20000 sq miles	**1.7**	**2.8**	**3.4**	**3.6**	**5.1**	**6.2**	**6.4**	**6.7**	**6.8**

Storm or Storm Center Name	**USACE MR 7-2B-Collinsville, IL**	
Storm Date(s)	8/12-15/1946	
Storm Type	General Storm	
Storm Location	38.67 N	89.98 W
Storm Center Elevation	500	
Precipitation Total & Duration (10 sq mi)	18.7 Inches in 72-hours	
Storm Representative Td	76.0 F	24
Storm Representative Td Location	32.55 N	93.00 W
In-place Maximum Td	80.5 F	
Moisture Inflow Vector	SSW @ 455	
In-place Maximization Factor	**1.23**	
Temporal Transposition (Date)	1-Aug	
Transposition Td Location	34.90 N	85.10 W
Transposition Maximum Td	79.0 F	
Transposition Adjustment Factor	**0.90**	
Grid Point Elevation	900	
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.00**	

Collinsville, IL August 12, 1946 Moisture Inflow Analysis



DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET

LOCATION MAP

Storm of 12-16 August 1946
Assignment MR 7-2B
Location Mo., Ill., Ind. & Ky.
Study Prepared by:
Upper Mississippi Valley Division
St. Louis District

Part I Reviewed by H. M. Sec. of Weather Bureau, 3/8/49
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 3/20/50
Remarks: Center near Collinsville, Ill. Dewpt. 74° Ref. Pt. 225 S Grid F-12

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 1 sheet, scale 1: 1,000,000

Precipitation data and mass curves: (Number of Sheets)

Form 5001-C (Hourly precip. data)	58
Form 5001-B (24-hour " ")	—
Form 5001-D (" " ")	16
Misc. precip. records, meteorological data, etc.	15
Form 5002 (Mass rainfall curves)	44

PART II

Final isohyetal maps, in 1 sheet, scale 1: 1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)	5
Form S-11 (Depth-area data from isohyetal map)	3
Form S-12 (Maximum depth-duration data)	7
Maximum duration-depth-area curves	1
Data relating to periods of maximum rainfall	2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48	60	72	96	114
Max. Sta.	6.4	10.2	12.6	12.7	14.1	18.0	18.1	18.6	18.7	19.4	19.5
10	6.0	9.8	12.1	12.1	13.7	17.5	17.6	18.3	18.3	18.9	19.0
100	5.6	8.8	10.9	11.1	13.2	16.6	16.7	17.5	17.6	18.0	18.1
200	5.4	8.3	10.5	10.6	13.0	16.2	16.3	17.2	17.3	17.7	17.8
500	5.2	7.7	9.7	9.9	12.8	15.5	15.6	16.7	16.9	17.1	17.2
1,000	4.9	7.0	8.9	9.0	12.6	14.7	14.8	15.9	16.0	16.3	16.4
2,000	4.3	6.1	7.6	7.8	11.2	13.3	13.4	14.3	14.3	14.6	14.7
5,000	3.3	4.8	5.9	6.0	8.6	10.4	10.6	11.3	11.4	11.6	11.8
10,000	2.4	3.7	4.5	4.6	6.6	8.0	8.2	8.7	8.8	9.0	9.1
20,000	1.5	2.5	3.1	3.2	4.5	5.6	5.8	6.0	6.1	6.3	6.5
20,400	1.5	2.5	3.1	3.2	4.5	5.5	5.7	6.0	6.1	6.3	6.4

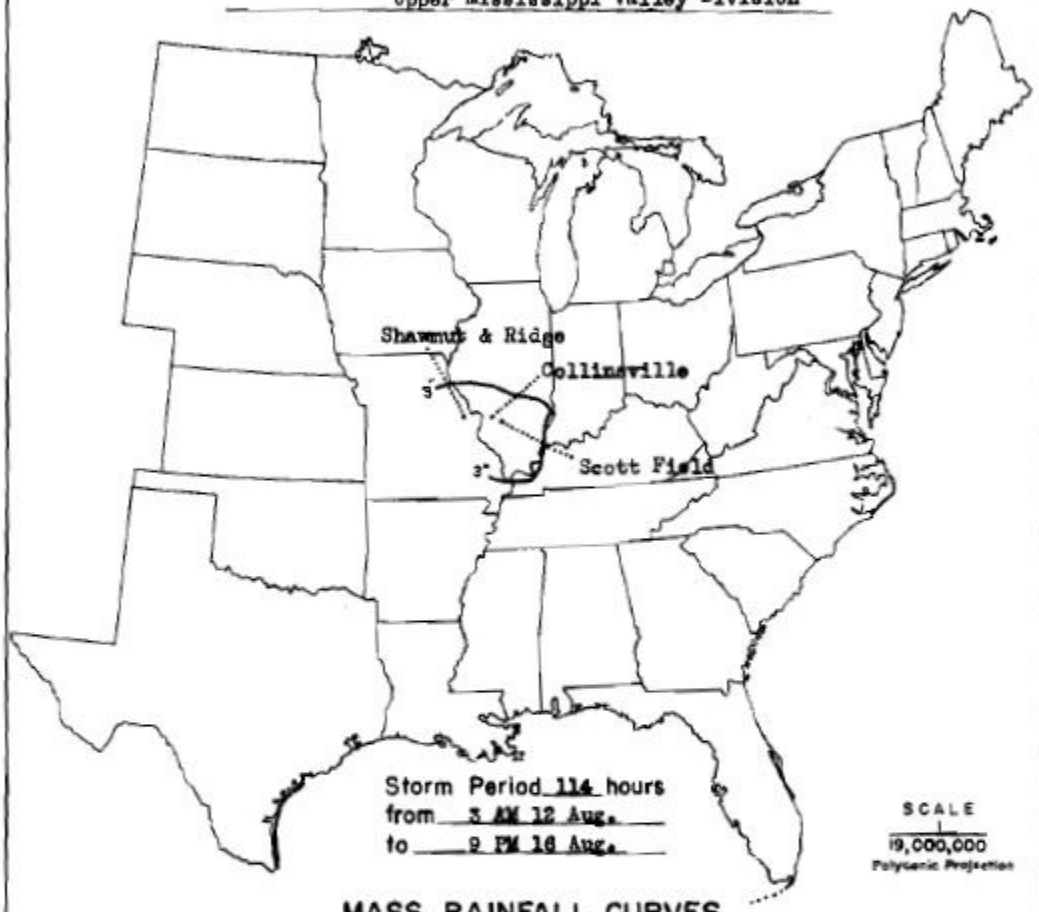
Form S-2

DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

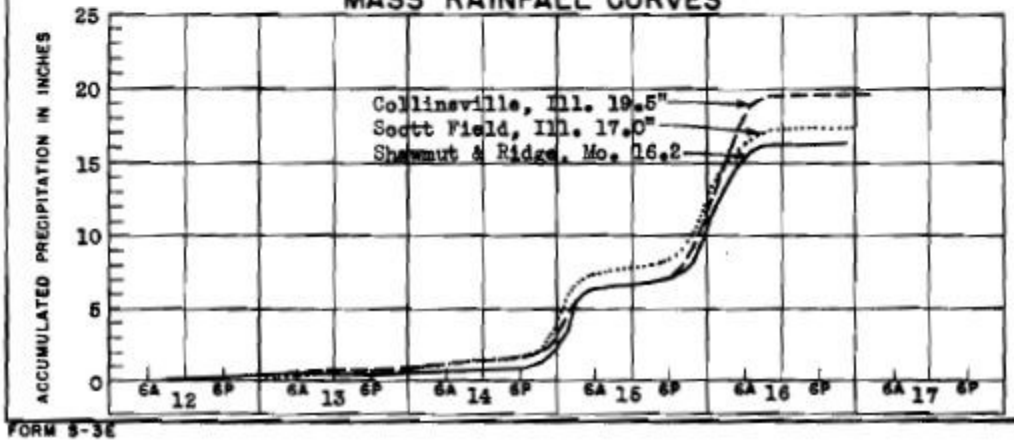
STORM STUDIES - ISOHYETAL MAP

Storm of 12-16 August 1946 — Assignment MR 7-2B

Study Prepared by: St. Louis, Mo. District
Upper Mississippi Valley Division



MASS RAINFALL CURVES



FORM 5-3E

Holt, MO June 18, 1947
Transpositioned Grid Points: 1-4, 6-9, 12-16, 18-20
Storm Type: MCC

Storm Name:	**USACE MR 8-20-Holt, MO**
Storm Date:	**6/18-22/1947**
AWA Analysis Date:	**4/12/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date	**5-Jul**	
	Lat	**Long**
Storm center location	**39.45 N**	**94.34 W**
Storm Rep Td location	**36.18 N**	**95.25 W**
Transposition Td location	**37.73 N**	**82.91 W**
Basin location	**41.00 N**	**82.00 W**

Moisture Inflow Direction:	**SSW @ 230**	miles
Basin Elevation	**900**	feet
Storm Elevation	**1,000**	feet
Storm Duration	**6**	hours

The storm representative Td is	**79.0 F**	with total precipitable water above sea level of			**3.44**	inches.
The in-place maximum Td is	**81.0 F**	with total precipitable water above sea level of			**3.76**	inches.
The transpositioned maximum Td is	**78.5 F**	with total precipitable water above sea level of			**3.37**	inches.
The in-place storm elevation is	**1,000**	which subtracts	**0.280**	inches of precipitable water at	**79.0 F**	
The in-place storm elevation is	**1,000**	which subtracts	**0.300**	inches of precipitable water at	**81.0 F**	
The transposition basin elevation at	**900**	which subtracts	**0.260**	inches of precipitable water at	**78.5 F**	
The inflow barrier/basin elevation height is	**900**	which subtracts	**0.260**	inches of precipitable water at	**78.5 F**	

The in-place storm maximization factor is	**1.09**
The transposition/elevation to basin factor is	**0.90**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**0.98**

Notes: DAD values taken from USACE MR 8-20, 1sqmi amount taken from Holt, MO world record rainfall within the overall storm. Storm representative Td value was based on maximum 6-hr Td values between June 22-23, 1947 at KHRO and KTUL.

Observed Storm Depth-Area-Duration

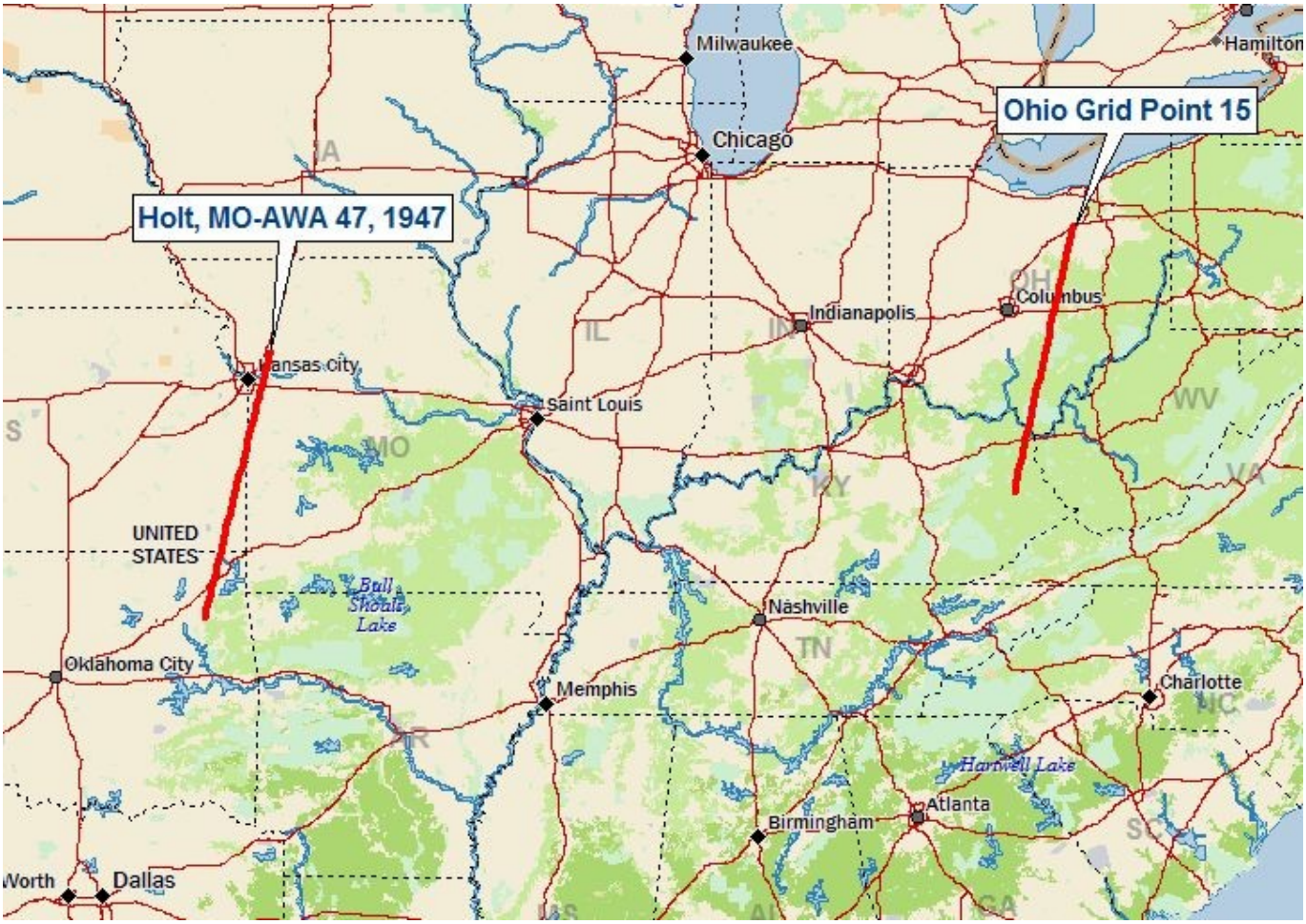
	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**12.0**	**12.0**	**12.0**	**12.0**	-	**12.0**	**14.4**	-	**16.6**
10 sq miles	**11.5**	**11.5**	**11.5**	**11.5**	-	**11.5**	**12.6**	-	**15.8**
100 sq miles	**7.9**	**7.9**	**7.9**	**7.9**	-	**7.9**	**9.3**	-	**12.9**
200 sq miles	**7.1**	**7.1**	**7.1**	**7.1**	-	**7.1**	**8.4**	-	**11.9**
500 sq miles	**6.3**	**6.3**	**6.3**	**6.3**	-	**6.3**	**7.4**	-	**10.6**
1000 sq miles	**5.6**	**5.6**	**5.6**	**5.6**	-	**5.6**	**6.6**	-	**9.6**
5000 sq miles	**3.5**	**3.7**	**3.7**	**3.7**	-	**3.7**	**4.6**	-	**6.7**
10000 sq miles	**2.6**	**2.9**	**3.0**	**3.0**	-	**3.0**	**3.7**	-	**5.4**
20000 sq miles	**1.8**	**2.1**	**2.2**	**2.2**	-	**2.2**	**3.1**	-	**4.4**

Adjusted Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**11.8**	**11.8**	**11.8**	**11.8**	-	**11.8**	**14.1**	-	**16.3**
10 sq miles	**11.3**	**11.3**	**11.3**	**11.3**	-	**11.3**	**12.4**	-	**15.5**
100 sq miles	**7.8**	**7.8**	**7.8**	**7.8**	-	**7.8**	**9.1**	-	**12.7**
200 sq miles	**7.0**	**7.0**	**7.0**	**7.0**	-	**7.0**	**8.3**	-	**11.7**
500 sq miles	**6.2**	**6.2**	**6.2**	**6.2**	-	**6.2**	**7.3**	-	**10.4**
1000 sq miles	**5.5**	**5.5**	**5.5**	**5.5**	-	**5.5**	**6.5**	-	**9.4**
5000 sq miles	**3.4**	**3.6**	**3.6**	**3.6**	-	**3.6**	**4.5**	-	**6.6**
10000 sq miles	**2.6**	**2.8**	**2.9**	**2.9**	-	**2.9**	**3.6**	-	**5.3**
20000 sq miles	**1.8**	**2.1**	**2.2**	**2.2**	-	**2.2**	**3.0**	-	**4.3**

Storm or Storm Center Name	**USACE MR 8-20-Holt, MO**	
Storm Date(s)	6/18-22/1947	
Storm Type	MCC	
Storm Location	39.45 N	94.34 W
Storm Center Elevation	1,000	
Precipitation Total & Duration	17.6 Inches 6-hours USACE MR 8-20	
Storm Representative Td	79.0 F	6
Storm Representative Td Location	36.18 N	95.25 W
Maximum Td	81.0 F	
Moisture Inflow Vector	SSW @ 230	Miles
In-place Maximization Factor	**1.09**	
Temporal Transposition (Date)	5-Jul	
Transposition Td Location	37.73 N	82.91 W
Transposition Maximum Td	78.5 F	
Transposition Adjustment Factor	**0.90**	
Average Basin Elevation	900	
Highest Elevation in Basin		
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**0.98**	

Holt, MO June 18, 1947 Moisture Inflow Analysis



DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET

LOCATION MAP

Storm of 18-23 June 1947
Assignment MR 8-20
Location Ill, Ia, Kans, Minn. Mo, Nebr, & S.Dak.
Study Prepared by:
Missouri River Division
Omaha District Office

Part I Reviewed by H. M. Sec. of Weather Bureau, 12/17/52
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 9/10/54
Remarks:

Center near Holt, Mo.
Dewpoint 75°, Ref. Pt. 140 S

DATA AND COMPUTATIONS COMPILED

Grid E-14

PART I

Preliminary isohyetal map, in sheet, scale

Precipitation data and mass curves: (Number of Sheets)

Form 5001-C (Hourly precip. data)--
Form 5001-B (24-hour " ")----------
Form 5001-D (" " " ")----------
Misc. precip. records, meteorological data, etc.
Form 5002 (Mass rainfall curves)----------

NOTE: This study was computed by the Regional Method which does not employ the Part I and Part II phases in their entirety.

PART II

Final isohyetal maps, in 1 sheet, scale 1:[illegible]

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)---------- 9
Form S-11 (Depth-area data from isohyetal map)---------- 4
Form S-12 (Maximum depth-duration data)---------- 7
Maximum duration-depth-area curves---------- 1
Data relating to periods of maximum rainfall----------

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	36	48	72	96	120		
Max.Station	12.0	12.0	12.0	12.0	12.0	14.4	16.8	16.8	17.6		
10	11.5	11.5	11.5	11.5	11.5	12.8	15.8	15.8	16.9		
100	7.9	7.9	7.9	7.9	7.9	9.3	12.9	12.9	14.1		
200	7.1	7.1	7.1	7.1	7.1	8.4	11.9	11.9	13.0		
500	6.3	6.3	6.3	6.3	6.3	7.4	10.6	10.6	11.6		
1000	5.6	5.6	5.6	5.8	5.6	6.6	9.6	9.6	10.5		
2000	4.9	4.9	4.9	4.9	4.9	5.7	8.4	8.4	9.3		
5000	3.5	3.7	3.7	3.7	3.7	4.6	6.7	6.7	7.3		
10000	2.6	2.9	3.0	3.0	3.0	3.7	5.4	5.4	5.9		
20000	1.8	2.1	2.2	2.2	2.2	3.1	4.4	4.6	4.9		
50000	1.2	1.4	1.6	1.6	1.8	2.5	3.2	3.5	3.9		
100000	0.8	1.0	1.2	1.4	1.6	2.1	2.7	2.9	3.0		
200000	0.5	0.7	0.8	1.1	1.4	1.7	2.1	2.2	2.3		
306000	0.3	0.5	0.6	0.7	0.9	1.2	1.6	1.8	1.8		

Form S-2

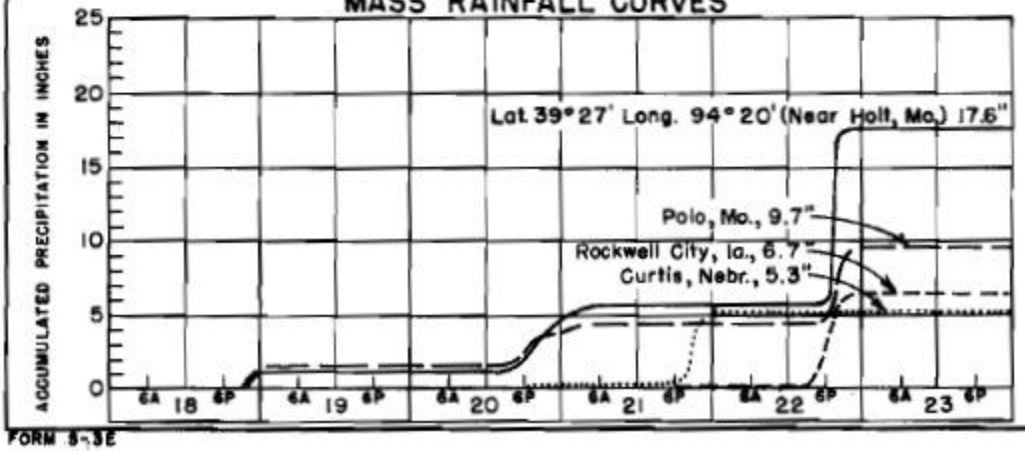
DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES - ISOHYETAL MAP

Storm of 18-23 June 1947 — Assignment MR 8-20

Study Prepared by: Omaha, Nebr., District
Missouri River Division

MASS RAINFALL CURVES



FORM 5-3E

Dumont, IA June 25, 1951
Transpositioned Grid Points: All
Storm Type: MCC

Storm Name:	**USACE UMV 3-29-Dumont, IA**
Storm Date:	**25-Jun-1951**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date	**10-Jul**	
	Lat	**Long**
Storm center location	**42.75 N**	**92.98 W**
Storm Rep Td location	**39.40 N**	**94.80 W**
Transposition Td location	**37.65 N**	**83.83 W**
Grid point location	**41.00 N**	**82.00 W**

Moisture Inflow Direction:	**SSW @ 25**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**1,000**	feet
Storm Duration	**6**	hours

The storm representative Td is	**75.5 F**	with total precipitable water above sea level of				**2.92**	inches.
The in-place maximum Td is	**81.5 F**	with total precipitable water above sea level of				**3.83**	inches.
The transpositioned maximum Td is	**78.5 F**	with total precipitable water above sea level of				**3.37**	inches.
The in-place storm elevation is	**1,000**	which subtracts	**0.260**	inches of precipitable water at		**75.5 F**	
The in-place storm elevation is	**1,000**	which subtracts	**0.310**	inches of precipitable water at		**81.5 F**	
The transposition basin elevation at	**900**	which subtracts	**0.260**	inches of precipitable water at		**78.5 F**	
The inflow barrier/basin elevation height is	**900**	which subtracts	**0.260**	inches of precipitable water at		**78.5 F**	

The in-place storm maximization factor is	**1.32**
The transposition/elevation to basin factor is	**0.88**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.17**

Notes: DAD values taken from USACE UMV 3-29. Storm representative Td value was based on maximum 6-hr Td values between June 25, 1951 at KSTJ, KMKC, and KTOP.

Observed Storm Depth-Area-Duration

	3 Hours	6 Hours	12 Hours	18 Hours	24 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**6.8**	**9.4**	**12.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
10 sq miles	**5.8**	**9.2**	**12.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
100 sq miles	**4.4**	**7.7**	**10.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
200 sq miles	**4.1**	**7.1**	**8.9**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
500 sq miles	**3.6**	**6.1**	**7.5**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
1000 sq miles	**3.2**	**5.3**	**6.6**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
5000 sq miles	**2.1**	**3.5**	**4.4**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
10000 sq miles	**1.6**	**2.7**	**3.5**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
20000 sq miles	**1.2**	**1.9**	**2.5**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Adjusted Storm Depth-Area-Duration

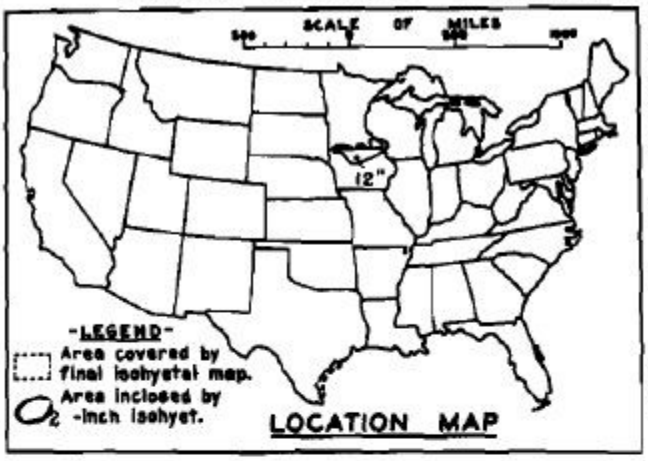
	3 Hours	6 Hours	12 Hours	18 Hours	24 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**7.9**	**11.0**	**14.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
10 sq miles	**6.8**	**10.7**	**14.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
100 sq miles	**5.1**	**9.0**	**11.7**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
200 sq miles	**4.8**	**8.3**	**10.4**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
500 sq miles	**4.2**	**7.1**	**8.8**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
1000 sq miles	**3.7**	**6.2**	**7.7**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
5000 sq miles	**2.5**	**4.1**	**5.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
10000 sq miles	**1.9**	**3.2**	**4.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
20000 sq miles	**1.4**	**2.2**	**2.9**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Storm or Storm Center Name	**USACE UMV 3-29-Dumont, IA**	
Storm Date(s)	25-Jun-1951	
Storm Type	MCC	
Storm Location	42.75 N	92.98 W
Storm Center Elevation	1,000	
Precipitation Total & Duration	12.00 Inches 6-hours USACE UMV 3-29	
Storm Representative Td	75.5 F	6
Storm Representative Td Location	39.40 N	94.80 W
Maximum Td	81.5 F	
Moisture Inflow Vector	SSW @ 250	Miles
In-place Maximization Factor	**1.32**	
Temporal Transposition (Date)	10-Jul	
Transposition Td Location	37.65 N	83.83 W
Transposition Maximum Td	78.5 F	
Transposition Adjustment Factor	**0.88**	
Grid Point Elevation	900	
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.17**	

Dumont, IA June 25, 1951 Moisture Inflow Analysis

DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET



Storm of 25-26 June 1951
Assignment UMV 3-29
Location Iowa, Minnesota & Wisc.
Study Prepared by:
North Central Division
Rock Island District Office

Part I Reviewed by H. M. Sec. of Weather Bureau, 11-21-55
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 7-18-57
Remarks:
Center near Dumont, Iowa. Rep. Dewpoint 72°, Ref. Pt. 160 SW

DATA AND COMPUTATIONS COMPILED

Grid D-13

PART I

Preliminary isohyetal map, in 1 sheet, scale 1:1,000,000

Precipitation data and mass curves:	(Number of Sheets)
Form 5001-C (Hourly precip. data)	56
Form 5001-B (24-hour " ")	-
Form 5001-D (" " " ")	11
Misc. precip. records, meteorological data, etc.	1
Form 5002 (Mass rainfall curves)	46

PART II

Final isohyetal maps, in 1 sheet, scale 1:500,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)	6
Form S-11 (Depth-area data from isohyetal map)	1
Form S-12 (Maximum depth-duration data)	6
Maximum duration-depth-area curves	1
Data relating to periods of maximum rainfall	2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	3	6	9	12	15						
Max. Station	6.8	9.4	11.6	12.0	12.0						
10	5.8	9.2	11.6	12.0	12.0						
100	4.4	7.7	9.7	10.0	10.0						
200	4.1	7.1	8.6	8.9	8.9						
500	3.6	6.1	7.3	7.5	7.6						
1000	3.2	5.3	6.4	6.6	6.6						
2000	2.7	4.5	5.4	5.6	5.7						
5000	2.1	3.5	4.2	4.4	4.5						
10000	1.6	2.7	3.3	3.5	3.6						
20000	1.2	1.9	2.3	2.5	2.6						

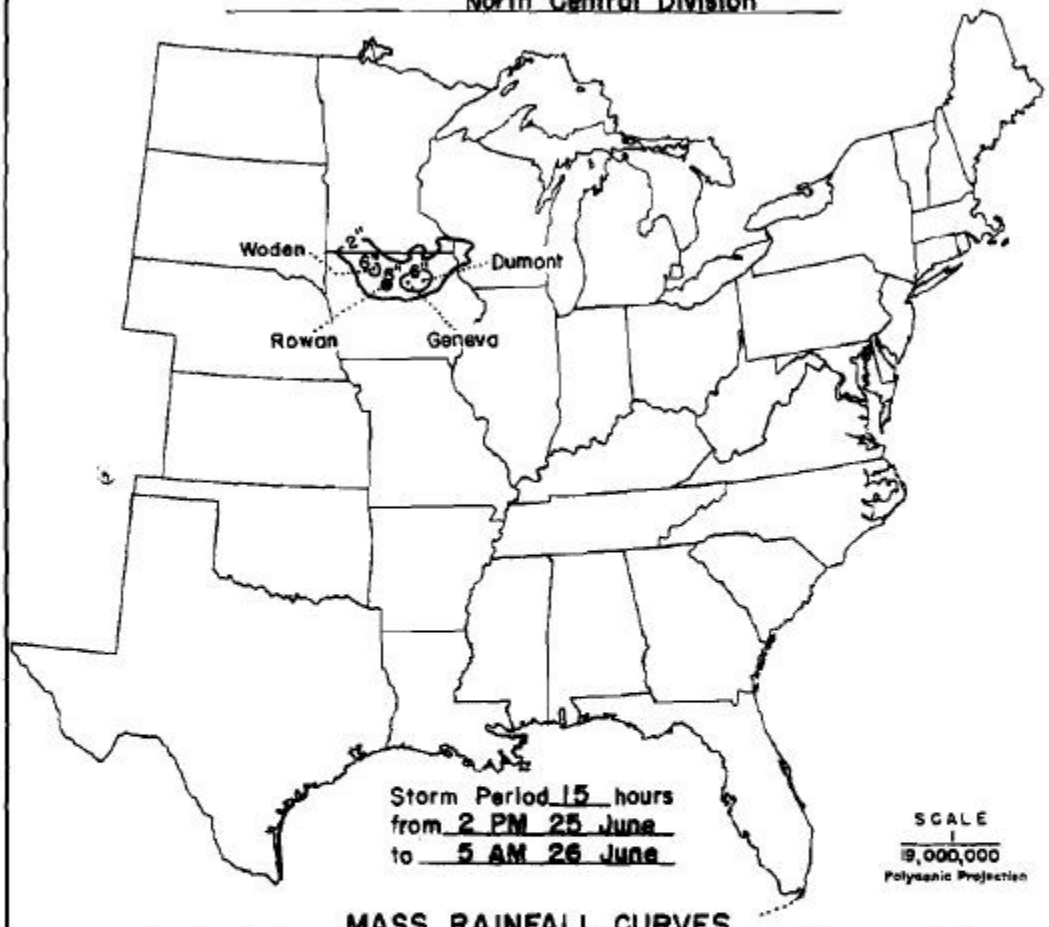
Form S-2

DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

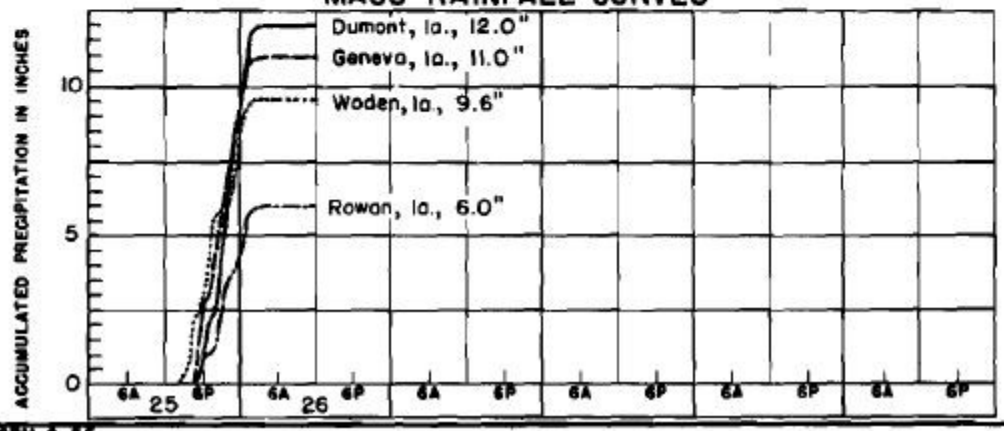
STORM STUDIES – ISOHYETAL MAP

Storm of 25-26 June 1951 — Assignment UMV 3-29

Study Prepared by: Rock Island, Ill. District
North Central Division



MASS RAINFALL CURVES



FORM 8-7SE

Council Grove, KS July 9, 1951
Transpositioned Grid Points: 1-2, 6
Storm Type: Synoptic

Storm Name:	**USACE MR 10-2-Council Grove, KS**
Storm Date:	**7/9-12/1951**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 1

Temporal Transposition Date	**15-Jul**	
	Lat	**Long**
Storm center location	**38.66 N**	**96.49 W**
Storm Rep Td location	**36.05 N**	**93.32 W**
Transposition Td location	**35.40 N**	**82.40 W**
Grid point location	**38.00 N**	**85.50 W**

Moisture Inflow Direction:	**SE @ 250**	miles
Grid Point Elevation	**600**	feet
Storm Elevation	**1,200**	feet
Storm Duration	**24**	hours

The storm representative Td is	**75.0 F**	with total precipitable water above sea level of				**2.85**	inches.
The in-place maximum Td is	**80.5 F**	with total precipitable water above sea level of				**3.68**	inches.
The transpositioned maximum Td is	**79.0 F**	with total precipitable water above sea level of				**3.44**	inches.
The in-place storm elevation is	**1,200**	which subtracts	**0.300**	inches of precipitable water at		**75.0 F**	
The in-place storm elevation is	**1,200**	which subtracts	**0.360**	inches of precipitable water at		**80.5 F**	
The transposition basin elevation at	**600**	which subtracts	**0.170**	inches of precipitable water at		**79.0 F**	
The inflow barrier/basin elevation height is	**600**	which subtracts	**0.170**	inches of precipitable water at		**79.0 F**	

The in-place storm maximization factor is	**1.30**
The transposition/elevation to basin factor is	**0.99**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.28**

Notes: DAD values taken from MR 10-2. Storm representative Td value was based on maximum 24-hr Td values between July 9-10, 1951 at KFSM, KFYV, and KFLP.

Observed Storm Depth-Area-Duration

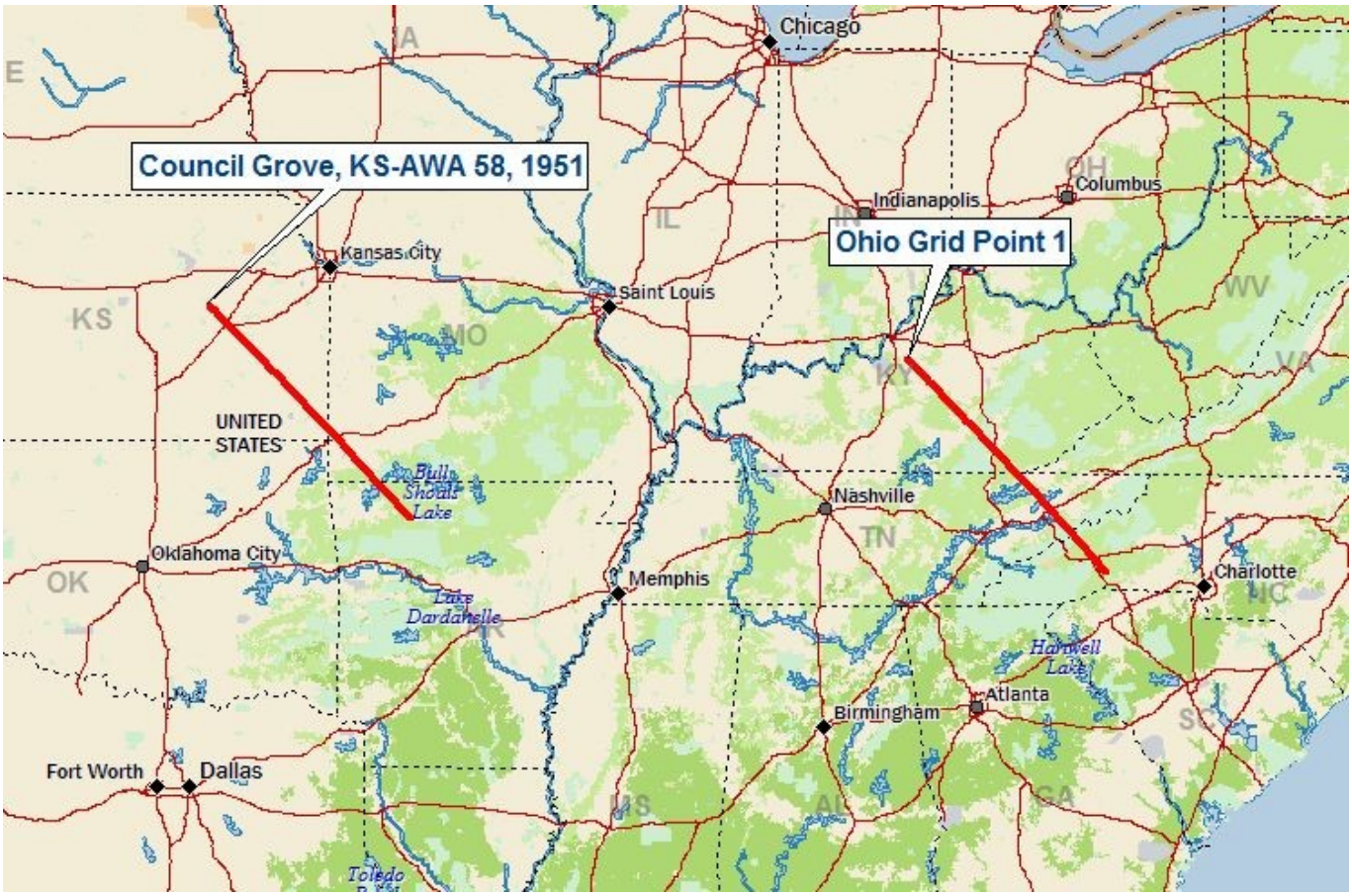
	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**5.3**	**7.0**	**7.9**	**8.6**	**11.8**	**13.1**	**14.3**	**17.2**	**18.2**
100 sq miles	**4.7**	**6.4**	**7.4**	**7.9**	**10.6**	**12.4**	**13.8**	**16.3**	**17.5**
200 sq miles	**4.6**	**6.2**	**7.2**	**7.5**	**10.2**	**12.0**	**13.3**	**15.9**	**17.0**
500 sq miles	**4.3**	**5.8**	**6.7**	**7.0**	**9.5**	**11.3**	**12.4**	**15.0**	**16.2**
1000 sq miles	**4.0**	**5.5**	**6.3**	**6.6**	**9.0**	**10.5**	**11.5**	**14.2**	**15.5**
2000 sq miles	**3.8**	**5.1**	**5.9**	**6.2**	**8.3**	**9.6**	**10.5**	**13.1**	**14.6**
5000 sq miles	**3.4**	**4.5**	**5.1**	**5.4**	**7.2**	**8.4**	**9.3**	**11.7**	**13.0**
10000 sq miles	**2.9**	**3.9**	**4.4**	**4.8**	**6.2**	**7.3**	**8.2**	**10.4**	**11.4**
20000 sq miles	**2.4**	**3.2**	**3.7**	**4.1**	**5.1**	**6.1**	**6.9**	**8.6**	**9.4**

Adjusted Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**6.8**	**9.0**	**10.1**	**11.0**	**15.1**	**16.8**	**18.3**	**22.1**	**23.3**
100 sq miles	**6.0**	**8.2**	**9.5**	**10.1**	**13.6**	**15.9**	**17.7**	**20.9**	**22.4**
200 sq miles	**5.9**	**8.0**	**9.2**	**9.6**	**13.1**	**15.4**	**17.1**	**20.4**	**21.8**
500 sq miles	**5.5**	**7.4**	**8.6**	**9.0**	**12.2**	**14.5**	**15.9**	**19.2**	**20.8**
1000 sq miles	**5.1**	**7.1**	**8.1**	**8.5**	**11.5**	**13.5**	**14.7**	**18.2**	**19.9**
2000 sq miles	**4.9**	**6.5**	**7.6**	**8.0**	**10.6**	**12.3**	**13.5**	**16.8**	**18.7**
5000 sq miles	**4.4**	**5.8**	**6.5**	**6.9**	**9.2**	**10.8**	**11.9**	**15.0**	**16.7**
10000 sq miles	**3.7**	**5.0**	**5.6**	**6.2**	**8.0**	**9.4**	**10.5**	**13.3**	**14.6**
20000 sq miles	**3.1**	**4.1**	**4.7**	**5.3**	**6.5**	**7.8**	**8.8**	**11.0**	**12.1**

Storm or Storm Center Name	**USACE MR 10-2-Council Grove, KS**	
Storm Date(s)	7/9-12/1951	
Storm Type	General Storm	
Storm Location	38.66 N	96.49 W
Storm Center Elevation	1200	
Precipitation Total & Duration (10 sq mi)	18.2 Inches in 72-hours	
Storm Representative Td	75.0 F	24
Storm Representative Td Location	36.05 N	93.32 W
In-place Maximum Td	80.5 F	
Moisture Inflow Vector	SE @ 250	
In-place Maximization Factor	1.30	
Temporal Transposition (Date)	15-Jul	
Transposition Td Location	35.40 N	82.40 W
Transposition Maximum SST	79.0 F	
Transposition Adjustment Factor	**0.99**	
Grid Point Elevation	600	
Inflow Barrier Height	600	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.28**	

Council Grove, KS July 9, 1951 Moisture Inflow Analysis



DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET

LOCATION MAP

Storm of 9-13 July 1951
Assignment MR 10-2
Location Kans., Nebr. Mo.
Study Prepared by:
Missouri River Division
Kansas City District Office

Part I Reviewed by H. M. Sec. of Weather Bureau, 10/29/51
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 12/10/52
Remarks: Center near Council Greve, Kans. Dewpt. 73°F-Ref.Pt. 205 SSW Grid F-16

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 1 sheet, scale 1: 1,000,000

Precipitation data and mass curves:	(Number of Sheets)
Form 5001-C (Hourly precip. data)	78
Form 5001-B (24-hour " ")	-
Form 5001-D (" " " ")	2
Misc. precip. records, meteorological data, etc.	151
Form 5002 (Mass rainfall curves)	61

PART II

Final isohyetal maps, in 1 sheet, scale 1: 1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)	7
Form S-11 (Depth-area data from isohyetal map)	2
Form S-12 (Maximum depth-duration data)	11
Maximum duration-depth-area curves	1
Data relating to periods of maximum rainfall	6

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48	60	72	96	108
Max. Station	5.8	7.5	8.2	9.3	13.1	13.5	14.4	17.9	18.5	18.5	18.5
10	5.3	7.0	7.9	8.6	11.8	13.1	14.3	17.2	18.2	18.2	18.2
100	4.7	6.4	7.4	7.9	10.6	12.4	13.8	16.3	17.5	17.5	17.5
200	4.6	6.2	7.2	7.5	10.2	12.0	13.3	15.9	17.0	17.0	17.0
500	4.3	5.8	6.7	7.0	9.5	11.3	12.4	15.0	16.2	16.2	16.2
1,000	4.0	5.5	6.3	6.6	9.0	10.5	11.5	14.2	15.5	15.5	15.5
2,000	3.8	5.1	5.9	6.2	8.3	9.6	10.5	13.1	14.6	14.6	14.6
5,000	3.4	4.5	5.1	5.4	7.2	8.4	9.3	11.7	13.0	13.1	13.1
10,000	2.9	3.9	4.4	4.8	6.2	7.3	8.2	10.4	11.4	11.5	11.5
20,000	2.4	3.2	3.7	4.1	5.1	6.1	6.9	8.6	9.4	9.6	9.6
50,000	1.3	2.0	2.5	2.8	3.4	4.0	4.7	5.8	6.3	6.5	6.5
57,000	1.1	1.7	2.3	2.5	3.0	3.8	4.4	5.4	5.9	6.0	6.0

Form S-2

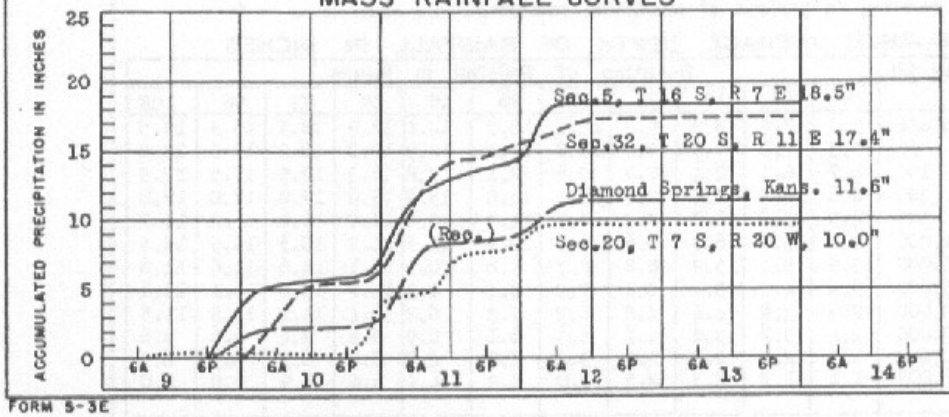
DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES - ISOHYETAL MAP

Storm of 9-13 July 1951 — Assignment MR 10-2

Study Prepared by: Kansas City, Mo. District
Missouri River Division

MASS RAINFALL CURVES



FORM 5-3E

Kelso, MO August 11, 1952
Transpositioned Grid Points: 1-3, 6-23
Storm Type: MCC

Storm Name:	**USACE UMV 3-30-Kelso, MO**
Storm Date:	**11-Aug-1952**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date **25-Jul**

	Lat	Long
Storm center location	**37.19 N**	**89.55 W**
Storm Rep Td location	**35.17 N**	**89.50 W**
Transposition Td location	**38.98 N**	**81.95 W**
Grid point location	**41.00 N**	**82.00 W**

Moisture Inflow Direction:	**S @ 140**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**500**	feet
Storm Duration	**6**	hours

The storm representative Td is	**76.5 F**	with total precipitable water above sea level of				**3.07**	inches.
The in-place maximum Td is	**81.0 F**	with total precipitable water above sea level of				**3.75**	inches.
The transpositioned maximum Td is	**79.0 F**	with total precipitable water above sea level of				**3.44**	inches.
The in-place storm elevation is	**500**	which subtracts	**0.140**	inches of precipitable water at		**76.5 F**	
The in-place storm elevation is	**500**	which subtracts	**0.150**	inches of precipitable water at		**81.0 F**	
The transposition basin elevation at	**900**	which subtracts	**0.260**	inches of precipitable water at		**79.0 F**	
The inflow barrier/basin elevation height is	**900**	which subtracts	**0.260**	inches of precipitable water at		**79.0 F**	

The in-place storm maximization factor is	**1.23**
The transposition/elevation to basin factor is	**0.88**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.09**

Notes: DAD values taken from USACE UMV 3-30. Storm representative Td value was based on maximum 6-hr Td values between August 11, 1952 at KMEM, KNQA, KMKL, and KDYR.

Observed Storm Depth-Area-Duration

	1 Hours	3 Hours	6 Hours	12 Hours	18 Hours	24 Hours	36 Hours	48 Hours	72 Hours
10 sq miles	**5.5**	**11.5**	**13.0**	-	-	-	-	-	-
100 sq miles	**4.2**	**10.4**	**11.9**	-	-	-	-	-	-
200 sq miles	**0.0**	**0.0**	**0.0**	-	-	-	-	-	-
500 sq miles	**2.9**	**7.4**	**8.7**	-	-	-	-	-	-
1000 sq miles	**2.3**	**5.7**	**6.9**	-	-	-	-	-	-
5000 sq miles	-	-	-	-	-	-	-	-	-
10000 sq miles	-	-	-	-	-	-	-	-	-
20000 sq miles	-	-	-	-	-	-	-	-	-

Adjusted Storm Depth-Area-Duration

	1 Hours	3 Hours	6 Hours	12 Hours	18 Hours	24 Hours	36 Hours	48 Hours	72 Hours
10 sq miles	**6.0**	**12.5**	**14.1**	-	-	-	-	-	-
100 sq miles	**4.6**	**11.3**	**12.9**	-	-	-	-	-	-
200 sq miles	**0.0**	**0.0**	**0.0**	-	-	-	-	-	-
500 sq miles	**3.2**	**8.0**	**9.5**	-	-	-	-	-	-
1000 sq miles	**2.5**	**6.2**	**7.5**	-	-	-	-	-	-
5000 sq miles	-	-	-	-	-	-	-	-	-
10000 sq miles	-	-	-	-	-	-	-	-	-
20000 sq miles	-	-	-	-	-	-	-	-	-

Storm or Storm Center Name	**USACE UMV 3-30-Kelso, MO**	
Storm Date(s)	11-Aug-1952	
Storm Type	MCC	
Storm Location	37.19 N	89.55 W
Storm Center Elevation	500	
Precipitation Total & Duration	13.00 Inches 6-hours USACE UMV 3-30	
Storm Representative Td	76.5 F	6
Storm Representative Td Location	35.17 N	89.50 W
Maximum Td	81.0 F	
Moisture Inflow Vector	S @ 140	Miles
In-place Maximization Factor	1.23	
Temporal Transposition (Date)	25-Jul	
Transposition Td Location	38.98 N	81.95 W
Transposition Maximum Td	79.0 F	
Transposition Adjustment Factor	**0.88**	
Grid Point Elevation	900	
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.09**	

Kelso, MO August 11, 1952 Moisture Inflow Analysis

DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET

LOCATION MAP

Storm of 11-12 August 1952
Assignment UMV 3-30
Location SE Mo. and SW Ill.
Study Prepared by:
Lower Mississippi Valley Division
St. Louis District

Part I Reviewed by H. M. Sec. of Weather Bureau, 9/29/60
Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 5/10/63
Remarks: Center at Kelso, Missouri. Dewpoint 75°F, 135 SSW. Grid F-12

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 1 sheet, scale 1:500,000

Precipitation data and mass curves:	(Number of Sheets)
Form 5001-C (Hourly precip. data)	13
Form 5001-B (24-hour " ")	0
Form 5001-D (" " ")	2
Misc. precip. records, meteorological data, etc.	9
Form 5002 (Mass rainfall curves)	5

PART II

Final isohyetal maps, in 1 sheet, scale 1:500,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)	1
Form S-11 (Depth-area data from isohyetal map)	1
Form S-12 (Maximum depth-duration data)	5
Maximum duration-depth-area curves	1
Data relating to periods of maximum rainfall	2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	1	2	3	4	5	6					
10	5.5	9.1	11.5	12.9	13.0	13.0					
100	4.2	8.0	10.4	11.7	11.9	11.9					
500	2.9	5.5	7.4	8.0	8.6	8.7					
1,000	2.3	4.1	5.7	6.2	6.8	6.9					
1,730	1.7	3.1	4.3	4.9	5.4	5.5					

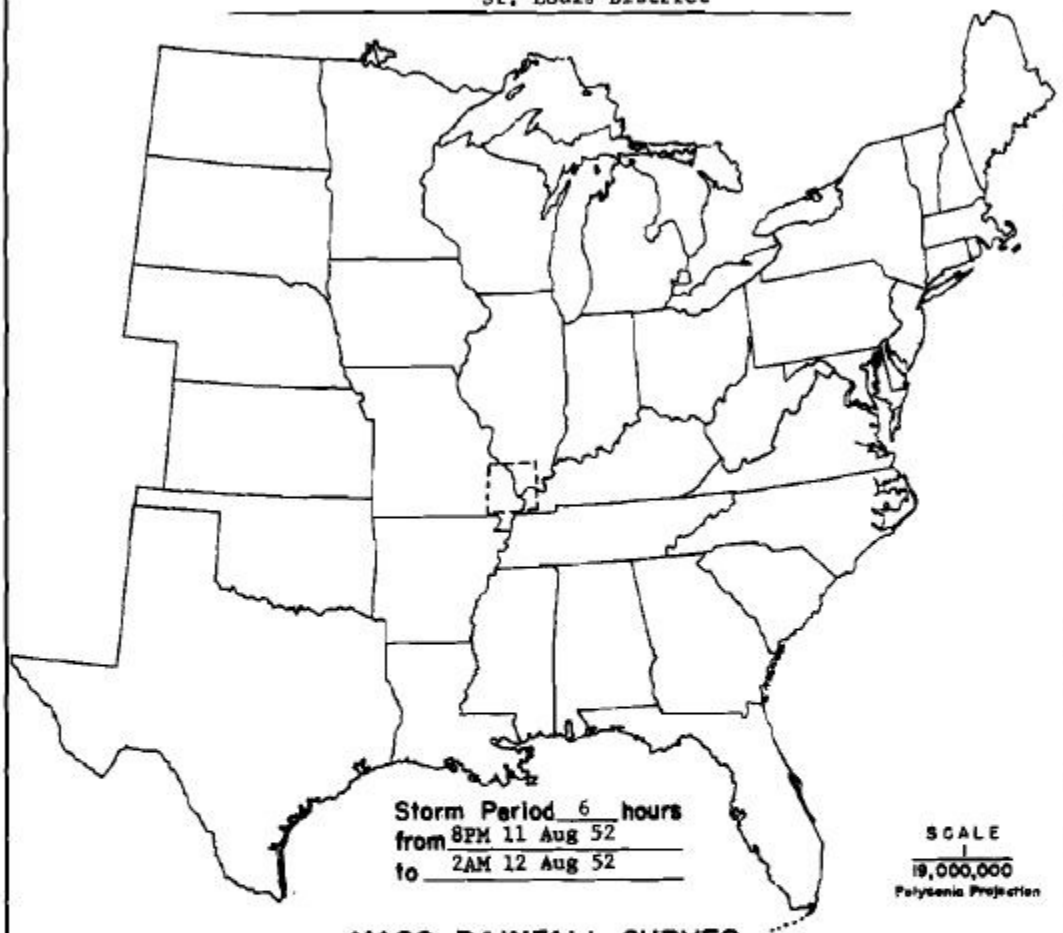
Form S-2

DEPARTMENT OF THE ARMY — CORPS OF ENGINEERS

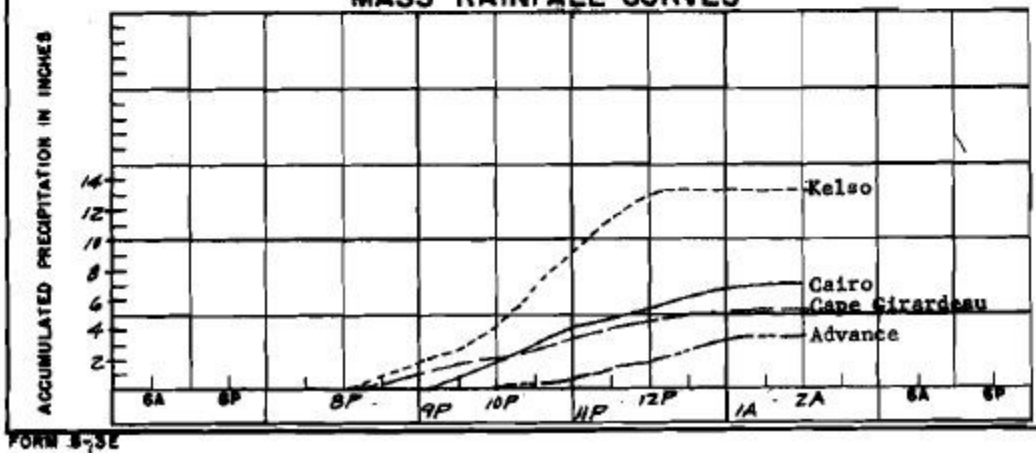
STORM STUDIES – ISOHYETAL MAP

Storm of 11 - 12 August 1952 — Assignment UMV 3-30

Study Prepared by: Lower Mississippi Valley Division
St. Louis District



MASS RAINFALL CURVES



FORM 8-73E

Paris Waterworks, IN June 27, 1957
Transpositioned Grid Points: 1-7, 10-23
Storm Type: Synoptic

Storm Name:	**HMB-V18 Paris Waterworks, IN**
Storm Date:	**6/27-28/1957**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date	**13-Jul**	
	Lat	**Long**
Storm center location	**39.05 N**	**87.70 W**
Storm Rep Td location	**36.00 N**	**86.70 W**
Transposition Td location	**37.95 N**	**81.00 W**
Grid point location	**41.00 N**	**82.00 W**

Moisture Inflow Direction:	**SSE @ 215**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**500**	feet
Storm Duration	**12**	hours

The storm representative Td is	**74.0 F**	with total precipitable water above sea level of				**2.73**	inches.
The in-place maximum Td is	**79.5 F**	with total precipitable water above sea level of				**3.52**	inches.
The transpositioned maximum Td is	**78.5 F**	with total precipitable water above sea level of				**3.37**	inches.
The in-place storm elevation is	**500**	which subtracts	**0.120**	inches of precipitable water at		**74.0 F**	
The in-place storm elevation is	**500**	which subtracts	**0.150**	inches of precipitable water at		**79.5 F**	
The transposition basin elevation at	**900**	which subtracts	**0.260**	inches of precipitable water at		**78.5 F**	
The inflow barrier/basin elevation height is	**900**	which subtracts	**0.260**	inches of precipitable water at		**78.5 F**	

The in-place storm maximization factor is	**1.29**
The transposition/elevation to basin factor is	**0.92**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.19**

Notes: DAD values taken from EPRI Storm Number 18, HMB V-18. Storm representative Td value was based on maximum 12-hr Td values between June 27-28, 1957 at KBNA, and KMQY.

Observed Storm Depth-Area-Duration

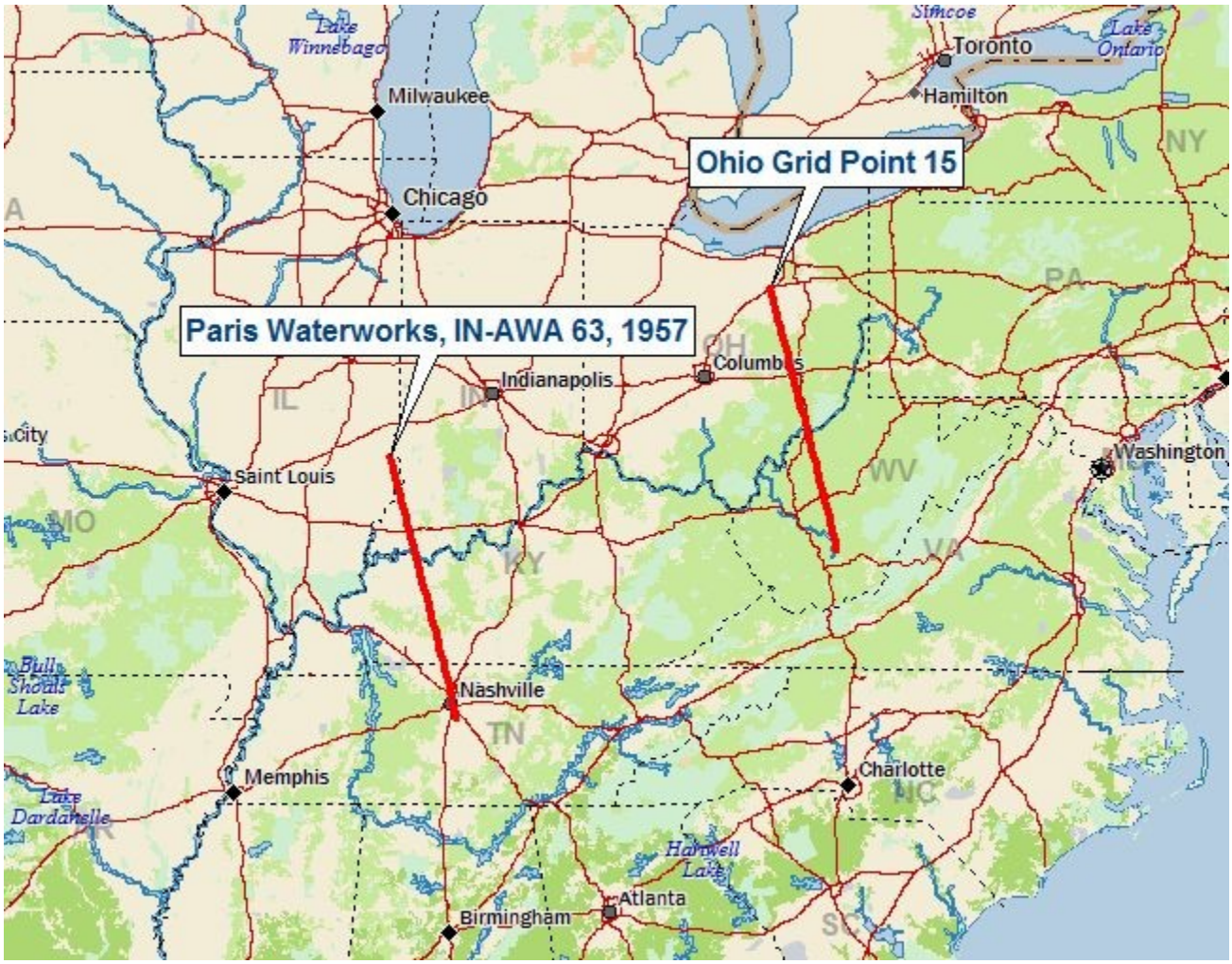
	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	-	-	-	-	-	-	-	-	
100 sq miles	**8.0**	**10.9**	-	**11.5**	-	-	-	-	-
200 sq miles	**7.6**	**10.3**	-	**11.1**	-	-	-	-	-
500 sq miles	**6.8**	**9.3**	-	**10.2**	-	-	-	-	-
1000 sq miles	**6.2**	**8.4**	-	**9.4**	-	-	-	-	-
5000 sq miles	**4.4**	**5.9**	-	**7.1**	-	-	-	-	-
10000 sq miles	**3.6**	**4.7**	-	**6.0**	-	-	-	-	-
20000 sq miles	-	-	-	-	-	-	-	-	-

Adjusted Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	-	-	-	-	-	-	-	-	
100 sq miles	**9.5**	**13.0**	-	**13.7**	-	-	-	-	-
200 sq miles	**9.0**	**12.3**	-	**13.2**	-	-	-	-	-
500 sq miles	**8.1**	**11.1**	-	**12.1**	-	-	-	-	-
1000 sq miles	**7.4**	**10.0**	-	**11.2**	-	-	-	-	-
5000 sq miles	**5.2**	**7.0**	-	**8.4**	-	-	-	-	-
10000 sq miles	**4.3**	**5.6**	-	**7.1**	-	-	-	-	-
20000 sq miles	-	-	-	-	-	-	-	-	-

Storm or Storm Center Name	**HMB-V18 Paris Waterworks, IN**	
Storm Date(s)	6/27-28/1957	
Storm Type	Synoptic	
Storm Location	39.05 N	87.70 W
Storm Center Elevation	500	
Precipitation Total & Duration	12.40 Inches	24-hours HMB V-18
Storm Representative Td	74.0 F	12
Storm Representative Td Location	36.00 N	86.70 W
Maximum Td	79.5 F	
Moisture Inflow Vector	SSE @ 215	Miles
In-place Maximization Factor	**1.29**	
Temporal Transposition (Date)	13-Jul	
Transposition Td Location	37.95 N	81.00 W
Transposition Maximum Td	78.5 F	
Transposition Adjustment Factor	**0.92**	
Grid Point Elevation	900	
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.29**	

Paris Waterworks, IN June 27, 1957 Moisture Inflow Analysis



STORM STUDIES – PERTINENT DATA SHEET

LOCATION MAP

Storm of June 27-28, 1957
Assignment HMS-V18
Location
Study Prepared by:

Part I Reviewed by Hydromet. Sec. of Weather Bureau,
Part II Approved by Office, Chief of Engineers for distribution of factual data,
Remarks
39° 38'
87° 42'
739 ft

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary Isohyetal map, in ____ sheet scale ____

Precipitation data and mass curves: (Number of Sheets)

Form 5001-C (Hourly precip. data) ____
Form 5001-B (24-hour " ") ____
Form 5001-D (" " " ") ____
Miscl. precip. records, meteorological data, etc. ____
Form 5002 (Mass rainfall curves) ____

PART II

Final isohyetal maps, in ____ sheet scale ____

Data and computation sheets:

Form S-10 (Data from mass rainfall curves) ____
Form S-11 (Depth-area data from isohyetal map) ____
Form S-12 (Maximum depth-duration data) ____
Maximum duration-depth-area curves ____
Data relating to periods of maximum rainfall ____

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Miles	Duration of Rainfall in Hours											
	3	6	12	18	24	30	36	48	60	72	96	120
25	4.5	8.7	12.0		12.4							
50	4.3	8.3	11.5		12.0							
100	4.2	8.0	10.9		11.5							
200	4.0	7.6	10.3		11.1							
500	3.7	6.9	9.3		10.2							
1000	3.4	6.2	8.4		9.4							
2000	3.1	5.5	7.4		8.5							
5000	2.6	4.4	5.9		7.1							
10000	2.2	3.6	4.7		6.0							

ISOHYETAL ANALYSIS

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Miles	Duration of Rainfall in Hours		
	6	12	24
100	8	10.9	11.5
200	7.6	10.3	11.1
500	6.8	9.3	10.2
1000	6.2	8.4	9.4
5000	4.4	5.9	7.1
10000	3.6	4.7	6

SYNOPTIC ANALYSIS

Ida Grove, IA August 30, 1962
Transpositioned Grid Points: 1, 6, 18
Storm Type: Synoptic/Convective

Storm Name:	**Ida Grove, IA**
Storm Date:	**30-Aug-1962**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 1

Temporal Transposition Date **15-Aug**

	Lat	Long
Storm center location	**42.32 N**	**95.47 W**
Storm Rep dew point location	**36.00 N**	**93.30 W**
Transposition dewpoint location	**31.70 N**	**83.40 W**
Grid point location	**38.00 N**	**85.50 W**

Moisture Inflow Direction:	**SSE @ 450**	miles
Grid Point Elevation	**600**	feet
Storm Elevation	**1,200**	feet
Storm Duration	**24hr**	feet

The storm representative dew point is	**75.0 F**	with total precipitable water above sea level of				**2.85**	inches.
The in-place maximum dew point is	**80.0 F**	with total precipitable water above sea level of				**3.60**	inches.
The transpositioned maximum dew point is	**79.0 F**	with total precipitable water above sea level of				**3.44**	inches.
The in-place storm elevation is	**1,200**	which subtracts	**0.30**	inches of precipitable water at		**75.0 F**	
The in-place storm elevation is	**1,200**	which subtracts	**0.35**	inches of precipitable water at		**80.0 F**	
The transposition basin elevation at	**600**	which subtracts	**0.17**	inches of precipitable water at		**79.0 F**	
The inflow barrier/basin elevation height is	**600**	which subtracts	**0.17**	inches of precipitable water at		**79.0 F**	

The in-place storm maximization factor is	**1.27**
The transposition/elevation to basin factor is	**1.01**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.28**

Notes: DAD values taken from EPRI Storm Number 19. Storm representative dew point value was based on maximum 24-hr Td values between August 28-31, 1962 at KSGF, KFSM, KLIT, and KLRF. Values were selected in region where temperature did not vary more than a 1-degree over a large area.

Observed Storm Depth-Area-Duration

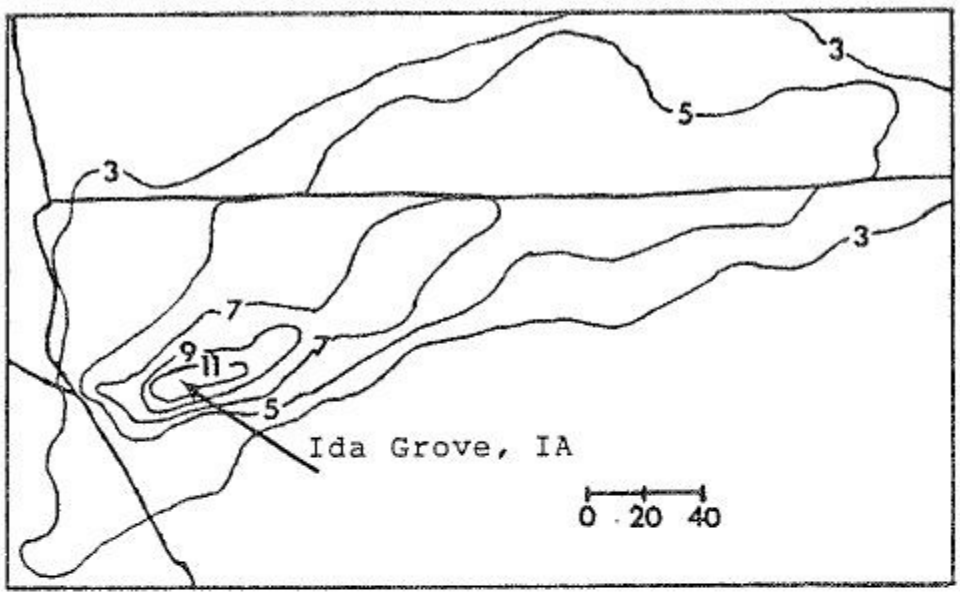
	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	-	-	-	-	-	-	-	-	-
100 sq miles	**5.7**	**8.0**	-	**12.2**	-	**12.9**	-	-	-
200 sq miles	**5.4**	**7.6**	-	**11.7**	-	**12.3**	-	-	-
500 sq miles	**4.8**	**7.0**	-	**10.8**	-	**11.3**	-	-	-
1000 sq miles	**4.2**	**6.3**	-	**9.8**	-	**10.3**	-	-	-
5000 sq miles	**2.6**	**4.3**	-	**7.0**	-	**7.6**	-	-	-
10000 sq miles	**2.1**	**3.5**	-	**5.8**	-	**6.6**	-	-	-
20000 sq miles	-	-	-	-	-	-	-	-	-

Adjusted Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	-	-	-	-	-	-	-	-	-
100 sq miles	**7.3**	**10.3**	-	**15.6**	-	**16.5**	-	-	-
200 sq miles	**6.9**	**9.7**	-	**15.0**	-	**15.8**	-	-	-
500 sq miles	**6.2**	**9.0**	-	**13.8**	-	**14.5**	-	-	-
1000 sq miles	**5.4**	**8.1**	-	**12.6**	-	**13.2**	-	-	-
5000 sq miles	**3.3**	**5.5**	-	**9.0**	-	**9.7**	-	-	-
10000 sq miles	**2.7**	**4.5**	-	**7.4**	-	**8.5**	-	-	-
20000 sq miles	-	-	-	-	-	-	-	-	-

Storm or Storm Center Name	**Ida Grove, IA**	
Storm Date(s)	30-Aug-1962	
Storm Type	Synoptic	
Storm Location	42.32 N	95.47 W
Storm Center Elevation	1,200	
Precipitation Total & Duration	12.85 Inches 48-hours EPRI Storm Number 19	
Storm Representative Dewpoint	75.0 F	24hr average
Storm Representative Dewpoint Location	36.00 N	93.30 W
Maximum Dewpoint	80.0 F	
Moisture Inflow Vector	SSE @ 450	Miles
In-place Maximization Factor	**1.27**	
Temporal Transposition (Date)	15-Aug	
Transposition Dewpoint Location	31.70 N	83.40 W
Transposition Maximum Dewpoint	79.0 F	
Transposition Adjustment Factor	**1.01**	
Grid Point Elevation	600	
Inflow Barrier Height	600	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.28**	

Ida Grove, IA August 30, 1962 Moisture Inflow Analysis



ISOHYETAL ANALYSIS

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Miles	Duration of Rainfall in Hours 6	12	24	48
100	5.73	7.97	12.2	12.85
200	5.42	7.62	11.65	12.34
500	4.82	6.98	10.82	11.3
1000	4.18	6.25	9.78	10.32
5000	2.59	4.31	7.01	7.6
10000	2.1	3.51	5.82	6.58

College Hill, OH June 3, 1963
Transpositioned Grid Points: All
Storm Type: MCC

Storm Name:	**College Hill, OH SPAS 1226**
Storm Date:	**6/3-5/1963**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date	**15-Jun**	
	Lat	**Long**
Storm center location	**40.09 N**	**81.65 W**
Storm Rep dew point location	**39.20N**	**83.00 W**
Transposition dewpoint location	**40.12 N**	**83.35 W**
Grid point location	**41.00 N**	**82.00 W**

Moisture Inflow Direction:	**SW @ 95**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**1,000**	feet
Storm Duration	**12**	feet

The storm representative dew point is	**68.5 F**	with total precipitable water above sea level of				**2.10**	inches.
The in-place maximum dew point is	**76.5 F**	with total precipitable water above sea level of				**3.07**	inches.
The transpositioned maximum dew point is	**76.0 F**	with total precipitable water above sea level of				**2.99**	inches.
The in-place storm elevation is	**1,000**	which subtracts	**0.210**	inches of precipitable water at		**68.5 F**	
The in-place storm elevation is	**1,000**	which subtracts	**0.270**	inches of precipitable water at		**76.5 F**	
The transposition basin elevation at	**900**	which subtracts	**0.230**	inches of precipitable water at		**76.0 F**	
The inflow barrier/basin elevation height is	**900**	which subtracts	**0.230**	inches of precipitable water at		**76.0 F**	

The in-place storm maximization factor is	**1.48**
The transposition/elevation to basin factor is	**0.99**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.46**

Notes: Storm representative dew point value was based on maximum 12hr Td values between June 4-5, 1963 at KLCK, KILN, and KHTS.

Observed Storm Depth-Area-Duration

	1 Hours	3 Hours	6 Hours	12 Hours	18 Hours	24 Hours	36 Hours	48 Hours	72 Hours
1 sq miles	**2.5**	**5.6**	**10.5**	**15.1**	**17.1**	**17.6**	**17.7**	**17.7**	-
10 sq miles	**2.1**	**4.6**	**8.1**	**12.4**	**13.3**	**13.9**	**14.0**	**14.1**	-
100 sq miles	**1.4**	**2.9**	**5.5**	**7.8**	**8.6**	**8.7**	**9.7**	**9.9**	-
200 sq miles	**1.0**	**2.3**	**4.5**	**5.8**	**6.5**	**6.6**	**8.1**	**8.3**	-
500 sq miles	**0.6**	**1.6**	**2.2**	**3.7**	**4.4**	**5.3**	**5.7**	**6.6**	-
1000 sq miles	**0.5**	**1.3**	**2.2**	**3.3**	**3.4**	**3.4**	**5.1**	**5.2**	-
2000 sq miles	**0.4**	**0.5**	**1.0**	**2.3**	**3.2**	**3.3**	**4.3**	**4.5**	-
5000 sq miles	**0.2**	**0.4**	**0.7**	**1.1**	**1.3**	**1.7**	**2.9**	**3.0**	-
10000 sq miles	**0.1**	**0.2**	**0.5**	**0.8**	**1.1**	**1.3**	**1.6**	**1.7**	-
20000 sq miles	-	-	-	-	-	-	-	-	-

Adjusted Storm Depth-Area-Duration

	1 Hours	3 Hours	6 Hours	12 Hours	18 Hours	24 Hours	36 Hours	48 Hours	72 Hours
1 sq miles	**3.7**	**8.1**	**15.4**	**22.1**	**25.0**	**25.7**	**25.9**	**25.9**	-
10 sq miles	**3.0**	**6.7**	**11.9**	**18.1**	**19.4**	**20.4**	**20.5**	**20.7**	-
100 sq miles	**2.0**	**4.2**	**8.1**	**11.4**	**12.6**	**12.7**	**14.1**	**14.4**	-
200 sq miles	**1.5**	**3.4**	**6.5**	**8.5**	**9.6**	**9.7**	**11.8**	**12.1**	-
500 sq miles	**0.8**	**2.4**	**3.3**	**5.4**	**6.4**	**7.7**	**8.4**	**9.6**	-
1000 sq miles	**0.8**	**1.9**	**3.2**	**4.9**	**4.9**	**5.0**	**7.5**	**7.6**	-
2000 sq miles	**0.5**	**0.8**	**1.5**	**3.4**	**4.7**	**4.8**	**6.3**	**6.6**	-
5000 sq miles	**0.2**	**0.6**	**1.0**	**1.6**	**1.9**	**2.4**	**4.2**	**4.4**	-
10000 sq miles	**0.1**	**0.4**	**0.7**	**1.1**	**1.6**	**1.9**	**2.4**	**2.5**	-
20000 sq miles	-	-	-	-	-	-	-	-	-

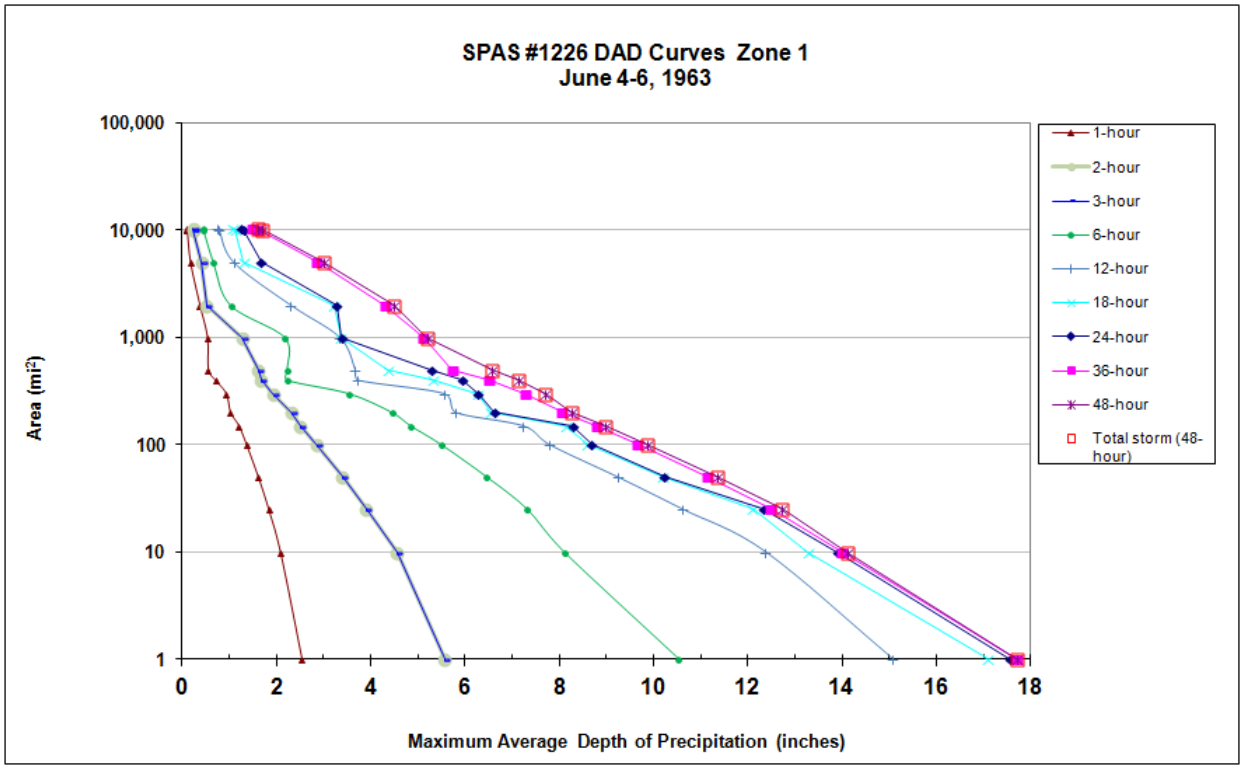
Storm or Storm Center Name	**College Hill, OH SPAS 1226**	
Storm Date(s)	6/3-5/1963	
Storm Type	MCC	
Storm Location	40.09 N	81.65 W
Storm Center Elevation	1,000	
Precipitation Total & Duration	19.39 Inches 48-hours	
Storm Representative Dewpoint	68.5 F	12
Storm Representative Dewpoint Location	39.20N	83.00 W
Maximum Dewpoint	76.5 F	
Moisture Inflow Vector	SW @ 95	
In-place Maximization Factor	**1.48**	
Temporal Transposition (Date)	15-Jun	
Transposition Dewpoint Location	40.12 N	83.35 W
Transposition Maximum Dewpoint	76.0 F	
Transposition Adjustment Factor	**0.99**	
Grid Point Elevation	900	
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.46**	

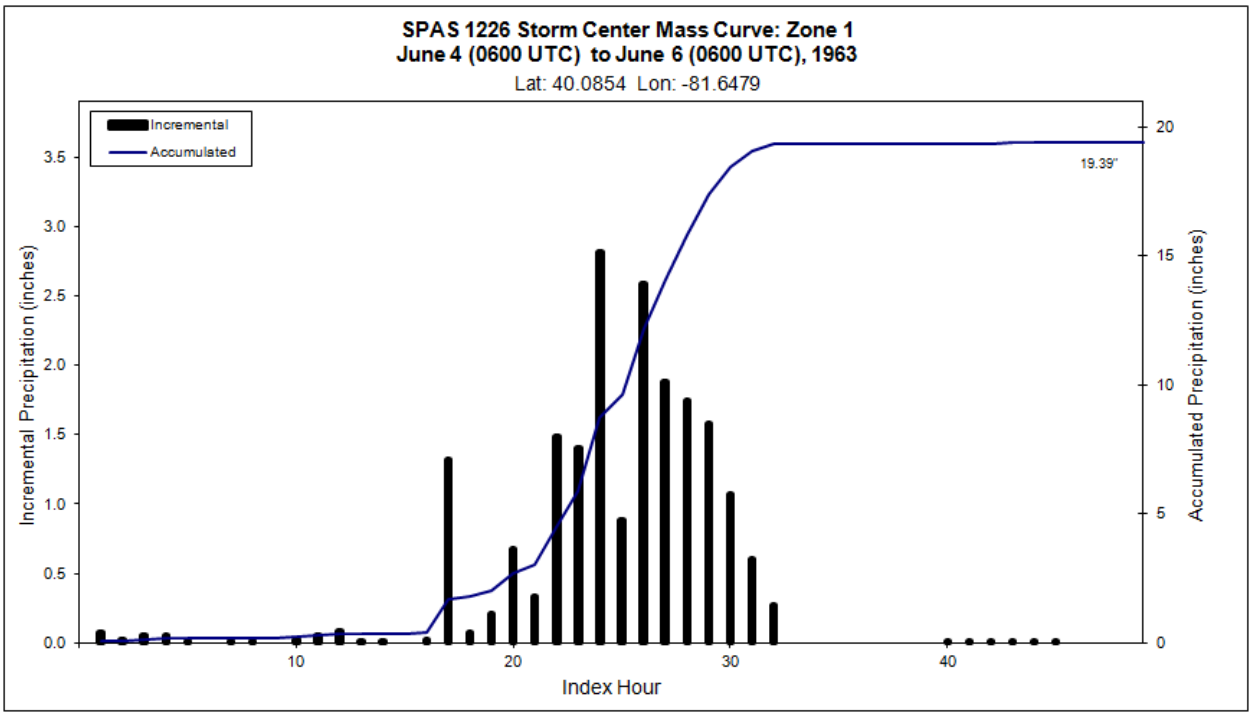
College Hill, OH June 3, 1963 Moisture Inflow Analysis

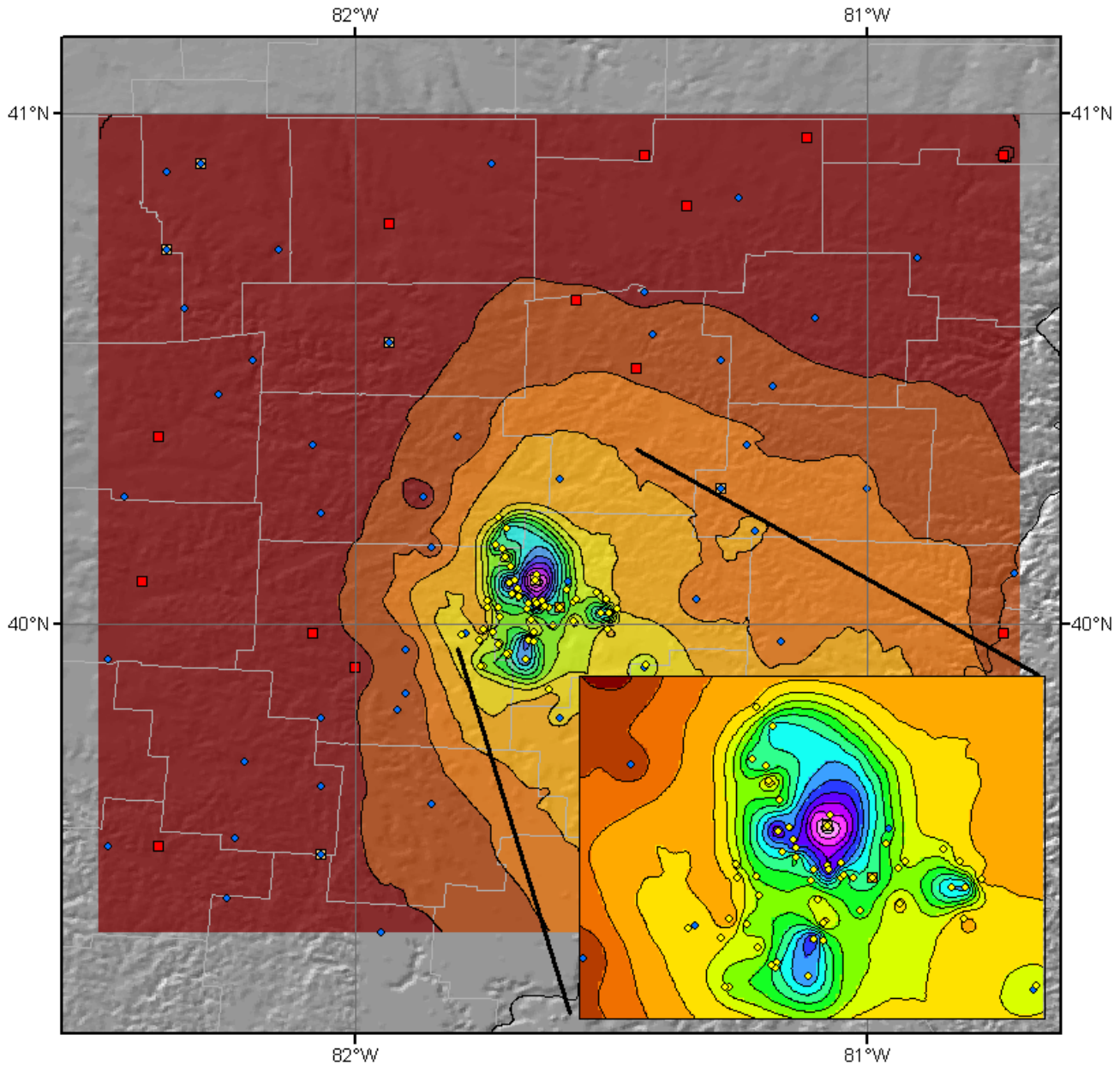
Storm 1226 - June 4 (0600 UTC) - June 6 (0600 UTC), 1963

MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

	Duration (hours)								
Area (mi^2)	1	3	6	12	18	24	36	48	Total
0.1	2.81	6.28	11.5	17.08	18.99	19.16	19.37	19.39	19.39
1	2.54	5.56	10.53	15.07	17.09	17.56	17.7	17.7	17.70
10	2.08	4.56	8.1	12.37	13.28	13.9	14	14.11	14.11
25	1.83	3.9	7.32	10.61	12.1	12.33	12.49	12.72	12.72
50	1.61	3.4	6.46	9.23	10.18	10.23	11.13	11.34	11.34
100	1.36	2.85	5.5	7.79	8.59	8.69	9.66	9.86	9.86
150	1.2	2.5	4.85	7.23	8.14	8.28	8.79	8.98	8.98
200	1.02	2.32	4.45	5.8	6.54	6.62	8.06	8.26	8.26
300	0.93	1.93	3.54	5.55	6.26	6.28	7.28	7.7	7.70
400	0.7	1.67	2.24	3.73	5.31	5.93	6.5	7.13	7.13
500	0.55	1.61	2.23	3.66	4.37	5.28	5.73	6.57	6.57
1,000	0.53	1.28	2.18	3.34	3.37	3.39	5.12	5.19	5.19
2,000	0.37	0.52	1.03	2.3	3.22	3.28	4.3	4.5	4.50
5,000	0.17	0.41	0.67	1.09	1.31	1.67	2.86	3	3.00
10,000	0.1	0.24	0.46	0.78	1.12	1.3	1.61	1.7	1.70
10,512	0.1	0.24	0.44	0.75	1.08	1.26	1.5	1.6	1.60




SPAS 1226 Storm Center Mass Curve: Zone 1
June 4 (0600 UTC) to June 6 (0600 UTC), 1963
Lat: 40.0854 Lon: -81.6479
Incremental
Accumulated
19.39"
Incremental Precipitation (inches)
Accumulated Precipitation (inches)
Index Hour
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
0
5
10
15
20
10
20
30
40



Total Precipitation (48 hours)
SPAS #1226
6/04/1963 0600 UTC - 6/06/1963 0600 UTC

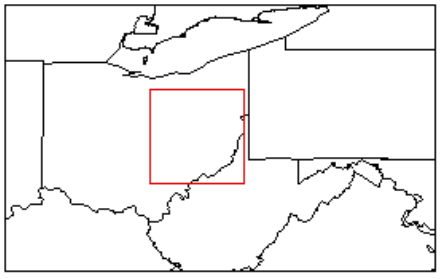
Daily
Hourly
Hourly Estimated
Hourly Pseudo
Supplemental

0 5 10 20 30 Miles

Precipitation (inches)

0.00 - 1.00	4.01 - 5.00	8.01 - 9.00	12.01 - 13.00	18.01 - 20.00
1.01 - 2.00	5.01 - 6.00	9.01 - 10.00	13.01 - 14.00	
2.01 - 3.00	6.01 - 7.00	10.01 - 11.00	14.01 - 16.00	
3.01 - 4.00	7.01 - 8.00	11.01 - 12.00	16.01 - 18.00	

N



11/25/2011

David City, NE June 24, 1963
Transpositioned Grid Points: 1-2, 6-7, 12-13, 18-19
Storm Type: MCC

Storm Name:	**SPAS 1030-David City, NE**
Storm Date:	**24-Jun-1963**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 13

Temporal Transposition Date	**9-Jul**	
	Lat	**Long**
Storm center location	**41.23 N**	**97.07 W**
Storm Rep dew point location	**39.41 N**	**94.83 W**
Transposition dewpoint location	**39.20 N**	**81.26 W**
Grid point location	**41.00 N**	**84.00 W**

Moisture Inflow Direction:	**SE @ 175**	miles
Grid Point Elevation	**700**	feet
Storm Elevation	**1,700**	feet
Storm Duration	**6**	hours

The storm representative dew point is	**73.5 F**	with total precipitable water above sea level of				**2.67**	inches.
The in-place maximum dew point is	**81.5 F**	with total precipitable water above sea level of				**3.84**	inches.
The transpositioned maximum dew point is	**78.0 F**	with total precipitable water above sea level of				**3.29**	inches.
The in-place storm elevation is	**1,700**	which subtracts	**0.400**	inches of precipitable water at		**73.5 F**	
The in-place storm elevation is	**1,700**	which subtracts	**0.500**	inches of precipitable water at		**81.5 F**	
The transposition basin elevation at	**700**	which subtracts	**0.190**	inches of precipitable water at		**78.0 F**	
The inflow barrier/basin elevation height is	**700**	which subtracts	**0.190**	inches of precipitable water at		**78.0 F**	

The in-place storm maximization factor is	**1.47**
The transposition/elevation to basin factor is	**0.93**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.37**

Notes: In place of 1.56 adjusted to 1.50 based on HMR 51 and 55A guidance. DAD values taken from SPAS 1030.

Observed Storm Depth-Area-Duration

	1 Hours	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**3.9**	**14.1**	**15.6**	**15.9**	**16.0**	-	**16.0**	**16.0**	-	**16.0**
10 sq miles	**3.7**	**13.3**	**14.6**	**15.0**	**15.2**	-	**15.2**	**15.2**	-	**15.2**
100 sq miles	**3.0**	**11.2**	**12.7**	**13.1**	**13.2**	-	**13.2**	**13.2**	-	**13.2**
200 sq miles	**2.8**	**10.5**	**12.0**	**12.4**	**12.5**	-	**12.5**	**12.5**	-	**12.5**
500 sq miles	**2.4**	**9.0**	**10.4**	**10.8**	**10.8**	-	**10.8**	**10.9**	-	**10.9**
1000 sq miles	**2.0**	**7.8**	**9.0**	**9.4**	**9.5**	-	**9.5**	**9.5**	-	**9.5**
5000 sq miles	**0.9**	**4.2**	**5.9**	**6.6**	**6.8**	-	**6.9**	**6.9**	-	**6.9**
10000 sq miles	**0.6**	**2.6**	**4.1**	**4.6**	**4.9**	-	**4.9**	**5.0**	-	**5.0**
20000 sq miles	**0.4**	**1.5**	**2.4**	**2.9**	**3.1**	-	**3.1**	**3.1**	-	**3.1**

Adjusted Storm Depth-Area-Duration

	1 Hours	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**5.3**	**19.3**	**21.4**	**21.8**	**21.9**	-	**21.9**	**21.9**	-	**21.9**
10 sq miles	**5.0**	**18.2**	**20.0**	**20.5**	**20.7**	-	**20.8**	**20.8**	-	**20.7**
100 sq miles	**4.1**	**15.4**	**17.4**	**18.0**	**18.1**	-	**18.1**	**18.1**	-	**18.1**
200 sq miles	**3.8**	**14.3**	**16.4**	**17.0**	**17.1**	-	**17.1**	**17.1**	-	**17.1**
500 sq miles	**3.2**	**12.3**	**14.3**	**14.8**	**14.8**	-	**14.8**	**14.9**	-	**14.9**
1000 sq miles	**2.7**	**10.6**	**12.3**	**12.9**	**12.9**	-	**13.0**	**13.0**	-	**13.0**
5000 sq miles	**1.2**	**5.7**	**8.1**	**9.1**	**9.3**	-	**9.4**	**9.4**	-	**9.4**
10000 sq miles	**0.8**	**3.6**	**5.6**	**6.3**	**6.7**	-	**6.8**	**6.8**	-	**6.8**
20000 sq miles	**0.5**	**2.1**	**3.3**	**3.9**	**4.3**	-	**4.3**	**4.3**	-	**4.3**

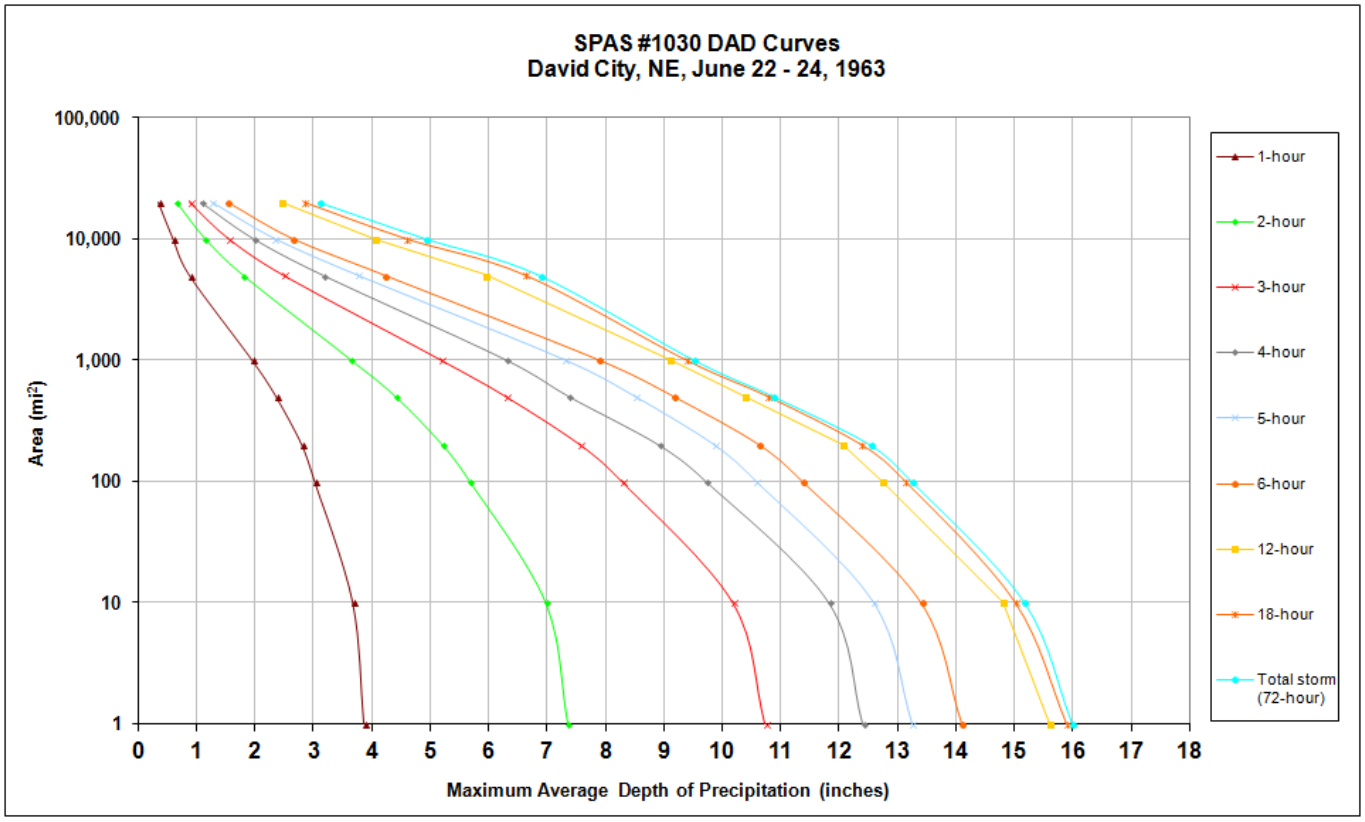
Storm or Storm Center Name	**SPAS 1030-David City, NE**	
Storm Date(s)	24-Jun-1963	
Storm Type	MCC	
Storm Location	41.23 N	97.07 W
Storm Center Elevation	1,700	
Precipitation Total & Duration	16.50 Inches 24-hours USACE Bucket Survey Data	
Storm Representative Dewpoint	73.5 F	6
Storm Representative Dewpoint Location	39.41 N	94.83 W
Maximum Dewpoint	81.5 F	
Moisture Inflow Vector	SE @ 175	
In-place Maximization Factor	1.47	
Temporal Transposition (Date)	9-Jul	
Transposition Dewpoint Location	39.20 N	81.26 W
Transposition Maximum Dewpoint	78.0 F	
Transposition Adjustment Factor	**0.93**	
Grid Point Elevation	700	
Inflow Barrier Height	700	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.37**	

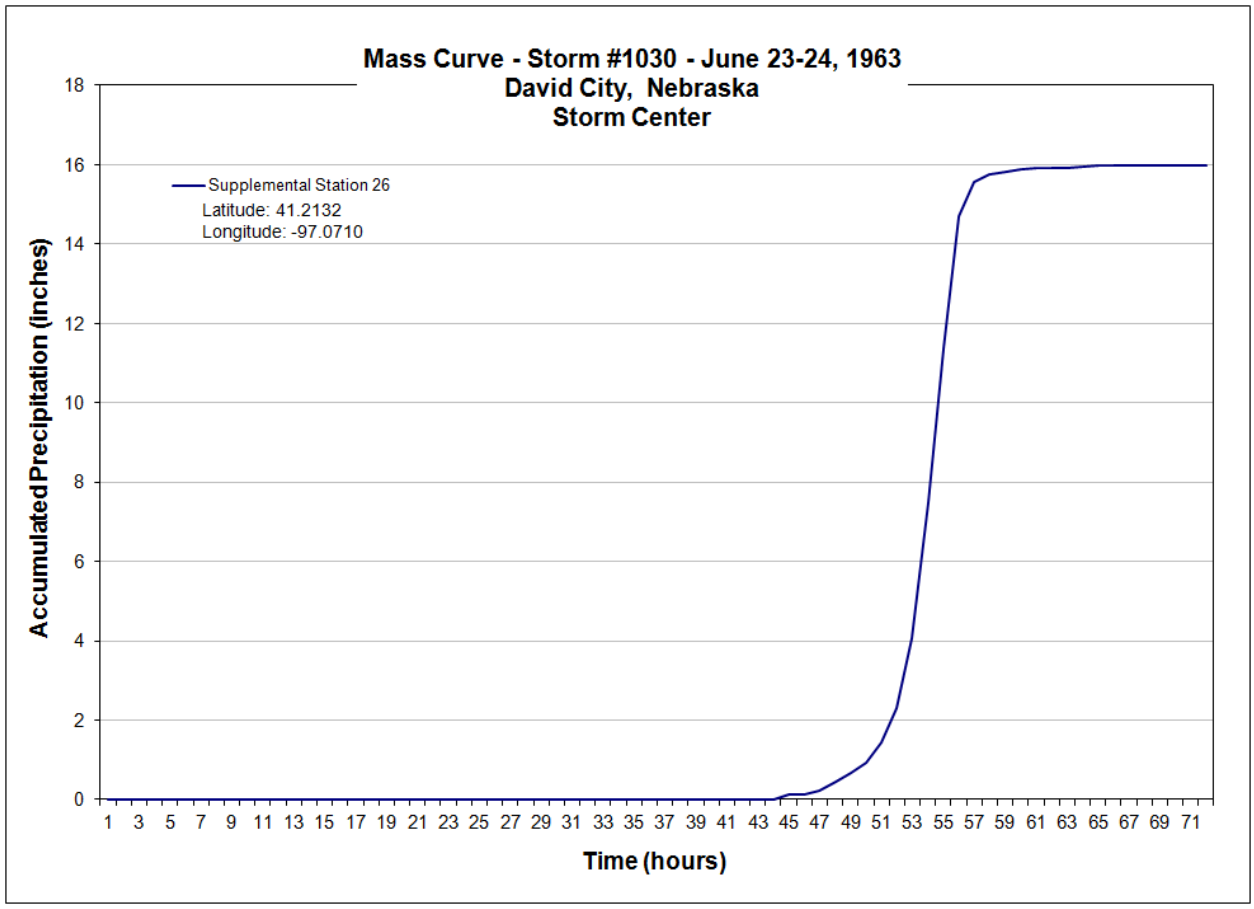
David City, NE June 24, 1963 Moisture Inflow Analysis

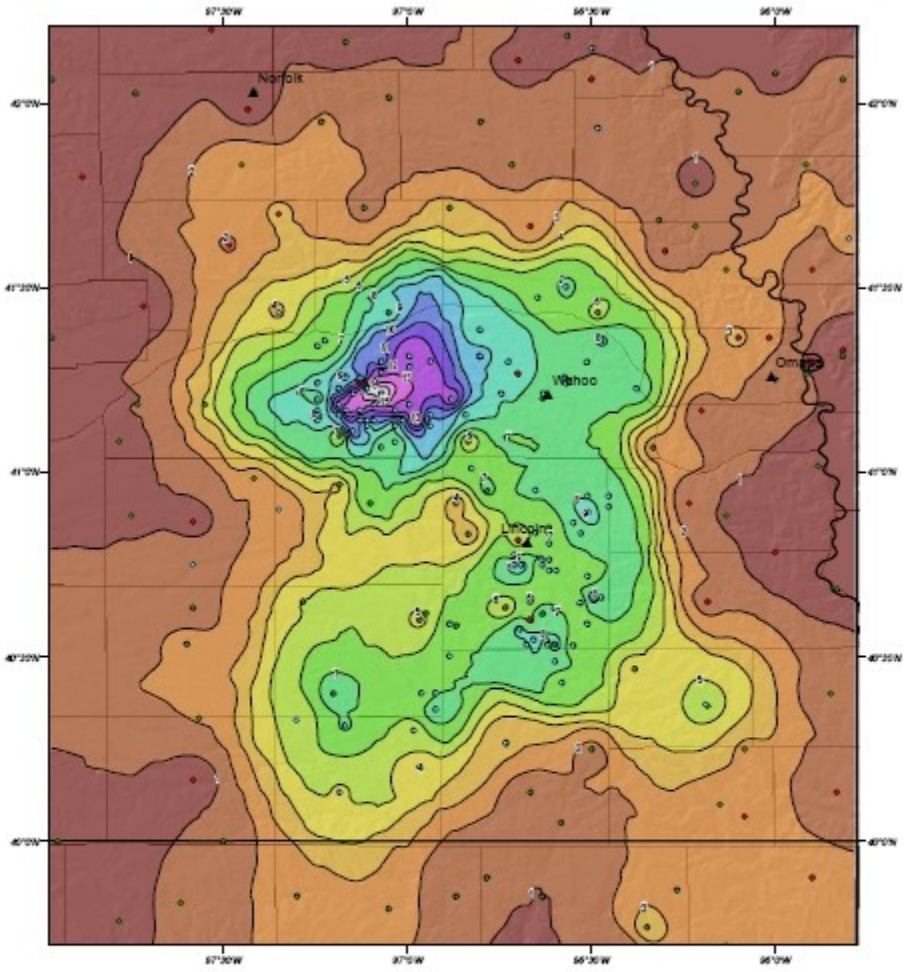
SPAS Storm 1030 - David City, NE, June 22 - 24, 1963

MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

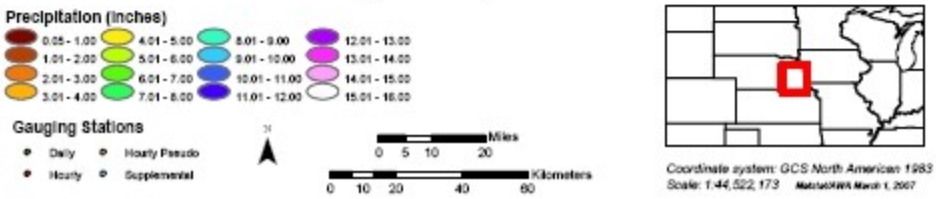
	Duration (hours)												
Area (mi^2)	1	2	3	4	5	6	12	18	24	36	48	72	total
1	3.87	7.36	10.73	12.40	13.26	14.10	15.61	15.90	15.98	15.98	15.98	15.98	15.98
10	3.68	6.98	10.18	11.82	12.60	13.40	14.80	15.02	15.15	15.13	15.13	15.16	15.16
100	3.03	5.68	8.28	9.72	10.59	11.37	12.75	13.14	13.23	13.23	13.23	13.23	13.23
200	2.81	5.21	7.57	8.91	9.87	10.63	12.07	12.39	12.49	12.49	12.50	12.52	12.52
500	2.37	4.41	6.30	7.38	8.52	9.17	10.39	10.79	10.82	10.84	10.86	10.87	10.87
1,000	1.96	3.65	5.19	6.31	7.32	7.89	9.10	9.39	9.45	9.47	9.48	9.51	9.51
5,000	0.89	1.80	2.50	3.18	3.77	4.22	5.96	6.64	6.80	6.83	6.87	6.87	6.87
10,000	0.61	1.15	1.56	1.99	2.35	2.65	4.07	4.60	4.84	4.91	4.92	4.93	4.93
20,000	0.36	0.66	0.89	1.09	1.27	1.53	2.46	2.85	3.04	3.09	3.10	3.10	3.10




Mass Curve - Storm #1030 - June 23-24, 1963
David City, Nebraska
Storm Center
Supplemental Station 26
Latitude: 41.2132
Longitude: -97.0710
Accumulated Precipitation (inches)
Time (hours)
0
2
4
6
8
10
12
14
16
18
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65 67 69 71



SPAS Storm #1030 - June 22 to 24, 1963
Total Rainfall (72-hours) - Wahoo, Nebraska



Edgerton, MO July 18, 1965
Transpositioned Grid Points: 1-4, 6-9, 12-16, 18-20
Storm Type: Synoptic/Convective

Storm Name:	**SPAS 1183-Edgerton, MO**
Storm Date:	**7/18-20/1965**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date	**15-Jul**	
	Lat	**Long**
Storm center location	**40.41 N**	**95.51 W**
Storm Rep SST location	**39.22 N**	**96.58 W**
Transposition SST location	**39.81 N**	**83.07 W**
Grid point location	**41.00 N**	**82.00 W**

Moisture Inflow Direction:	**SW @ 100**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**1,000**	feet
Storm Duration	**24**	hours

The storm representative SST is	**76.0 F**	with total precipitable water above sea level of			**2.99**	inches.
The in-place maximum SST is	**80.5 F**	with total precipitable water above sea level of			**3.68**	inches.
The transpositioned maximum SST is	**78.0 F**	with total precipitable water above sea level of			**3.29**	inches.
The in-place storm elevation is	**1,000**	which subtracts	**0.260**	inches of precipitable water at	**76.0 F**	
The in-place storm elevation is	**1,000**	which subtracts	**0.300**	inches of precipitable water at	**80.5 F**	
The transposition storm elevation at	**900**	which subtracts	**0.250**	inches of precipitable water at	**78.0 F**	
The moisture inflow barrier height is	**900**	which subtracts	**0.250**	inches of precipitable water at	**78.0 F**	

The in-place maximization factor is	**1.24**
The transposition factor is	**0.90**
The elevation/barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.11**

Notes:

Observed Storm Depth-Area-Duration

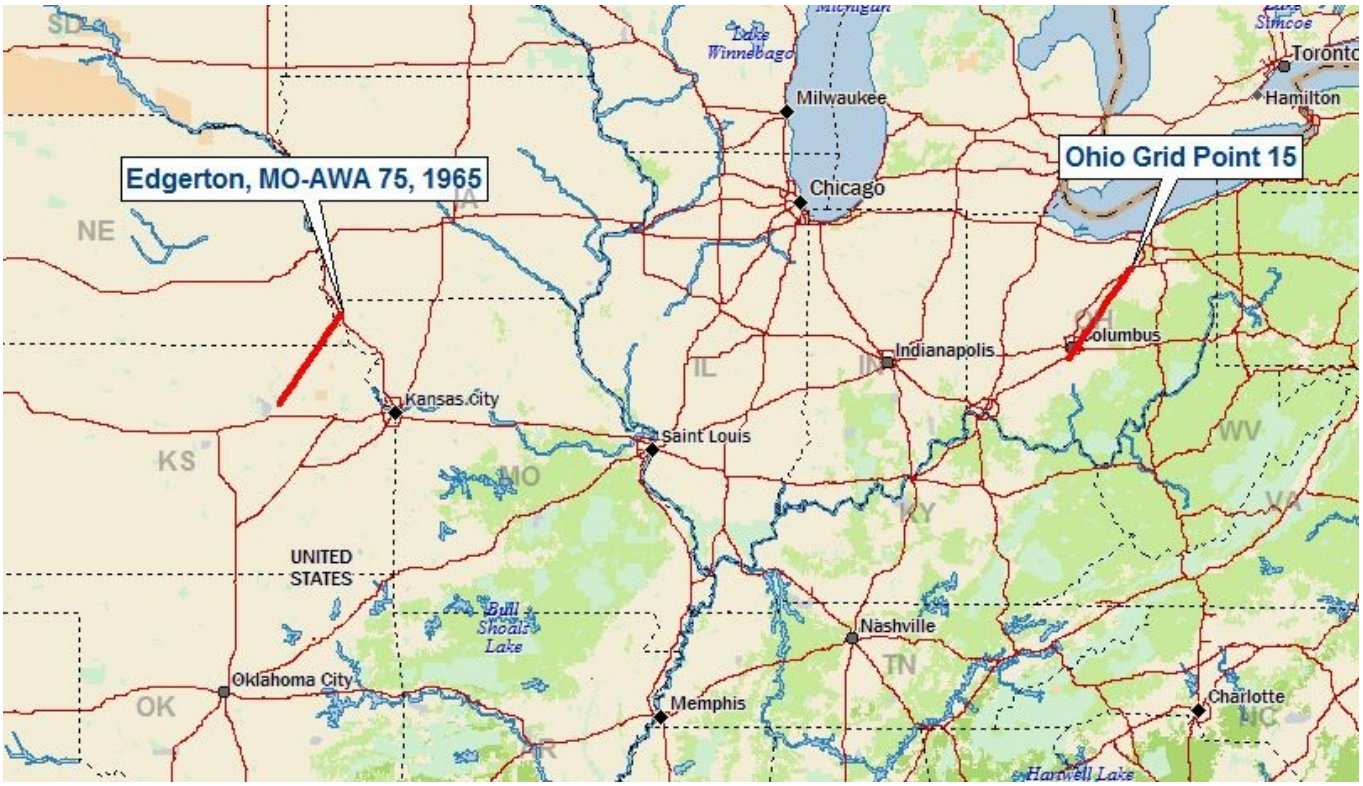
	1 Hours	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**3.7**	**11.8**	**16.7**	**17.3**	**18.0**	-	**19.3**	**19.4**	**20.1**	-
10 sq miles	**3.5**	**11.1**	**15.4**	**16.5**	**17.6**	-	**19.0**	**19.1**	**19.7**	-
100 sq miles	**2.4**	**7.5**	**11.0**	**11.5**	**13.4**	-	**15.3**	**16.4**	**17.2**	-
200 sq miles	**1.8**	**6.2**	**9.2**	**9.9**	**12.7**	-	**14.2**	**15.4**	**16.2**	-
500 sq miles	**1.4**	**4.4**	**6.1**	**8.2**	**10.9**	-	**13.4**	**13.9**	**15.2**	-
1000 sq miles	**1.2**	**3.7**	**5.8**	**7.6**	**9.5**	-	**12.1**	**13.0**	**13.8**	-
2000 sq miles	**1.0**	**3.5**	**4.9**	**6.8**	**8.7**	-	**10.8**	**11.8**	**12.7**	-
5000 sq miles	**0.6**	**2.7**	**3.8**	**5.6**	**6.9**	-	**8.5**	**9.7**	**10.4**	-
10000 sq miles	**0.4**	**2.1**	**3.2**	**4.0**	**5.2**	-	**7.0**	**7.7**	**8.2**	-
20000 sq miles	**0.3**	**1.4**	**2.2**	**2.8**	**3.6**	-	**4.9**	**5.4**	**5.8**	-

Adjusted Storm Depth-Area-Duration

	1 Hours	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**4.1**	**13.1**	**18.6**	**19.3**	**20.1**	-	**21.5**	**21.5**	**22.4**	-
10 sq miles	**3.9**	**12.4**	**17.2**	**18.4**	**19.6**	-	**21.2**	**21.2**	**21.9**	-
100 sq miles	**2.7**	**8.4**	**12.2**	**12.9**	**14.9**	-	**17.0**	**18.3**	**19.2**	-
200 sq miles	**2.0**	**6.9**	**10.3**	**11.0**	**14.1**	-	**15.8**	**17.1**	**18.0**	-
500 sq miles	**1.6**	**4.8**	**6.8**	**9.1**	**12.1**	-	**14.9**	**15.5**	**16.9**	-
1000 sq miles	**1.3**	**4.1**	**6.4**	**8.4**	**10.6**	-	**13.5**	**14.5**	**15.4**	-
2000 sq miles	**1.1**	**3.9**	**5.5**	**7.6**	**9.7**	-	**12.0**	**13.1**	**14.1**	-
5000 sq miles	**0.7**	**3.0**	**4.3**	**6.2**	**7.7**	-	**9.5**	**10.8**	**11.6**	-
10000 sq miles	**0.5**	**2.3**	**3.5**	**4.5**	**5.8**	-	**7.8**	**8.5**	**9.2**	-
20000 sq miles	**0.3**	**1.6**	**2.5**	**3.1**	**4.0**	-	**5.4**	**6.0**	**6.5**	-

Storm or Storm Center Name	**SPAS 1183-Edgerton, MO**	
Storm Date(s)	7/18-20/1965	
Storm Type	General Storm/MCC	
Storm Location	40.41 N	95.51 W
Storm Center Elevation	1,000	
Precipitation Total & Duration (10 sq mi)	20.76 inches in 60hrs, 18.59" in 24hrs	
Storm Representative SST	76.0 F	24
Storm Representative SST Location	39.22 N	96.58 W
In-place Maximum SST	80.5 F	
Moisture Inflow Vector	SW @ 100	
In-place Maximization Factor		
Temporal Transposition (Date)	15-Jul	
Transposition Dewpoint Location	39.81 N	83.07 W
Transposition Maximum SST	78.0 F	
Transposition Adjustment Factor	**0.90**	
Grid Point Elevation	900	
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.11**	

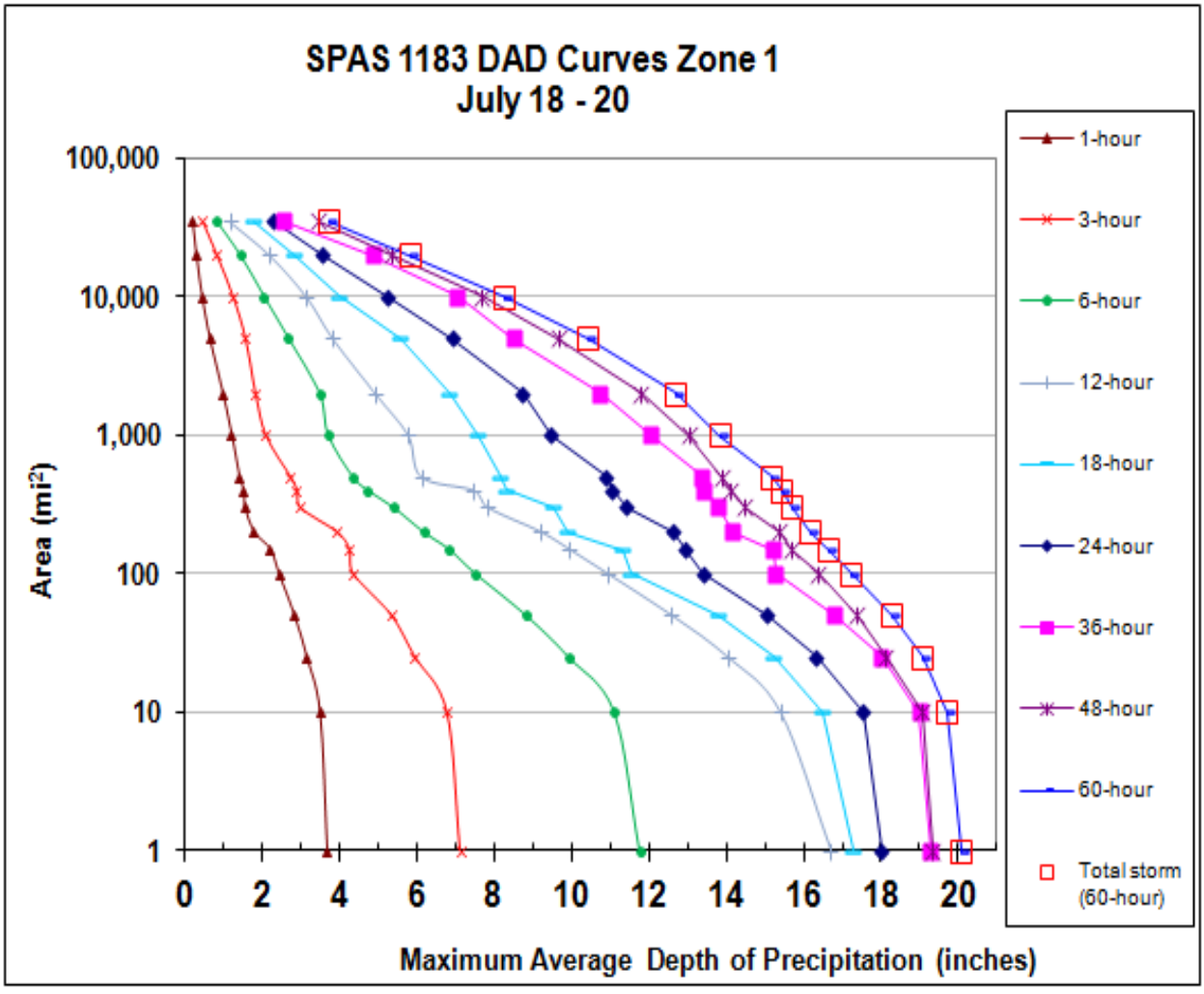
Edgerton, MO July 18, 1965 Moisture Inflow Analysis

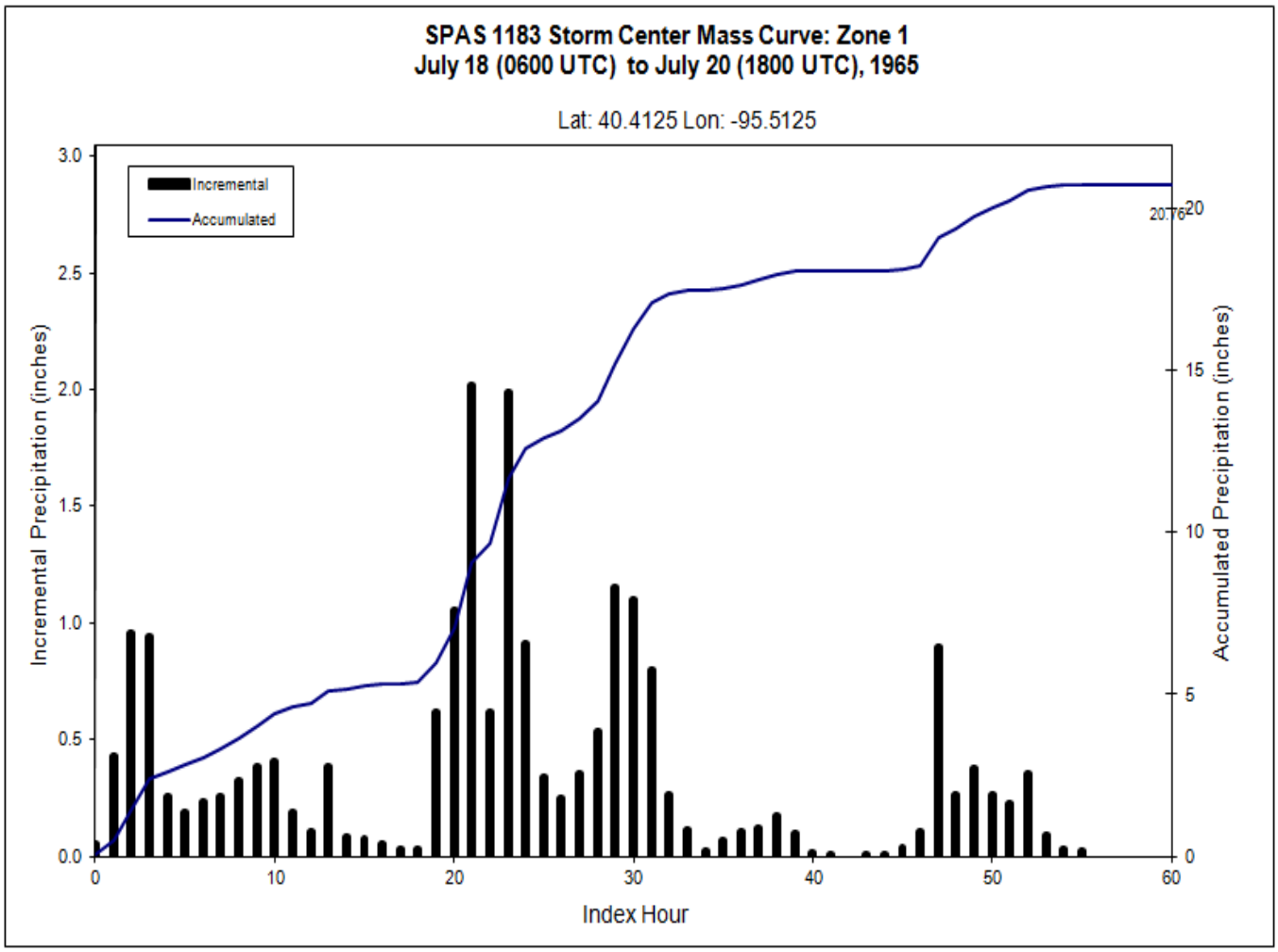


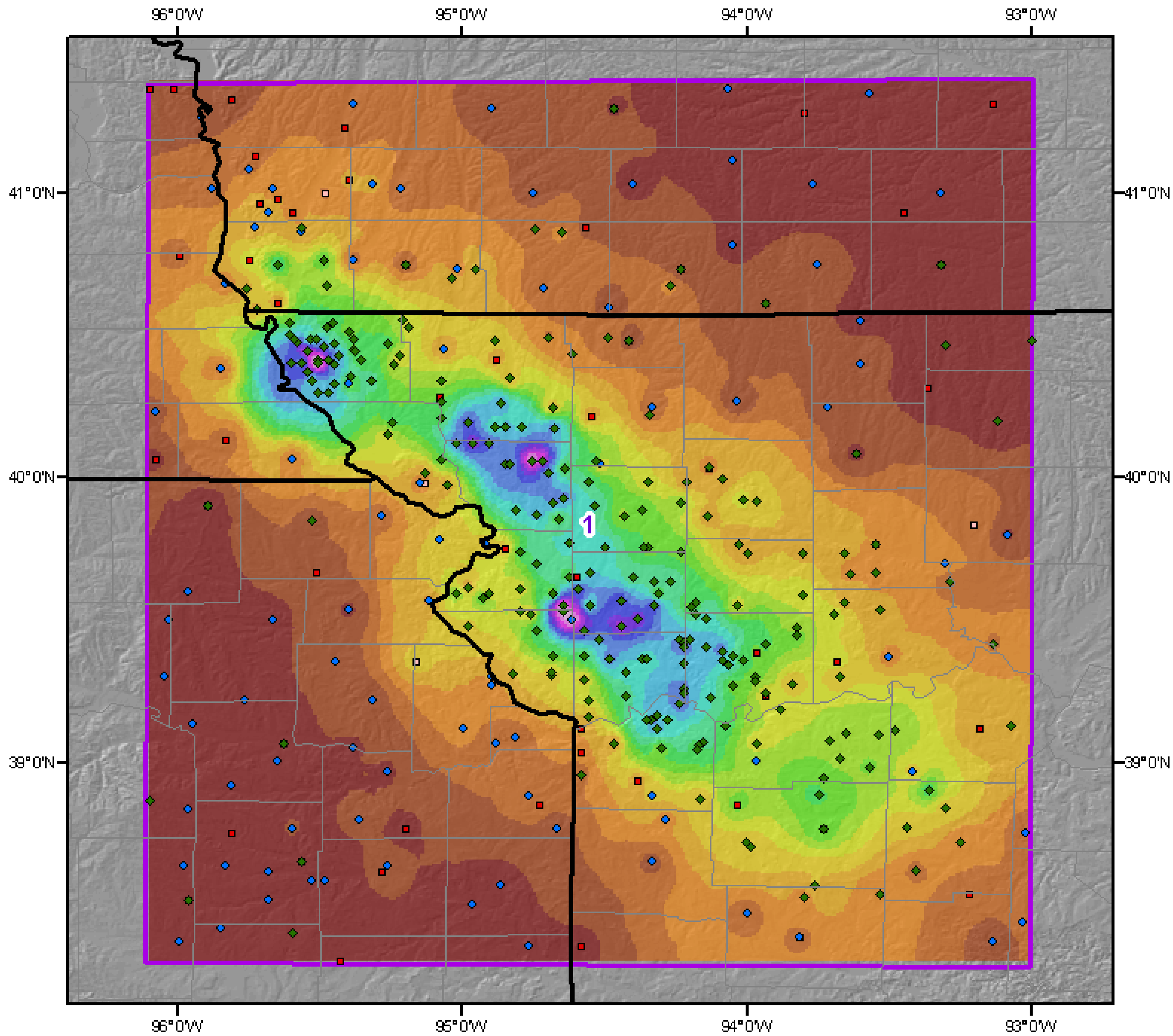
Storm 1183 - July 18, 1965 (0600 UTC) to July 20 (1800 UTC), 1965

MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

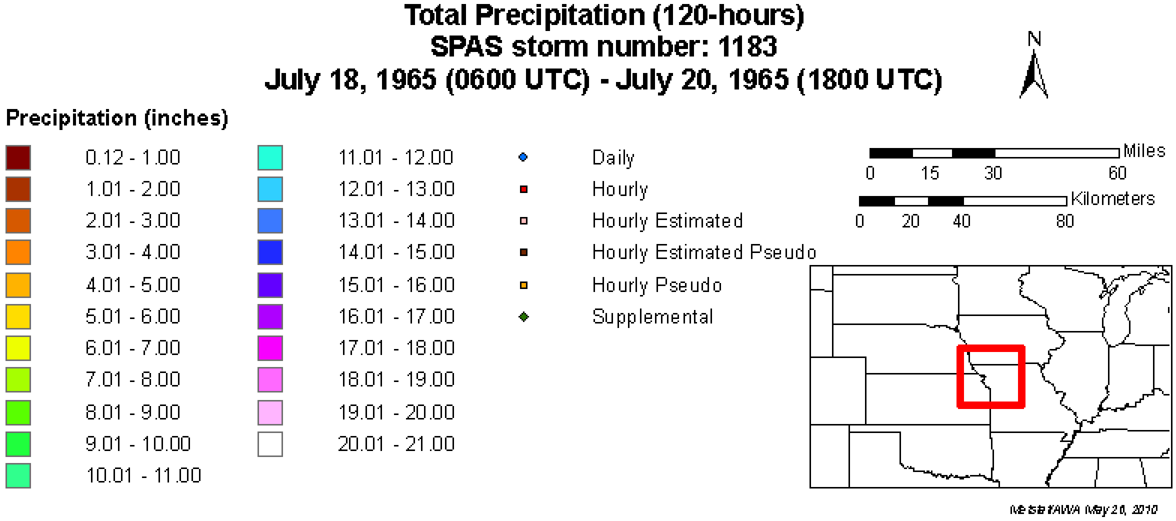
	Duration (hours)									
Area (mi^2)	1	3	6	12	18	24	36	48	60	Total
0.30	3.77	7.34	12.06	17.13	17.80	18.59	19.82	19.86	20.76	20.76
1	3.68	7.13	11.77	16.72	17.29	18.04	19.27	19.35	20.08	20.08
10	3.49	6.79	11.11	15.41	16.49	17.56	19.00	19.06	19.71	19.71
25	3.15	5.96	9.93	14.05	15.23	16.32	18.04	18.12	19.06	19.06
50	2.83	5.35	8.83	12.60	13.81	15.05	16.79	17.37	18.27	18.27
100	2.43	4.36	7.52	10.95	11.54	13.41	15.27	16.39	17.22	17.22
150	2.21	4.26	6.84	9.96	11.34	12.96	15.23	15.69	16.66	16.66
200	1.79	3.94	6.18	9.23	9.90	12.66	14.18	15.38	16.18	16.18
300	1.55	2.99	5.41	7.86	9.53	11.45	13.80	14.49	15.71	15.71
400	1.52	2.90	4.74	7.48	8.30	11.04	13.43	14.13	15.44	15.44
500	1.41	2.73	4.35	6.13	8.17	10.88	13.37	13.88	15.17	15.17
1,000	1.21	2.09	3.71	5.79	7.57	9.48	12.08	13.04	13.83	13.83
2,000	0.98	1.82	3.49	4.94	6.83	8.74	10.76	11.80	12.70	12.70
5,000	0.64	1.56	2.69	3.84	5.57	6.92	8.50	9.66	10.42	10.42
10,000	0.44	1.24	2.06	3.16	4.00	5.23	7.03	7.67	8.24	8.24
20,000	0.29	0.82	1.44	2.21	2.81	3.59	4.86	5.36	5.81	5.81
35,221	0.19	0.45	0.83	1.17	1.78	2.29	2.57	3.46	3.72	3.72




SPAS 1183 Storm Center Mass Curve: Zone 1
July 18 (0600 UTC) to July 20 (1800 UTC), 1965
Lat: 40.4125 Lon: -95.5125
Incremental
Accumulated
20.76
Incremental Precipitation (inches)
Accumulated Precipitation (inches)
Index Hour
0.0
0.5
1.0
1.5
2.0
2.5
3.0
0
5
10
15
20
0
10
20
30
40
50
60



Total Precipitation (120-hours)
SPAS storm number: 1183
July 18, 1965 (0600 UTC) - July 20, 1965 (1800 UTC)



Wooster, OH July 4, 1969
Transpositioned Grid Points: All
Storm Type: Synoptic/Convective

Storm Name:	**Wooster, OH SPAS 1209**
Storm Date:	**7/4-7/1969**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date	**15-Jul**	
	Lat	**Long**
Storm center location	**40.92 N**	**81.97 W**
Storm Rep dew point location	**39.43 N**	**83.80 W**
Transposition dewpoint location	**39.52 N**	**83.83 W**
Grid point location	**41.00 N**	**82.00 W**

Moisture Inflow Direction:	**SW @ 140**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**1,200**	feet
Storm Duration	**24**	hours

The storm representative dew point is	**76.0 F**	with total precipitable water above sea level of			**2.99**	inches.
The in-place maximum dew point is	**78.0 F**	with total precipitable water above sea level of			**3.29**	inches.
The transpositioned maximum dew point is	**78.0 F**	with total precipitable water above sea level of			**3.29**	inches.
The in-place storm elevation is	**1,200**	which subtracts	**0.310**	inches of precipitable water at	**76.0 F**	
The in-place storm elevation is	**1,200**	which subtracts	**0.330**	inches of precipitable water at	**78.0 F**	
The transposition basin elevation at	**900**	which subtracts	**0.250**	inches of precipitable water at	**78.0 F**	
The inflow barrier/basin elevation height is	**900**	which subtracts	**0.250**	inches of precipitable water at	**78.0 F**	

The in-place storm maximization factor is	**1.10**
The transposition/elevation to basin factor is	**1.03**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.13**

Notes: DAD values taken from SPAS 1209. Storm representative dew point value was based on maximum 24-hr Td values between July 4-5, 1969 at KILN, KFFO, and KCVG.

Observed Storm Depth-Area-Duration

	1 Hours	3 Hours	6 Hours	12 Hours	18 Hours	24 Hours	36 Hours	48 Hours	72 Hours
1 sq miles	**4.6**	**6.2**	**8.8**	**12.7**	**14.3**	**14.4**	**14.5**	**14.6**	**14.7**
10 sq miles	**4.2**	**6.0**	**8.7**	**12.3**	**13.7**	**13.7**	**13.8**	**14.0**	**14.0**
100 sq miles	**2.9**	**5.7**	**8.0**	**10.7**	**12.0**	**12.1**	**12.1**	**12.6**	**12.8**
200 sq miles	**2.5**	**5.5**	**7.7**	**10.4**	**11.6**	**11.6**	**11.7**	**12.2**	**12.4**
500 sq miles	**2.1**	**4.8**	**7.3**	**9.9**	**11.0**	**11.0**	**11.2**	**11.6**	**11.8**
1000 sq miles	**1.7**	**4.2**	**6.9**	**9.3**	**10.3**	**10.5**	**10.7**	**11.0**	**11.3**
2000 sq miles	**1.5**	**3.7**	**6.2**	**8.5**	**9.4**	**9.7**	**9.8**	**10.2**	**10.4**
5000 sq miles	**1.0**	**2.6**	**4.5**	**6.3**	**7.0**	**7.1**	**7.4**	**7.6**	**7.9**
10000 sq miles	**0.5**	**1.6**	**2.7**	**4.4**	**4.7**	**4.8**	**5.4**	**5.5**	**5.8**
20000 sq miles	**0.3**	**1.0**	**1.8**	**2.6**	**3.4**	**3.5**	**3.7**	**3.8**	**4.0**

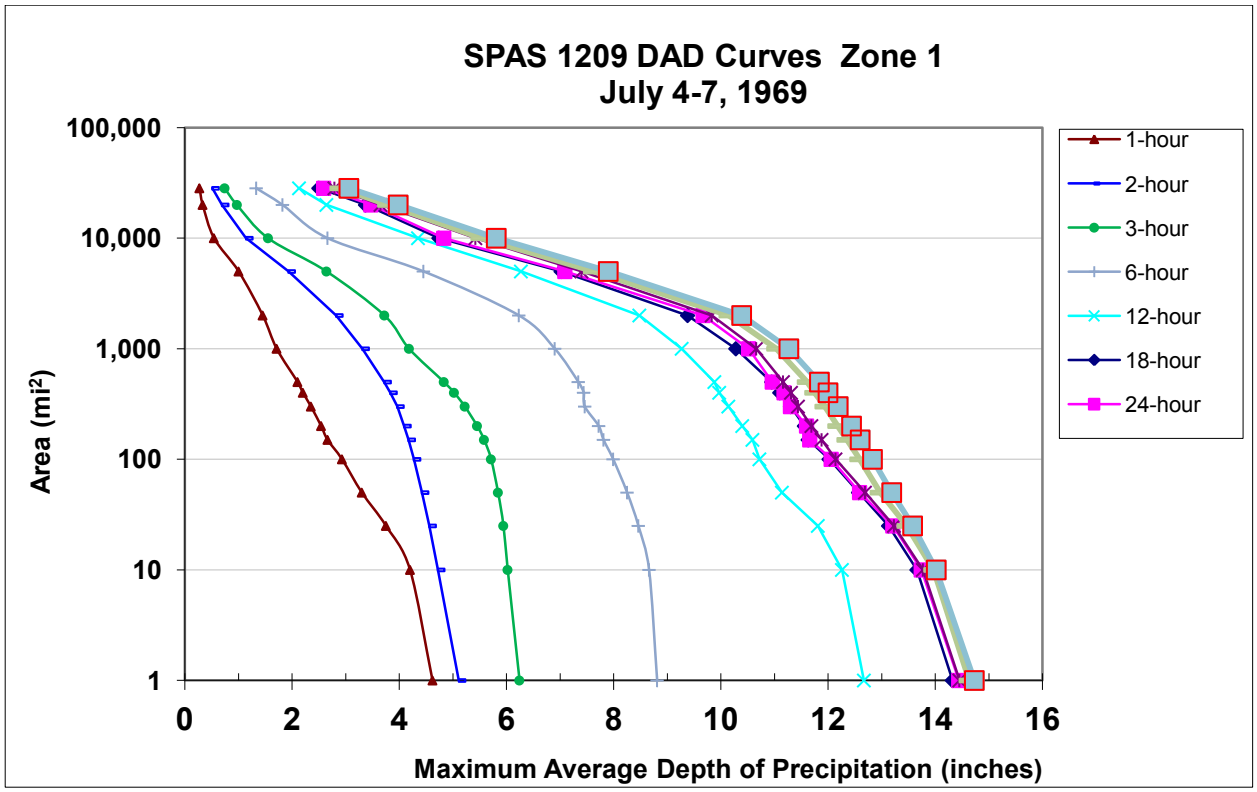
Adjusted Storm Depth-Area-Duration

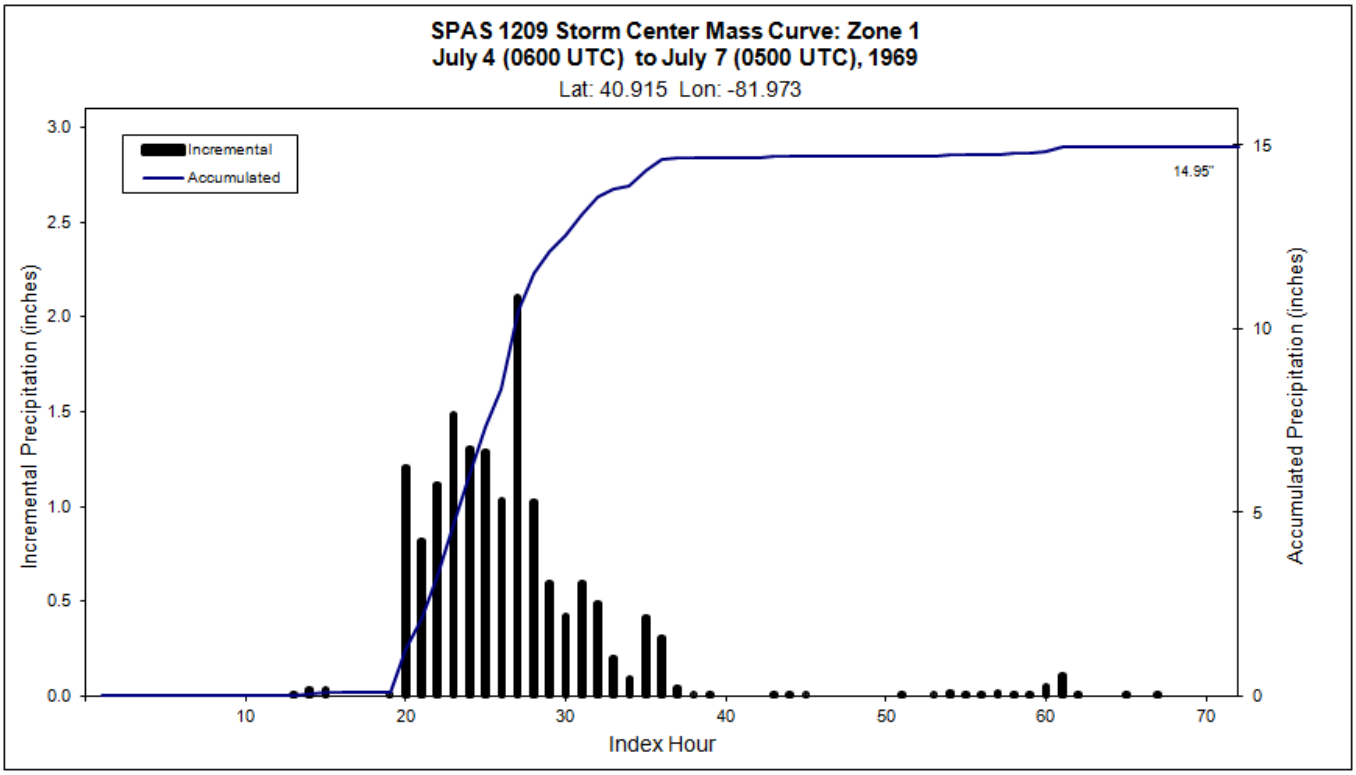
	1 Hours	3 Hours	6 Hours	12 Hours	18 Hours	24 Hours	36 Hours	48 Hours	72 Hours
1 sq miles	**5.2**	**7.1**	**10.0**	**14.4**	**16.2**	**16.4**	**16.4**	**16.6**	**16.7**
10 sq miles	**4.8**	**6.8**	**9.8**	**13.9**	**15.5**	**15.6**	**15.6**	**15.8**	**15.9**
100 sq miles	**3.3**	**6.5**	**9.1**	**12.2**	**13.6**	**13.7**	**13.8**	**14.3**	**14.6**
200 sq miles	**2.9**	**6.2**	**8.8**	**11.8**	**13.1**	**13.2**	**13.3**	**13.8**	**14.1**
500 sq miles	**2.4**	**5.5**	**8.3**	**11.2**	**12.4**	**12.4**	**12.7**	**13.2**	**13.4**
1000 sq miles	**1.9**	**4.7**	**7.8**	**10.5**	**11.7**	**11.9**	**12.1**	**12.5**	**12.8**
2000 sq miles	**1.6**	**4.2**	**7.1**	**9.6**	**10.6**	**11.0**	**11.2**	**11.5**	**11.8**
5000 sq miles	**1.1**	**3.0**	**5.0**	**7.1**	**8.0**	**8.0**	**8.4**	**8.6**	**9.0**
10000 sq miles	**0.6**	**1.8**	**3.0**	**4.9**	**5.4**	**5.5**	**6.1**	**6.3**	**6.6**
20000 sq miles	**0.4**	**1.1**	**2.1**	**3.0**	**3.8**	**3.9**	**4.1**	**4.3**	**4.5**

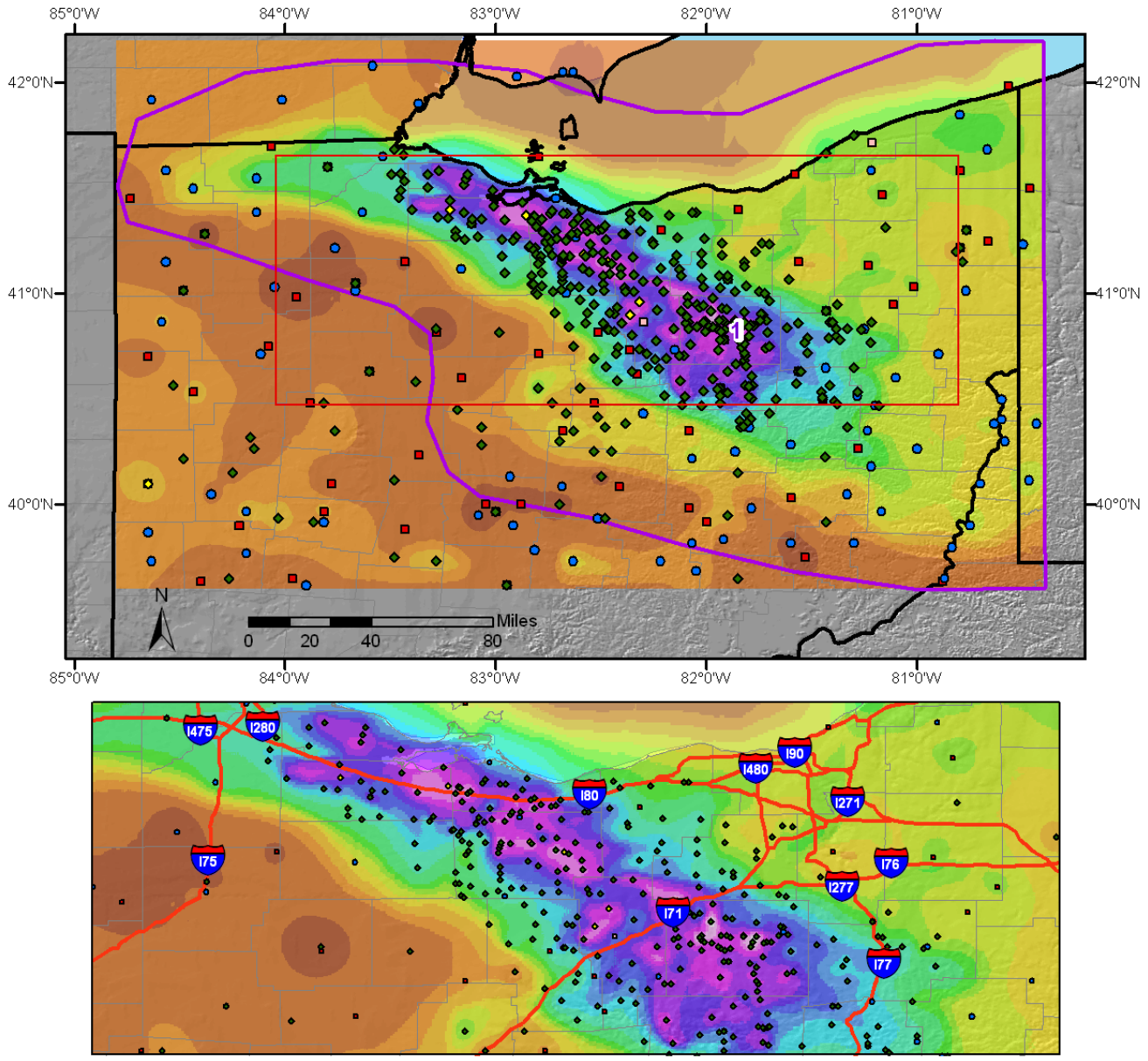
Storm or Storm Center Name	**Wooster, OH SPAS 1209**	
Storm Date(s)	7/4-7/1969	
Storm Type	Synoptic	
Storm Location	40.92 N	81.97 W
Storm Center Elevation	1,200	
Precipitation Total & Duration	14.73 Inches 72-hours	
Storm Representative Dewpoint	76.0 F	24
Storm Representative Dewpoint Location	39.43 N	83.80 W
Maximum Dewpoint	78.0 F	
Moisture Inflow Vector	SW @ 140	Miles
In-place Maximization Factor	1.10	
Temporal Transposition (Date)	15-Jul	
Transposition Dewpoint Location	39.52 N	83.83 W
Transposition Maximum Dewpoint	78.0 F	
Transposition Adjustment Factor	**1.03**	
Grid Point Elevation	900	
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.13**	

Wooster, OH July 4, 1969 Moisture Inflow Analysis

MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)											
	Duration (hours)										
Area (mi^2)	1	2	3	6	12	18	24	36	48	72	Total
0	4.82	5.33	6.41	8.95	13.02	14.58	14.67	14.69	14.94	14.95	14.95
1	4.62	5.11	6.24	8.81	12.67	14.32	14.44	14.45	14.63	14.73	14.73
10	4.2	4.72	6.02	8.66	12.26	13.66	13.74	13.77	13.97	14.02	14.02
25	3.75	4.56	5.94	8.46	11.81	13.13	13.21	13.23	13.47	13.58	13.58
50	3.3	4.42	5.84	8.25	11.14	12.57	12.59	12.69	12.97	13.19	13.19
100	2.93	4.27	5.71	7.99	10.72	12.02	12.06	12.14	12.59	12.83	12.83
150	2.66	4.17	5.58	7.81	10.59	11.63	11.66	11.88	12.35	12.6	12.60
200	2.54	4.09	5.45	7.72	10.4	11.56	11.6	11.69	12.18	12.44	12.44
300	2.35	3.96	5.22	7.46	10.14	11.3	11.3	11.44	11.94	12.19	12.19
400	2.2	3.83	5.02	7.44	9.97	11.1	11.18	11.31	11.75	12	12.00
500	2.1	3.72	4.83	7.34	9.88	10.95	10.96	11.16	11.61	11.84	11.84
1,000	1.71	3.31	4.18	6.9	9.27	10.28	10.52	10.66	11.04	11.27	11.27
2,000	1.45	2.82	3.72	6.23	8.48	9.38	9.67	9.83	10.15	10.39	10.39
5,000	1	1.93	2.64	4.45	6.27	7.02	7.09	7.4	7.62	7.9	7.90
10,000	0.54	1.14	1.55	2.66	4.35	4.74	4.83	5.42	5.52	5.81	5.81
20,000	0.33	0.69	0.97	1.82	2.64	3.37	3.47	3.65	3.78	3.98	3.98
28,279	0.27	0.51	0.74	1.33	2.13	2.5	2.59	2.79	2.89	3.06	3.06




SPAS 1209 Storm Center Mass Curve: Zone 1
July 4 (0600 UTC) to July 7 (0500 UTC), 1969
Lat: 40.915 Lon: -81.973
Incremental
Accumulated
14.95"
Incremental Precipitation (inches)
Accumulated Precipitation (inches)
Index Hour
0.0
0.5
1.0
1.5
2.0
2.5
3.0
0
5
10
15
10
20
30
40
50
60
70

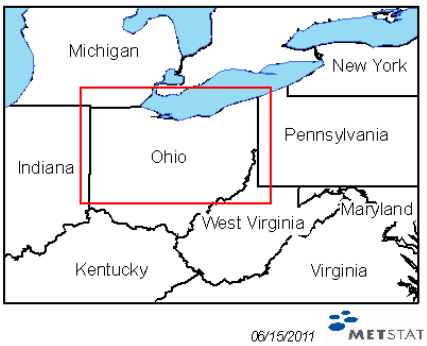


Wooster, Ohio "Independence Day storm" - ISOHYETAL FROM SPAS

Total 72-hour Rainfall (inches)
07/04/1969 0600 UTC - 07/07/1969 0500 UTC
SPAS #1209

Inches

0.00	3.01 - 3.50	9.01 - 10.00	Daily
0.01 - 0.50	3.51 - 4.00	10.01 - 11.00	Hourly
0.51 - 1.00	4.01 - 5.00	11.01 - 12.00	Hourly Est.
1.01 - 1.50	5.01 - 6.00	12.01 - 13.00	Hourly Est. Pseudo
1.51 - 2.00	6.01 - 7.00	13.01 - 14.00	Hourly Pseudo
2.01 - 2.50	7.01 - 8.00	>14.00	Supplemental
2.51 - 3.00	8.01 - 9.00	DAD zone	Supplemental Est.



Enid, OK October 10, 1973
Transpositioned Grid Points: None
Storm Type: MCC

Storm Name:	**Enid, OK-SPAS 1034**
Storm Date:	**10-Oct-1973**
AWA Analysis Date:	**10/12/2012**

Storm Adjustment for Ohio-In Place Only

Temporal Transposition Date 1-Oct

	Lat	Long
Storm center location	36.38 N	97.87 W
Storm Rep dew point location	33.35 N	96.55 W
Transposition dewpoint location	XX	XX
Basin location	XX	XX

Moisture Inflow Direction:	**SSE @ 225**	miles
Basin Elevation	**1,300**	feet
Storm Elevation	**1,250**	feet
Storm Duration	**12hr**	feet

The storm representative dew point is	**75.0 F**	with total precipitable water above sea level of				**2.85**	inches.
The in-place maximum dew point is	**76.5 F**	with total precipitable water above sea level of				**3.07**	inches.
The transpositioned maximum dew point is	**XXXX**	with total precipitable water above sea level of				**2.92**	inches.
The in-place storm elevation is	**1,250**	which subtracts	**0.31**	inches of precipitable water at		**75.0 F**	
The in-place storm elevation is	**1,250**	which subtracts	**0.325**	inches of precipitable water at		**76.5 F**	
The transposition basin elevation at	**XXXX**	which subtracts	**XX**	inches of precipitable water at		**XX**	
The inflow barrier/basin elevation height is	**XXXX**	which subtracts	**XX**	inches of precipitable water at		**XX**	

The in-place storm maximization factor is	**1.08**
The transposition/elevation to basin factor is	**#VALUE!**
The barrier adjustment factor is	**#VALUE!**
The total adjustment factor is	**#VALUE!**

Notes: DAD values taken from SPAS 1034.

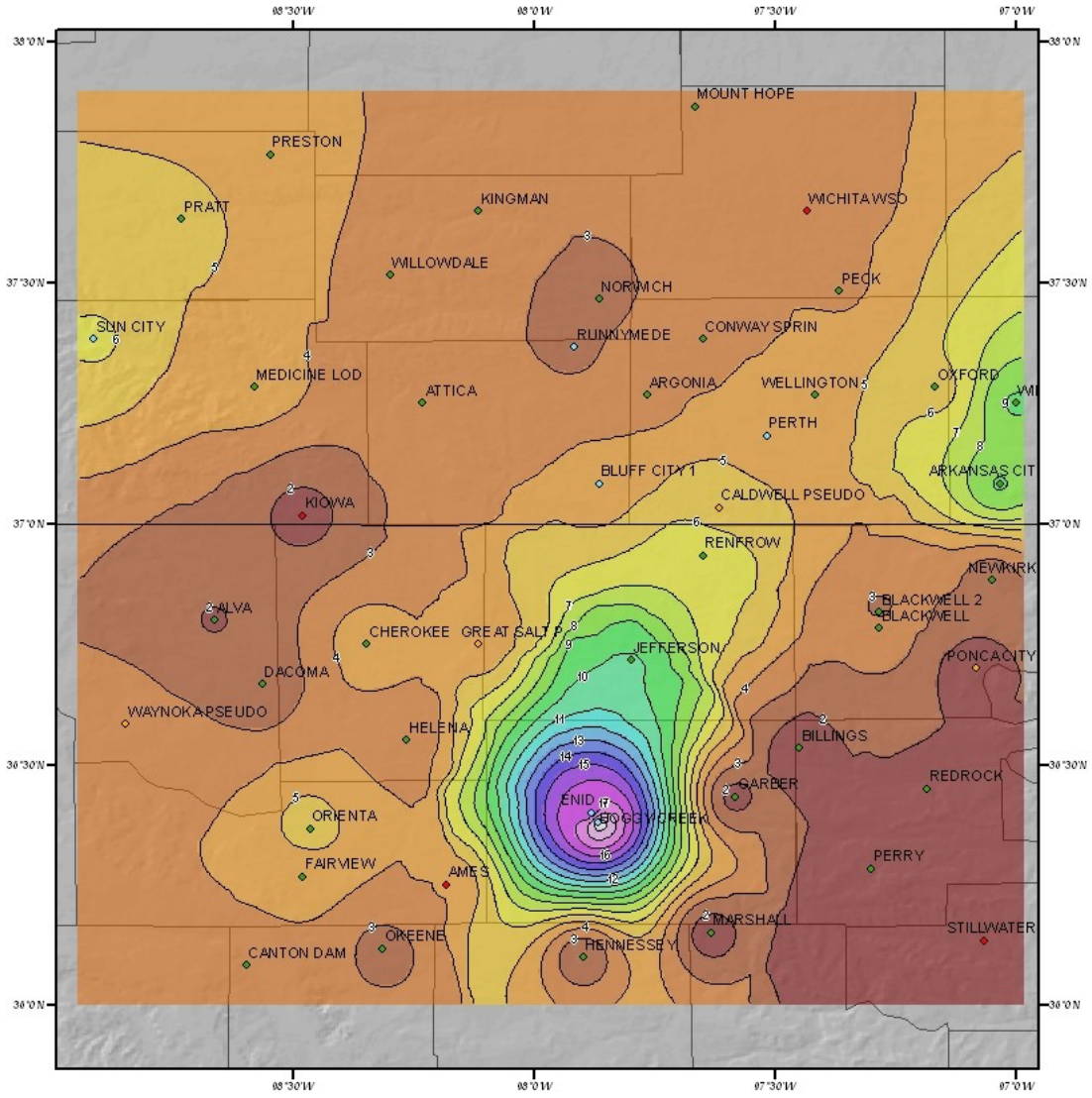
Observed Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**10.7**	**16.3**	**18.1**	**18.1**	**0.0**	**18.1**	**18.3**	**0.0**	**18.5**
100 sq miles	**9.7**	**14.6**	**16.2**	**16.2**	**0.0**	**16.2**	**16.4**	**0.0**	**16.6**
200 sq miles	**9.1**	**13.7**	**15.2**	**15.2**	**0.0**	**15.2**	**15.3**	**0.0**	**15.5**
500 sq miles	**7.9**	**11.3**	**12.7**	**12.7**	**0.0**	**12.7**	**12.9**	**0.0**	**12.9**
1000 sq miles	**6.7**	**9.5**	**10.5**	**10.5**	**0.0**	**10.5**	**10.6**	**0.0**	**10.6**
5000 sq miles	**3.9**	**5.2**	**5.6**	**5.6**	**0.0**	**5.6**	**5.7**	**0.0**	**5.7**
10000 sq miles	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
20000 sq miles	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Adjusted Storm Depth-Area-Duration

	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**
100 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**
200 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**
500 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**
1000 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**
5000 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**
10000 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**
20000 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**

Storm or Storm Center Name	**Enid, OK-SPAS 1034**	
Storm Date(s)	10-Oct-1973	
Storm Type	MCC	
Storm Location	36.38 N	97.87 W
Storm Center Elevation	1,250	
Precipitation Total & Duration	20.00 Inches 15-hours NCDC Storm Data report	
Storm Representative Dewpoint	75.0 F	12hr average taken from KDFW and WACO from 2100CDT 10-9-73 to 0900CDT10-10-73
Storm Representative Dewpoint Location	33.35 N	96.55 W
Maximum Dewpoint	76.5 F	
Moisture Inflow Vector	SSE @ 225 Miles	
In-place Maximization Factor	1.08	
Temporal Transposition (Date)	1-Oct	
Transposition Dewpoint Location	XXXX	XXXX
Transposition Maximum Dewpoint	XXXX	
Basin Elevation	1,300	
Transposition to Basin Adjustment Factor	#VALUE!	
Higher of Basin Elevation - Inflow Barrier Height	1,300	
Elevation Adjustment Factor	#VALUE!	
Total Adjustment Factor	#VALUE!	



SPAS Storm #1034 - October 9 to 12, 1973
Total Rainfall (96-hours) - Enid, Oklahoma

Precipitation (inches)

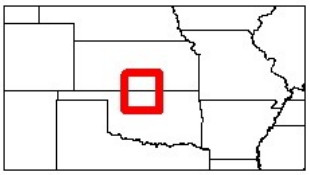
1.35 - 2.00	5.01 - 6.00	9.01 - 10.00	13.01 - 14.00	17.01 - 18.00
2.01 - 3.00	6.01 - 7.00	10.01 - 11.00	14.01 - 15.00	18.01 - 19.00
3.01 - 4.00	7.01 - 8.00	11.01 - 12.00	15.01 - 16.00	19.01 - 20.00
4.01 - 5.00	8.01 - 9.00	12.01 - 13.00	16.01 - 17.00	

Gauging Stations

Hourly · Daily
Hourly Pseudo · Supplemental

N

Miles: 0 5 10 20
Kilometers: 0 10 20 40 60

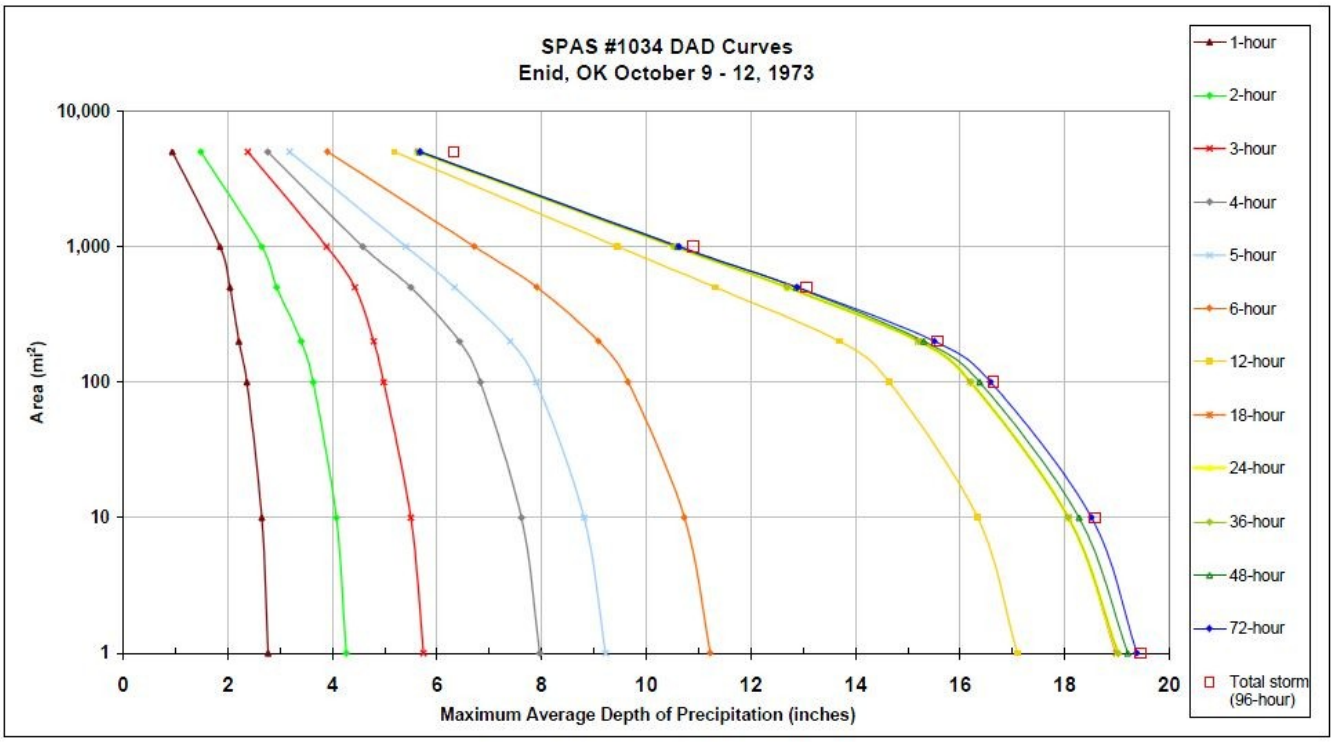


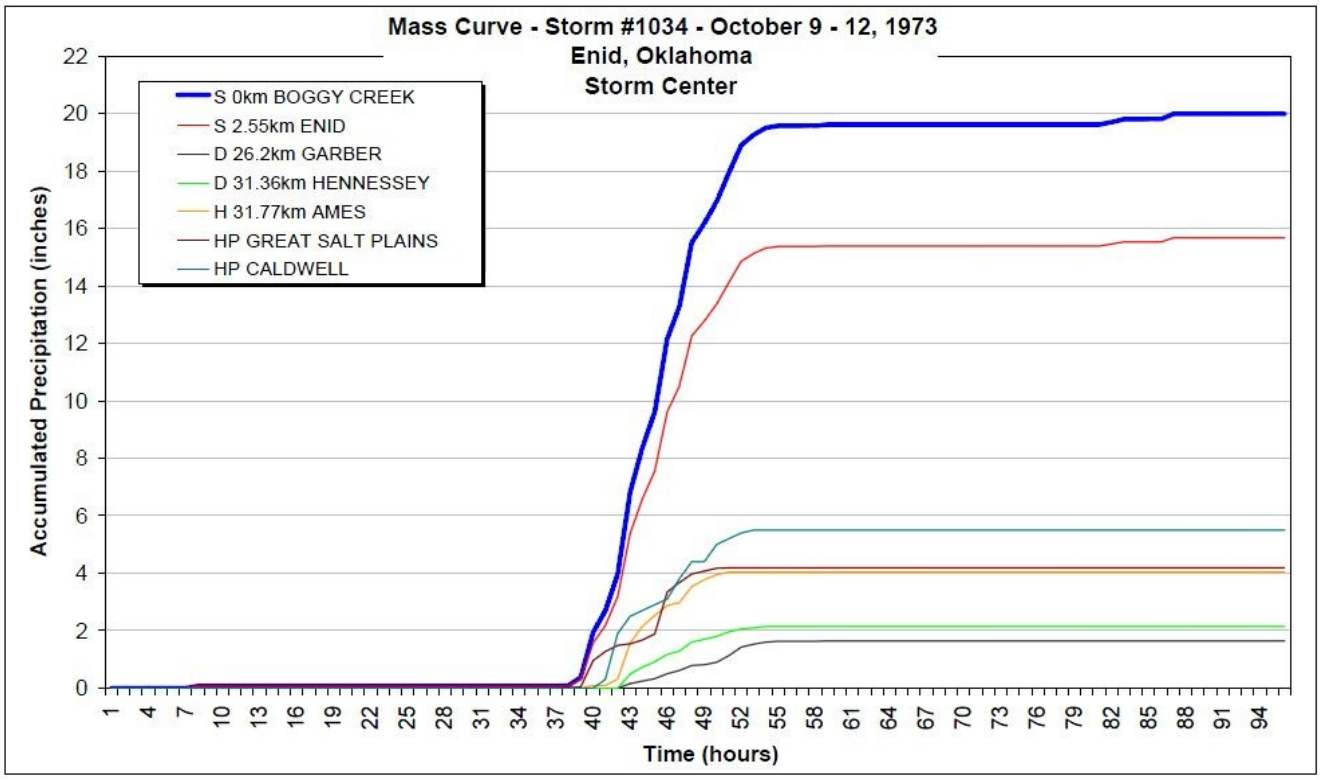
Coordinate system: GCS North American 1983
Scale: 1:1,210,722 *Created:* April 9, 2007

Storm 1034 - Enid OK, October 9 - 12, 1973

MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

Area (mi^2)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	total
1	2.77	4.26	5.74	7.96	9.22	11.22	17.09	18.98	19.02	19.02	19.20	19.38	19.45	19.45
10	2.65	4.07	5.50	7.61	8.81	10.73	16.33	18.07	18.07	18.07	18.27	18.51	18.58	18.58
100	2.36	3.63	4.98	6.83	7.90	9.65	14.64	16.19	16.20	16.20	16.37	16.58	16.64	16.64
200	2.21	3.40	4.79	6.43	7.40	9.09	13.69	15.19	15.21	15.21	15.30	15.51	15.57	15.57
500	2.04	2.93	4.43	5.50	6.33	7.91	11.32	12.69	12.69	12.69	12.86	12.89	13.06	13.06
1,000	1.85	2.65	3.89	4.58	5.40	6.71	9.45	10.53	10.53	10.53	10.60	10.63	10.89	10.89
5,000	0.94	1.48	2.38	2.76	3.18	3.91	5.18	5.63	5.63	5.63	5.67	5.68	6.32	6.32




Mass Curve - Storm #1034 - October 9 - 12, 1973
Enid, Oklahoma
Storm Center
S 0km BOGGY CREEK
S 2.55km ENID
D 26.2km GARBER
D 31.36km HENNESSEY
H 31.77km AMES
HP GREAT SALT PLAINS
HP CALDWELL
Accumulated Precipitation (inches)
Time (hours)

Louisville, MS April 12, 1979
Transpositioned Grid Points: 1-10
Storm Type: Synoptic/Convective

Storm Name:	**SPAS 1227 Louisville, MS**
Storm Date:	**4/11-15/1979**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 1

Temporal Transposition Date **25-Apr**

	Lat	Long
Storm center location	**33.12 N**	**89.05 W**
Storm Rep dew point location	**30.27 N**	**91.54 W**
Transposition dewpoint location	**35.15 N**	**87.99 W**
Grid point location	**38.00 N**	**85.50 W**

Moisture Inflow Direction:	**SW @ 250**	miles
Grid Point Elevation	**600**	feet
Storm Elevation	**600**	feet
Storm Duration	**24**	hours

The storm representative dew point is	**72.0 F**	with total precipitable water above sea level of				**2.47**	inches.
The in-place maximum dew point is	**75.0 F**	with total precipitable water above sea level of				**2.85**	inches.
The transpositioned maximum dew point is	**71.5 F**	with total precipitable water above sea level of				**2.42**	inches.
The in-place storm elevation is	**600**	which subtracts	**0.140**	inches of precipitable water at		**72.0 F**	
The in-place storm elevation is	**600**	which subtracts	**0.150**	inches of precipitable water at		**75.0 F**	
The transposition basin elevation at	**600**	which subtracts	**0.140**	inches of precipitable water at		**71.5 F**	
The inflow barrier/basin elevation height is	**600**	which subtracts	**0.140**	inches of precipitable water at		**71.5 F**	

The in-place storm maximization factor is	**1.16**
The transposition/elevation to basin factor is	**0.84**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**0.98**

Notes: DAD values taken from SPAS 1227. Storm representative dew point value was based on maximum 24-hr Td values between April 11-12, 1979 at KLFT and KBTR.

Observed Storm Depth-Area-Duration

	1 Hours	3 Hours	6 Hours	12 Hours	18 Hours	24 Hours	36 Hours	48 Hours	72 Hours
1 sq miles	**4.3**	**7.3**	**9.0**	**13.0**	**16.9**	**19.5**	**21.4**	**21.5**	**21.5**
10 sq miles	**4.3**	**7.3**	**9.0**	**13.0**	**16.9**	**18.6**	**21.3**	**21.3**	**21.3**
100 sq miles	**3.6**	**6.7**	**8.5**	**12.4**	**16.4**	**18.2**	**19.6**	**19.6**	**19.8**
200 sq miles	**3.3**	**6.3**	**8.1**	**11.8**	**15.5**	**17.5**	**18.9**	**19.0**	**19.1**
500 sq miles	**3.0**	**5.5**	**7.1**	**10.2**	**14.2**	**15.9**	**17.8**	**17.8**	**17.8**
1000 sq miles	**2.6**	**4.8**	**6.3**	**8.6**	**12.8**	**14.1**	**16.3**	**16.3**	**16.6**
2000 sq miles	**2.3**	**4.0**	**5.5**	**8.1**	**11.2**	**12.7**	**15.3**	**15.4**	**15.4**
5000 sq miles	**1.8**	**3.2**	**4.2**	**6.2**	**8.8**	**10.8**	**12.3**	**12.3**	**13.5**
10000 sq miles	**1.3**	**2.3**	**3.1**	**4.8**	**6.8**	**8.6**	**10.5**	**10.5**	**11.6**
20000 sq miles	**0.6**	**1.3**	**2.2**	**3.8**	**5.2**	**6.8**	**8.4**	**8.6**	**9.4**

Adjusted Storm Depth-Area-Duration

	1 Hours	3 Hours	6 Hours	12 Hours	18 Hours	24 Hours	36 Hours	48 Hours	72 Hours
1 sq miles	**4.2**	**7.1**	**8.8**	**12.7**	**16.5**	**19.0**	**20.9**	**21.0**	**21.0**
10 sq miles	**4.2**	**7.1**	**8.8**	**12.7**	**16.5**	**18.2**	**20.8**	**20.8**	**20.8**
100 sq miles	**3.6**	**6.5**	**8.3**	**12.1**	**16.1**	**17.8**	**19.1**	**19.1**	**19.3**
200 sq miles	**3.2**	**6.1**	**7.9**	**11.5**	**15.1**	**17.1**	**18.5**	**18.5**	**18.6**
500 sq miles	**2.9**	**5.4**	**6.9**	**10.0**	**13.9**	**15.6**	**17.4**	**17.4**	**17.4**
1000 sq miles	**2.5**	**4.7**	**6.1**	**8.4**	**12.5**	**13.7**	**15.9**	**15.9**	**16.2**
2000 sq miles	**2.2**	**3.9**	**5.4**	**7.9**	**10.9**	**12.4**	**14.9**	**15.0**	**15.0**
5000 sq miles	**1.7**	**3.1**	**4.1**	**6.0**	**8.5**	**10.5**	**12.0**	**12.0**	**13.1**
10000 sq miles	**1.3**	**2.3**	**3.0**	**4.7**	**6.6**	**8.4**	**10.2**	**10.2**	**11.3**
20000 sq miles	**0.6**	**1.3**	**2.2**	**3.7**	**5.0**	**6.6**	**8.2**	**8.4**	**9.2**

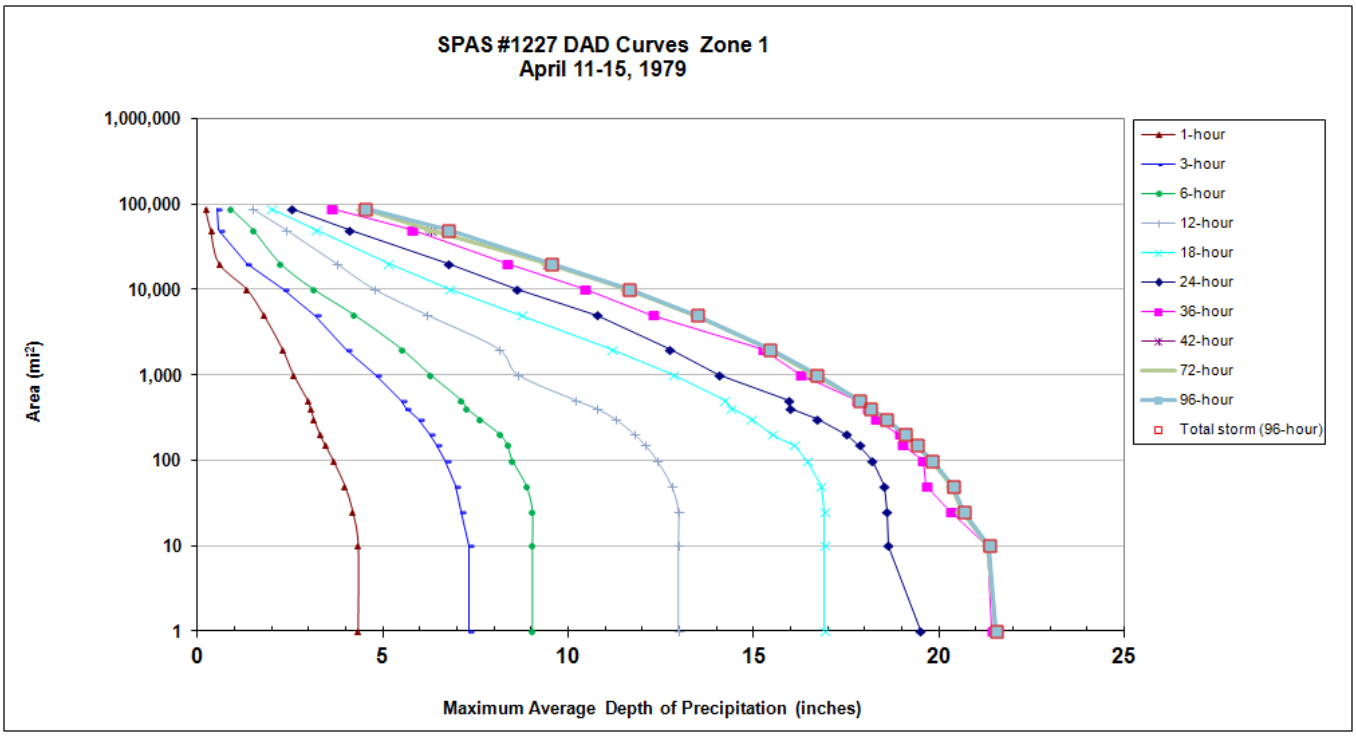
Storm or Storm Center Name	**SPAS 1227 Louisville, MS**	
Storm Date(s)	4/11-15/1979	
Storm Type	Synoptic	
Storm Location	33.12 N	89.05 W
Storm Center Elevation	600	
Precipitation Total & Duration	22.07 Inches 48-hours	
Storm Representative Dewpoint	72.0 F	24
Storm Representative Dewpoint Location	30.27 N	91.54 W
Maximum Dewpoint	75.0 F	
Moisture Inflow Vector	SW @ 250	
In-place Maximization Factor	**1.16**	
Temporal Transposition (Date)	25-Apr	
Transposition Dewpoint Location	35.15 N	87.99 W
Transposition Maximum Dewpoint	71.5 F	
Transposition Adjustment Factor	**0.84**	
Grid Point Elevation	600	
Inflow Barrier Height	600	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**0.98**	

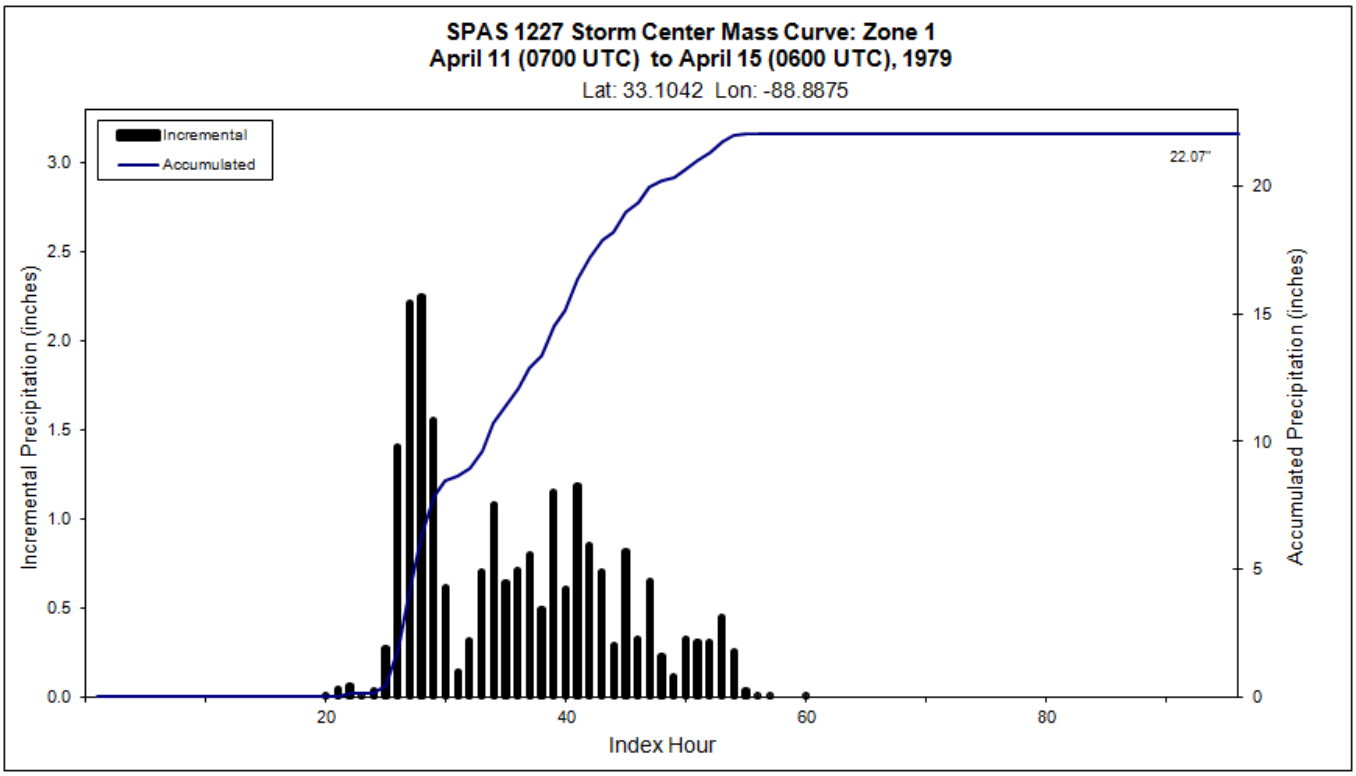
Louisville, MS April 12, 1979 Moisture Inflow Analysis

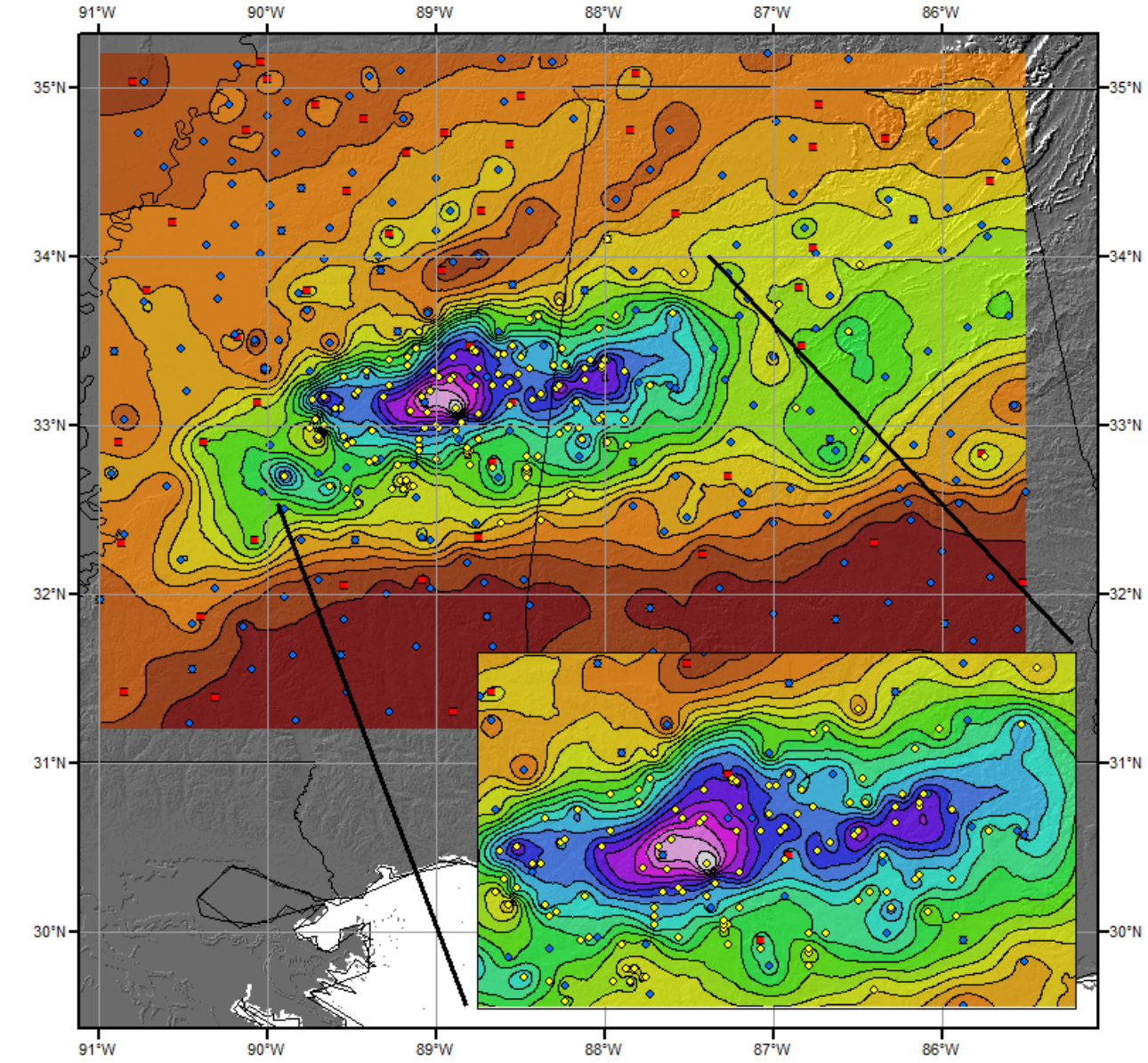
Storm 1227 - April 11 (0700 UTC) - April 15 (0600 UTC), 1979

MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

	Duration (hours)										
Area (mi^2)	1	3	6	12	18	24	36	48	72	96	Total
0.3	4.42	7.51	9.32	13.37	17.46	20.06	22.05	22.07	22.07	22.07	22.07
1	4.32	7.32	9.02	12.98	16.92	19.5	21.44	21.53	21.53	21.53	21.53
10	4.32	7.32	9.02	12.98	16.92	18.63	21.32	21.32	21.32	21.35	21.35
25	4.17	7.1	9.02	12.98	16.92	18.59	20.32	20.32	20.62	20.68	20.68
50	3.96	6.96	8.85	12.79	16.83	18.52	19.65	19.65	20.35	20.39	20.39
100	3.64	6.68	8.47	12.39	16.44	18.2	19.57	19.61	19.8	19.82	19.82
150	3.43	6.44	8.34	12.07	16.1	17.85	19.03	19.04	19.37	19.4	19.40
200	3.29	6.26	8.13	11.78	15.51	17.51	18.93	18.97	19.08	19.09	19.09
300	3.13	5.95	7.61	11.28	14.94	16.71	18.29	18.58	18.58	18.6	18.60
400	3.04	5.62	7.25	10.76	14.4	15.97	18.09	18.14	18.14	18.14	18.14
500	2.96	5.49	7.1	10.2	14.22	15.93	17.78	17.79	17.84	17.86	17.86
1,000	2.58	4.8	6.26	8.64	12.82	14.06	16.27	16.31	16.6	16.71	16.71
2,000	2.28	4	5.48	8.12	11.16	12.74	15.25	15.37	15.41	15.45	15.45
5,000	1.78	3.18	4.21	6.19	8.75	10.78	12.28	12.28	13.45	13.47	13.47
10,000	1.32	2.31	3.11	4.77	6.79	8.59	10.45	10.49	11.56	11.63	11.63
20,000	0.58	1.31	2.22	3.75	5.15	6.76	8.35	8.57	9.42	9.53	9.53
50,000	0.35	0.58	1.47	2.38	3.2	4.1	5.8	5.95	6.29	6.78	6.78
87,823	0.21	0.52	0.88	1.48	1.98	2.52	3.62	4.18	4.45	4.53	4.53




SPAS 1227 Storm Center Mass Curve: Zone 1
April 11 (0700 UTC) to April 15 (0600 UTC), 1979
Lat: 33.1042 Lon: -88.8875
Incremental
Accumulated
22.07"
Incremental Precipitation (inches)
Accumulated Precipitation (inches)
Index Hour
0.0
0.5
1.0
1.5
2.0
2.5
3.0
0
5
10
15
20
20
40
60
80



Total Precipitation (96-hours)
SPAS 1227 - Louisville, MS
4/11/1979 0700 UTC - 4/15/1979 0600 UTC

Gauges

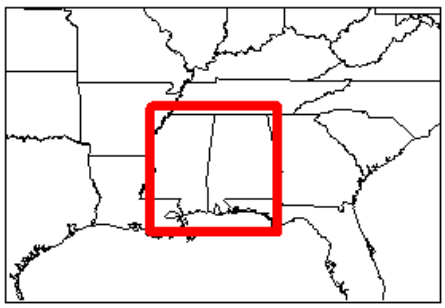
- Daily
- Hourly
- Hourly Pseudo
- Supplemental

Precipitation (inches)

0.04 - 1.00	6.01 - 7.00	12.01 - 13.00	18.01 - 19.00
1.01 - 2.00	7.01 - 8.00	13.01 - 14.00	19.01 - 20.00
2.01 - 3.00	8.01 - 9.00	14.01 - 15.00	> 20.00
3.01 - 4.00	9.01 - 10.00	15.01 - 16.00	
4.01 - 5.00	10.01 - 11.00	16.01 - 17.00	
5.01 - 6.00	11.01 - 12.00	17.01 - 18.00	

Miles: 0 20 40 80

Kilometers: 0 50 100 200



12/06/2011

Clyde, TX October 12, 1981
Transpositioned Grid Points: None
Storm Type: Synoptic/Convective

Storm Name:	**SPAS 1184-Clyde, TX**
Storm Date:	**10/10-14/1981**
AWA Analysis Date:	**10/12/2012**

Storm Adjustment for Ohio-In Place Only

Temporal Transposition Date 25-Sep

	Lat	Long
Storm center location	**32.48 N**	**99.48 W**
Storm Rep Td location	**29.50 N**	**97.00 W**
Transposition Td location	**XXXX**	**XXXX**
Basin location	**XXXX**	**XXXX**

Moisture Inflow Direction:	**SE @ 250**	miles
Basin Elevation	**0**	feet
Storm Elevation	**1,900**	feet
Storm Duration	**24**	hours

The storm representative Td is	**76.0 F**	with total precipitable water above sea level of				**2.99**	inches.
The in-place maximum Td is	**77.5 F**	with total precipitable water above sea level of				**3.22**	inches.
The transpositioned maximum Td is	**XX**	with total precipitable water above sea level of				**3.14**	inches.
The in-place storm elevation is	**1,900**	which subtracts	**0.46**	inches of precipitable water at		**76.0 F**	
The in-place storm elevation is	**1,900**	which subtracts	**0.50**	inches of precipitable water at		**77.5 F**	
The transposition storm elevation at	**XXXX**	which subtracts	**XX**	inches of precipitable water at		**Xx**	
Higher of moisture inflow barrier/basin height is	**XXXx**	which subtracts	**XX**	inches of precipitable water at		**XX**	

The in-place maximization factor is	**1.08**
The transposition factor is	**#VALUE!**
The elevation/barrier adjustment factor is	**#VALUE!**
The total adjustment factor is	**#VALUE!**

Notes:

Observed Storm Depth-Area-Duration

	1 Hours	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**3.9**	**10.1**	**14.2**	-	**18.1**	-	**21.7**	**22.3**	-	**22.4**
10 sq miles	**3.9**	**10.1**	**14.2**	-	**18.1**	-	**21.7**	**22.3**	-	**22.4**
100 sq miles	**3.4**	**8.8**	**12.5**	-	**15.7**	-	**19.5**	**20.4**	-	**20.6**
200 sq miles	**3.2**	**7.8**	**11.5**	-	**14.6**	-	**18.6**	**19.6**	-	**19.8**
500 sq miles	**2.5**	**6.7**	**9.9**	-	**13.0**	-	**16.7**	**17.8**	-	**17.9**
1000 sq miles	**2.2**	**5.7**	**9.2**	-	**12.5**	-	**15.5**	**17.1**	-	**17.5**
2000 sq miles	**2.1**	**5.0**	**8.4**	-	**10.9**	-	**14.2**	**15.8**	-	**16.7**
5000 sq miles	**1.5**	**4.1**	**7.0**	-	**9.4**	-	**13.0**	**14.4**	-	**14.8**
10000 sq miles	**1.2**	**3.5**	**5.9**	-	**8.1**	-	**11.5**	**13.0**	-	**13.3**
20000 sq miles	**0.5**	**2.6**	**4.7**	-	**6.8**	-	**9.2**	**10.6**	-	**11.0**

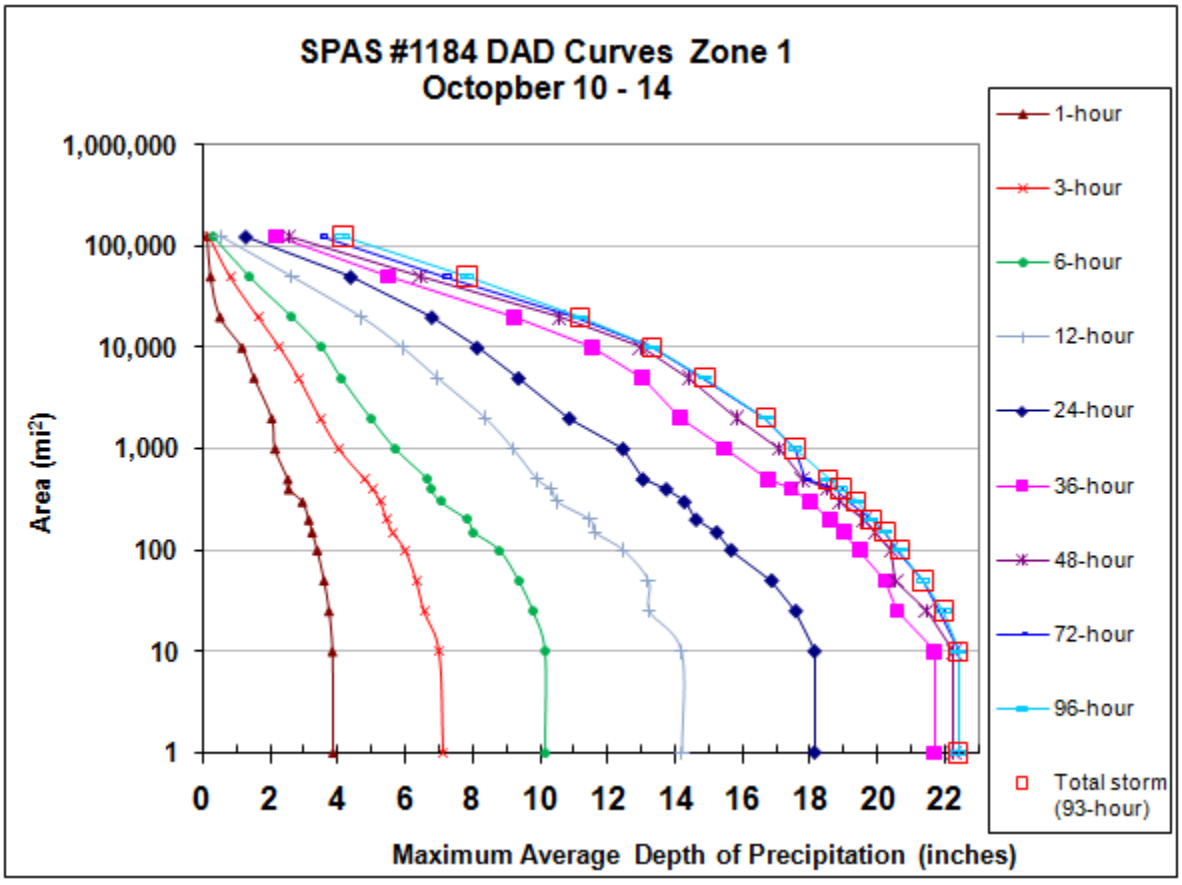
Adjusted Storm Depth-Area-Duration

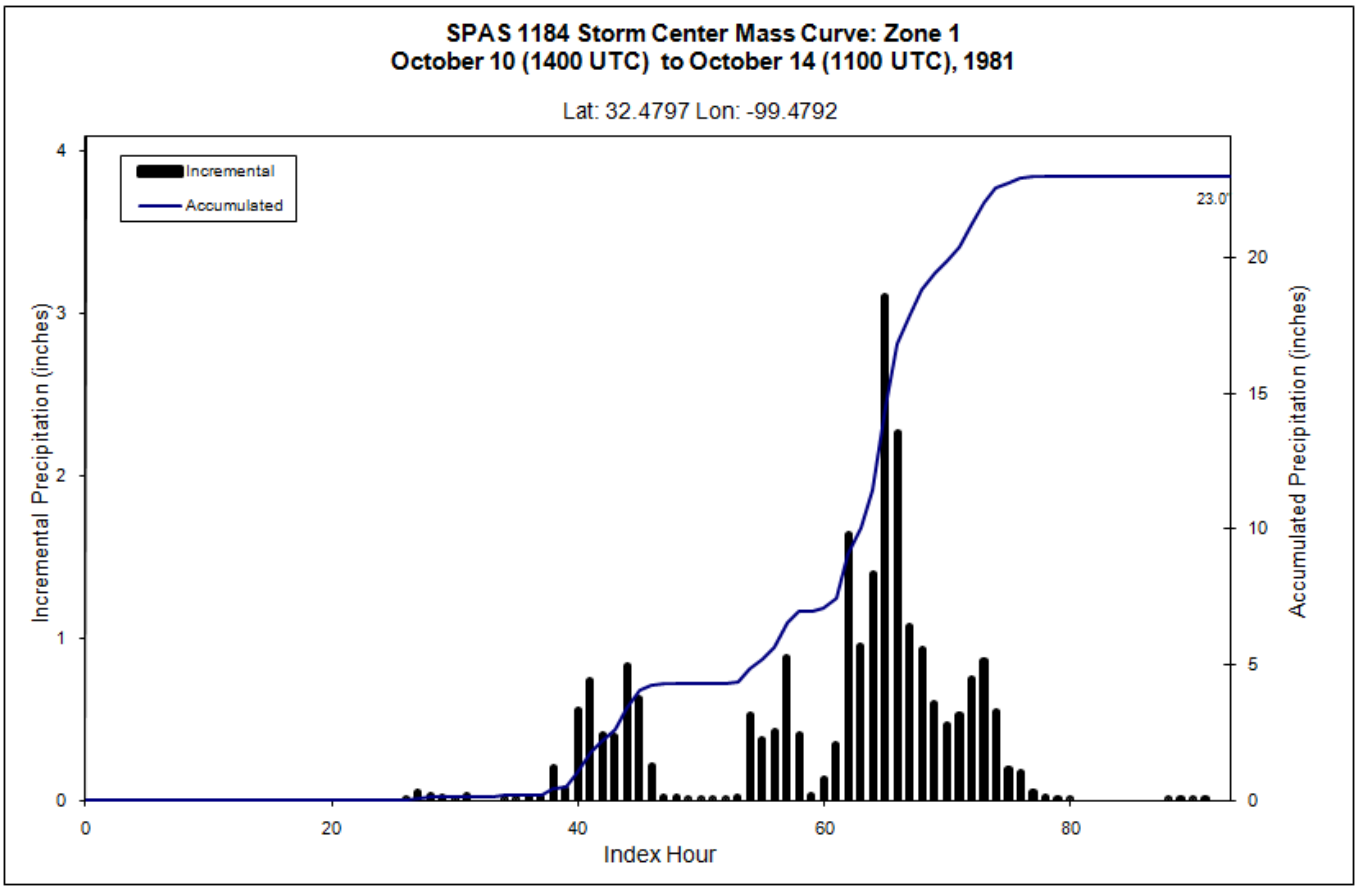
	1 Hours	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	-	**#VALUE!**	-	**#VALUE!**	**#VALUE!**	-	**#VALUE!**
10 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	-	**#VALUE!**	-	**#VALUE!**	**#VALUE!**	-	**#VALUE!**
100 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	-	**#VALUE!**	-	**#VALUE!**	**#VALUE!**	-	**#VALUE!**
200 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	-	**#VALUE!**	-	**#VALUE!**	**#VALUE!**	-	**#VALUE!**
500 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	-	**#VALUE!**	-	**#VALUE!**	**#VALUE!**	-	**#VALUE!**
1000 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	-	**#VALUE!**	-	**#VALUE!**	**#VALUE!**	-	**#VALUE!**
2000 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	-	**#VALUE!**	-	**#VALUE!**	**#VALUE!**	-	**#VALUE!**
5000 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	-	**#VALUE!**	-	**#VALUE!**	**#VALUE!**	-	**#VALUE!**
10000 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	-	**#VALUE!**	-	**#VALUE!**	**#VALUE!**	-	**#VALUE!**
20000 sq miles	**#VALUE!**	**#VALUE!**	**#VALUE!**	-	**#VALUE!**	-	**#VALUE!**	**#VALUE!**	-	**#VALUE!**

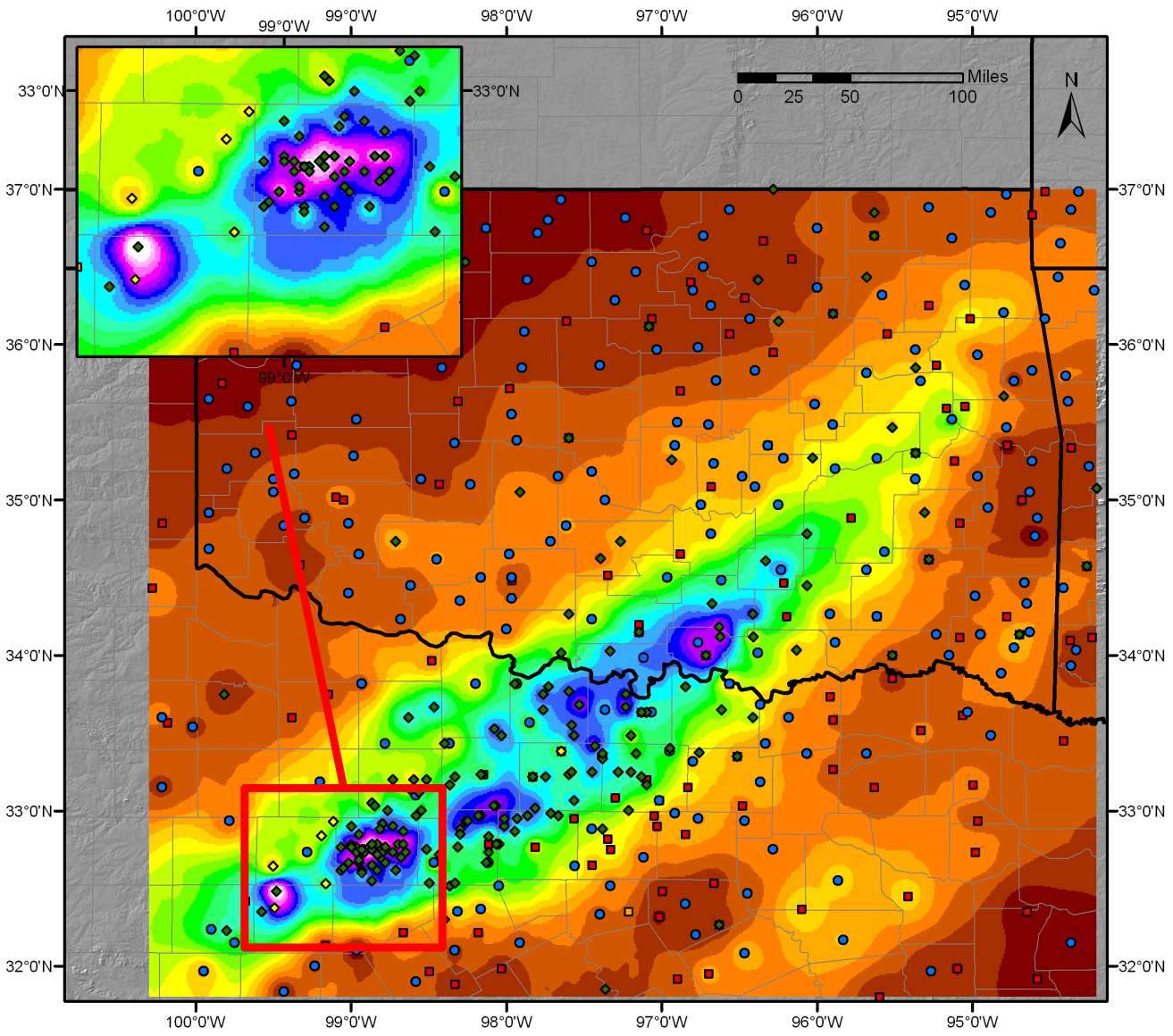
Storm or Storm Center Name	**SPAS 1184-Clyde, TX**			
Storm Date(s)	10/10-14/1981			
Storm Type	General Storm			
Storm Location	32.48 N	99.48 W		
Storm Center Elevation	1900			
Precipitation Total & Duration (10 sq mi)	23.23 inches in 93hrs, 22.4 inches in 72hrs			
Storm Representative Td	76.0 F			
Storm Representative Td Location	29.50 N	97.00 W	S	O
In-place Maximum Td	77.5 F		77.5	77
Moisture Inflow Vector	SE @ 250			
In-place Maximization Factor				
Temporal Transposition (Date)	25-Sep			
Transposition Dewpoint Location	XX	XX		
Transposition Maximum Td	XX			
Transposition Adjustment Factor				
Average Basin Elevation				
Highest Elevation in Basin				
Inflow Barrier Height				
Elevation Adjustment Factor				
Total Adjustment Factor	**#VALUE!**			

Storm 1184 - October 10 (1400 UTC) to October 14 (1100 UTC), 1981
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

	Duration (hours)									
Area (mi^2)	1	3	6	12	24	36	48	72	93	Total
0.30	3.97	7.32	10.44	14.56	18.64	22.27	22.88	23.00	23.00	23.00
1	3.87	7.14	10.14	14.19	18.13	21.69	22.26	22.39	22.39	22.39
10	3.85	7.02	10.14	14.18	18.13	21.69	22.26	22.39	22.39	22.39
25	3.75	6.57	9.78	13.23	17.58	20.59	21.45	21.81	21.96	21.96
50	3.60	6.34	9.36	13.20	16.86	20.24	20.54	21.34	21.36	21.36
100	3.40	6.01	8.79	12.46	15.66	19.48	20.40	20.60	20.66	20.66
150	3.25	5.64	8.04	11.62	15.23	19.00	19.93	20.22	20.22	20.22
200	3.15	5.46	7.83	11.47	14.62	18.59	19.60	19.81	19.81	19.81
300	2.96	5.28	7.05	10.50	14.27	18.00	18.89	19.08	19.37	19.37
400	2.55	5.04	6.75	10.32	13.73	17.43	18.51	18.76	18.93	18.93
500	2.53	4.81	6.66	9.90	13.04	16.74	17.78	17.86	18.55	18.55
1,000	2.15	4.04	5.71	9.19	12.45	15.47	17.08	17.53	17.56	17.56
2,000	2.05	3.49	4.98	8.37	10.86	14.16	15.83	16.65	16.69	16.69
5,000	1.53	2.85	4.10	6.95	9.35	13.03	14.42	14.83	14.89	14.89
10,000	1.17	2.29	3.52	5.91	8.12	11.53	12.97	13.28	13.31	13.31
20,000	0.52	1.64	2.64	4.69	6.78	9.21	10.56	11.00	11.17	11.17
50,000	0.24	0.81	1.38	2.64	4.37	5.50	6.45	7.14	7.83	7.83
124,876	0.14	0.19	0.30	0.53	1.26	2.18	2.56	3.48	4.14	4.15



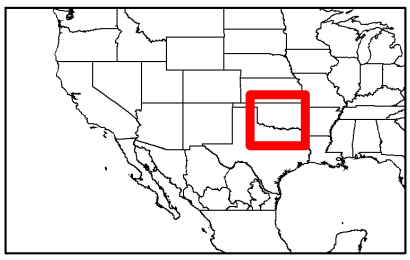

SPAS 1184 Storm Center Mass Curve: Zone 1
October 10 (1400 UTC) to October 14 (1100 UTC), 1981
Lat: 32.4797 Lon: -99.4792
Incremental
Accumulated
23.0
Incremental Precipitation (inches)
Accumulated Precipitation (inches)
Index Hour
0
1
2
3
4
0
5
10
15
20
0
20
40
60
80



Total Precipitation (inches)
SPAS storm number: 1184 - Breckenridge, TX
Lat/Lon box: 37.0 -100.3 31.8 -94.2
October 10 1400 UTC - October 14, 1981 1100 UTC (CPP: 93 hours)

Precipitation (inches)

0.00 - 1.00	8.01 - 9.00	16.01 - 17.00	Daily
1.01 - 2.00	9.01 - 10.00	17.01 - 18.00	Houly
2.01 - 3.00	10.01 - 11.00	18.01 - 19.00	Hourly estimated pseudo
3.01 - 4.00	11.01 - 12.00	19.01 - 20.00	Hourly pseudo
4.01 - 5.00	12.01 - 13.00	20.01 - 21.00	Supplemental
5.01 - 6.00	13.01 - 14.00	21.01 - 22.00	Supplemental estimated
6.01 - 7.00	14.01 - 15.00		
7.01 - 8.00	15.01 - 16.00		



Metstat/AWA May 13, 2010

Big Fork, AR December 1, 1982
Transpositioned Grid Points: All
Storm Type: Synoptic

Storm Name:	**Big Fork, AR SPAS 1219**
Storm Date:	**Dec 1-5, 1982**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date	**15-Nov**	
	Lat	**Long**
Storm center location	**35.87 N**	**92.12 W**
Storm Rep dew point location	**30.00 N**	**93.68 W**
Transposition dewpoint location	**35.13 N**	**83.56 W**
Grid point location	**41.00 N**	**82.00 W**

Moisture Inflow Direction:	**SSW @ 415**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**800**	feet
Storm Duration	**24**	hours

The storm representative dew point is	**72.0 F**	with total precipitable water above sea level of				**2.47**	inches.
The in-place maximum dew point is	**73.0 F**	with total precipitable water above sea level of				**2.60**	inches.
The transpositioned maximum dew point is	**69.0 F**	with total precipitable water above sea level of				**2.14**	inches.
The in-place storm elevation is	**800**	which subtracts	**0.18**	inches of precipitable water at		**72.0 F**	
The in-place storm elevation is	**800**	which subtracts	**0.18**	inches of precipitable water at		**73.0 F**	
The transposition basin elevation at	**900**	which subtracts	**0.19**	inches of precipitable water at		**69.0 F**	
The inflow barrier/basin elevation height is	**900**	which subtracts	**0.19**	inches of precipitable water at		**69.0 F**	

The in-place storm maximization factor is	**1.06**
The transposition/elevation to basin factor is	**0.81**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**0.85**

Notes: Storm representative dew point value was based on maximum 24-hr Td values between Dec. 2-3, 1982 at KLCH, KBPT, KLFT, and KPOE. These stations did not have any rainfall during this maximum 24-hr period.

Observed Storm Depth-Area-Duration

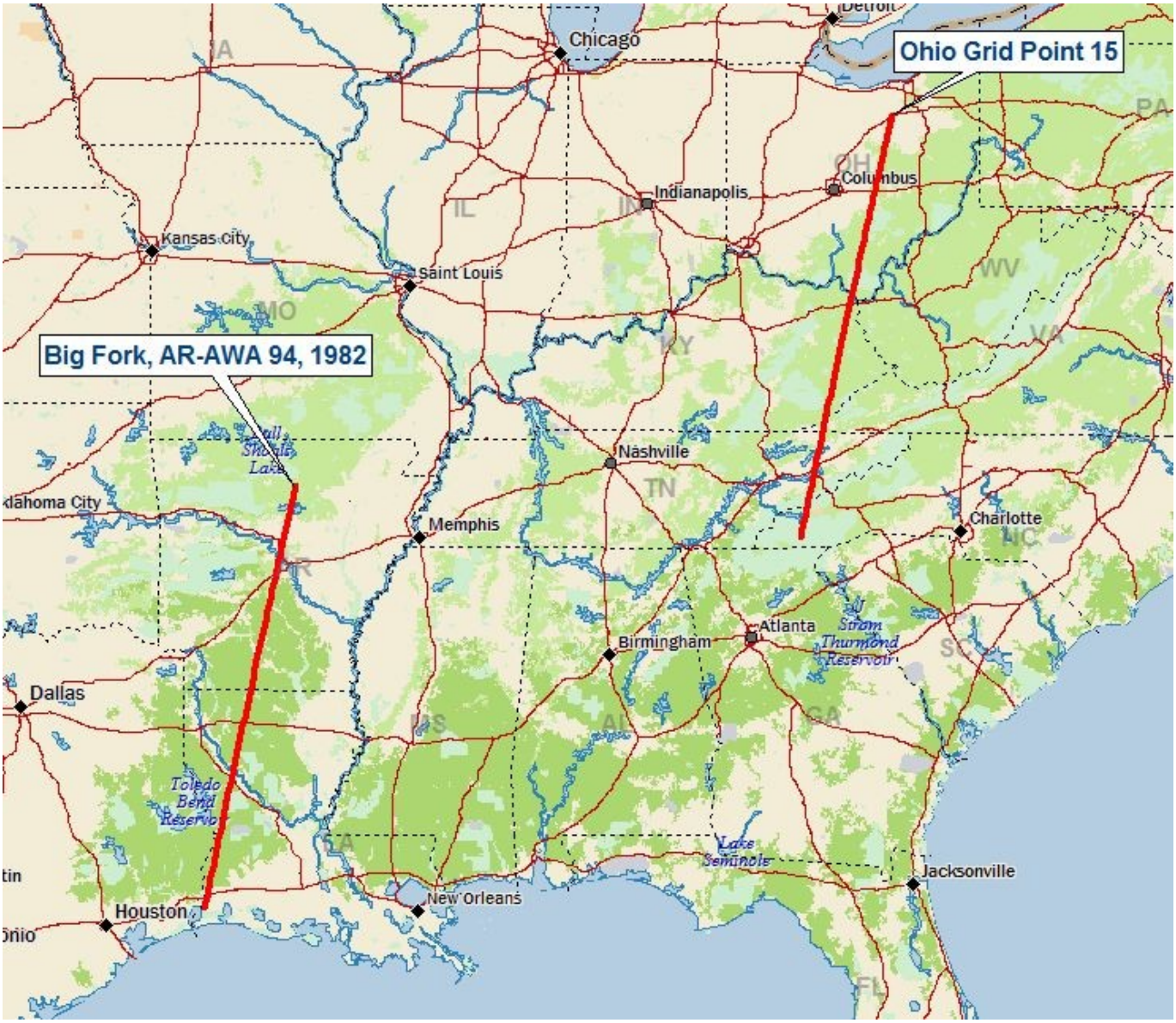
	1 Hours	3 Hours	6 Hours	12 Hours	18 Hours	24 Hours	36 Hours	48 Hours	72 Hours
1 sq miles	**2.4**	**5.2**	**6.6**	**9.7**	**13.1**	**14.2**	**14.7**	**15.1**	**15.5**
10 sq miles	**2.3**	**5.2**	**6.6**	**9.7**	**13.1**	**14.2**	**14.7**	**15.1**	**15.5**
100 sq miles	**2.1**	**4.8**	**6.0**	**9.0**	**12.1**	**13.7**	**14.4**	**14.7**	**15.0**
200 sq miles	**2.0**	**4.4**	**5.8**	**8.6**	**12.0**	**13.2**	**14.1**	**14.1**	**14.5**
500 sq miles	**1.7**	**3.9**	**5.5**	**8.3**	**11.4**	**12.6**	**13.6**	**13.8**	**14.2**
1000 sq miles	**1.5**	**3.2**	**5.1**	**7.7**	**10.9**	**12.2**	**12.9**	**13.3**	**13.6**
2000 sq miles	**1.4**	**3.1**	**4.7**	**7.3**	**10.4**	**11.8**	**12.5**	**12.7**	**13.0**
5000 sq miles	**1.1**	**2.5**	**4.0**	**6.6**	**9.5**	**10.8**	**11.7**	**11.9**	**12.1**
10000 sq miles	**0.9**	**2.0**	**3.5**	**5.8**	**8.4**	**9.6**	**10.8**	**10.9**	**11.2**
20000 sq miles	**0.8**	**1.7**	**2.8**	**4.7**	**6.9**	**8.1**	**9.2**	**9.7**	**10.0**

Adjusted Storm Depth-Area-Duration

	1 Hours	3 Hours	6 Hours	12 Hours	18 Hours	24 Hours	36 Hours	48 Hours	72 Hours
1 sq miles	**2.0**	**4.4**	**5.6**	**8.3**	**11.1**	**12.0**	**12.5**	**12.8**	**13.2**
10 sq miles	**2.0**	**4.4**	**5.6**	**8.3**	**11.1**	**12.0**	**12.5**	**12.8**	**13.2**
100 sq miles	**1.8**	**4.0**	**5.1**	**7.7**	**10.3**	**11.6**	**12.3**	**12.5**	**12.8**
200 sq miles	**1.7**	**3.7**	**4.9**	**7.3**	**10.2**	**11.2**	**12.0**	**12.0**	**12.3**
500 sq miles	**1.5**	**3.3**	**4.6**	**7.1**	**9.7**	**10.7**	**11.5**	**11.8**	**12.0**
1000 sq miles	**1.3**	**2.7**	**4.3**	**6.6**	**9.3**	**10.4**	**11.0**	**11.3**	**11.6**
2000 sq miles	**1.2**	**2.6**	**4.0**	**6.3**	**8.8**	**10.0**	**10.7**	**10.8**	**11.1**
5000 sq miles	**0.9**	**2.1**	**3.4**	**5.6**	**8.1**	**9.2**	**9.9**	**10.1**	**10.3**
10000 sq miles	**0.8**	**1.7**	**2.9**	**5.0**	**7.1**	**8.2**	**9.2**	**9.3**	**9.6**
20000 sq miles	**0.6**	**1.5**	**2.4**	**4.0**	**5.9**	**6.9**	**7.9**	**8.3**	**8.5**

Storm or Storm Center Name	**Big Fork, AR SPAS 1219**		
Storm Date(s)	Dec 1-5, 1982		
Storm Type	Synoptic		
Storm Location	35.87 N	92.12 W	
Storm Center Elevation	800		
Precipitation Total & Duration	15.45 Inches	72-hours	
Storm Representative Dewpoint	72.0 F	24	
Storm Representative Dewpoint Location	30.00 N	93.68 W	Nov
Maximum Dewpoint	73.0 F		73
Moisture Inflow Vector	SSW @ 415	Miles	
In-place Maximization Factor	**1.06**		
Temporal Transposition (Date)	15-Nov		
Transposition Dewpoint Location	35.13 N	83.56 W	
Transposition Maximum Dewpoint	69.0 F		
Transposition Adjustment Factor	**0.81**		
Grid Point Elevation	900		
Inflow Barrier Height	900		
Elevation Adjustment Factor	**1.00**		
Total Adjustment Factor	**0.85**		

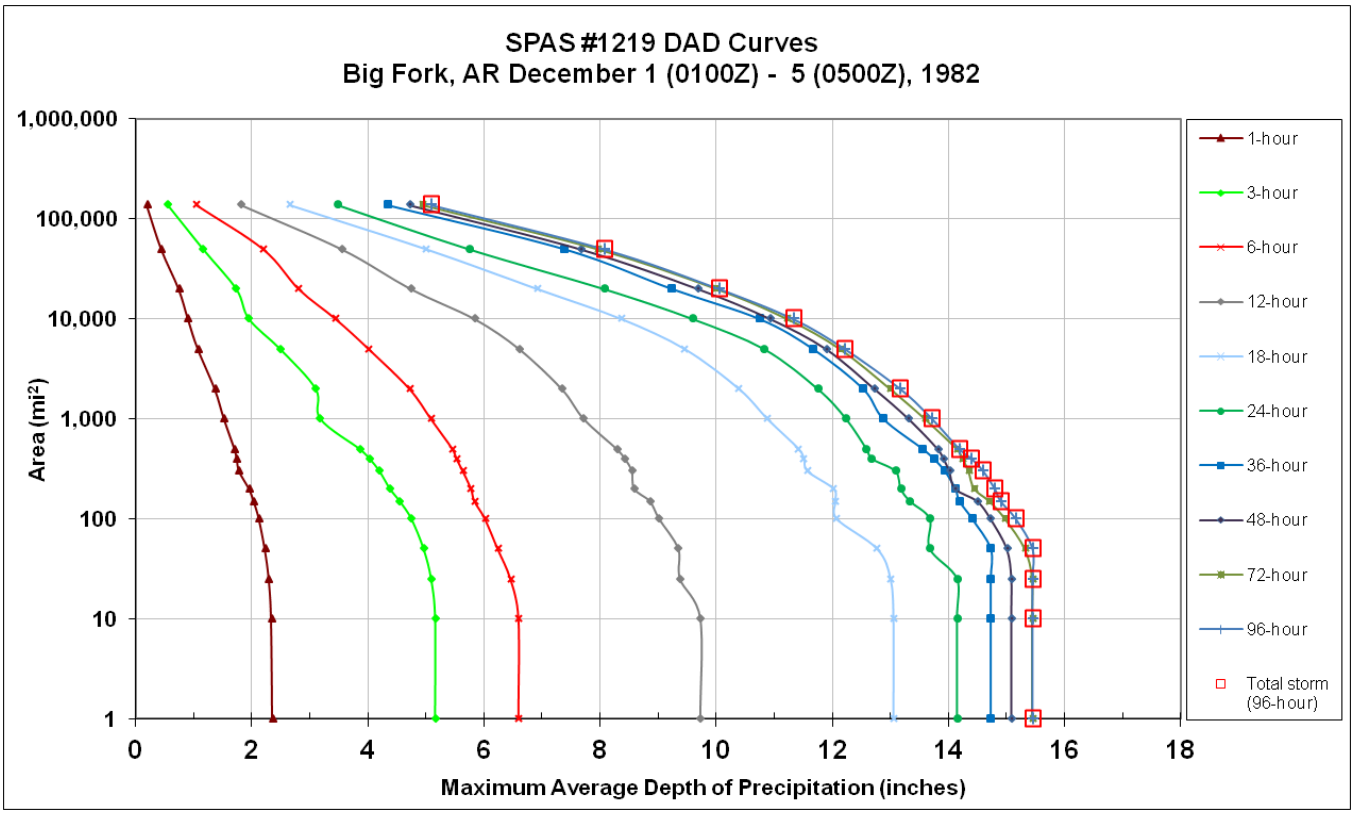
Big Fork, AR December 1, 1982 Moisture Inflow Analysis

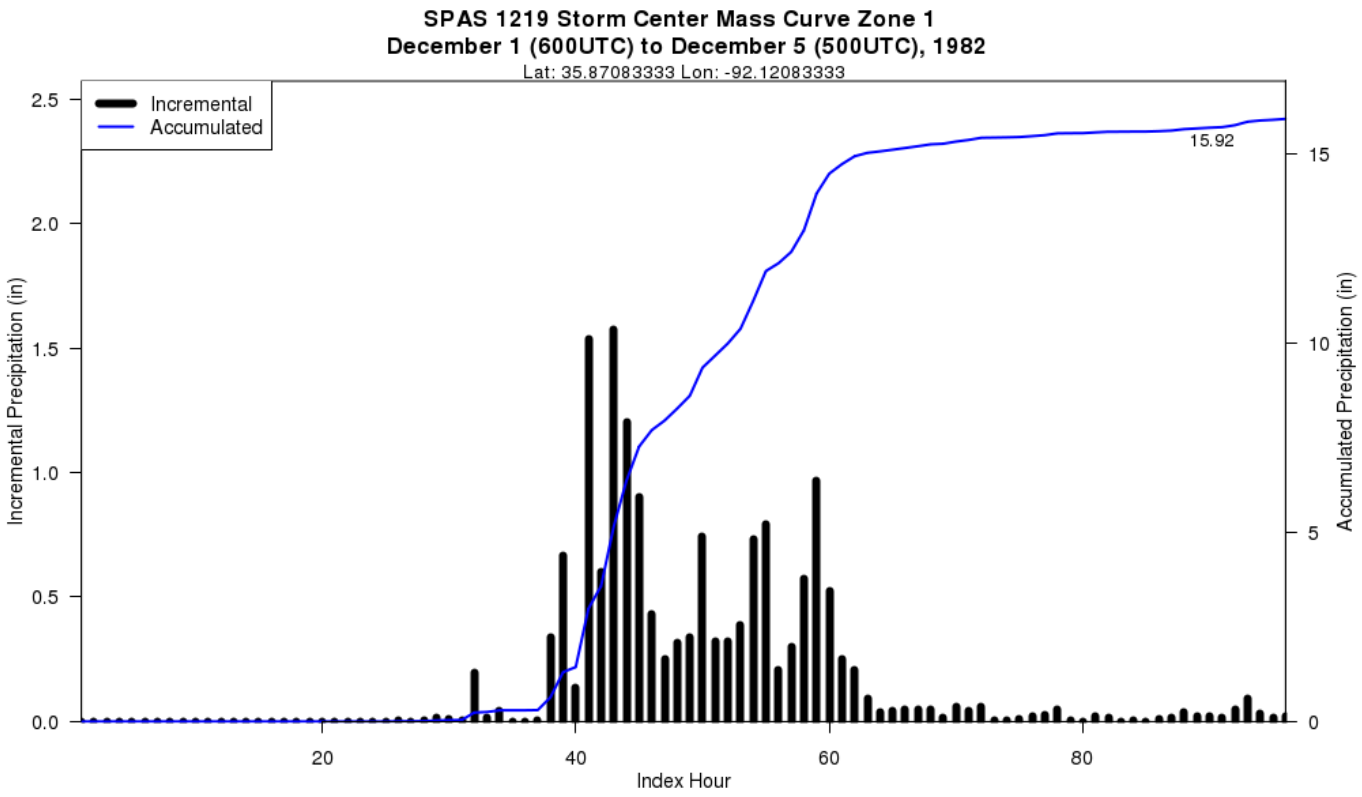


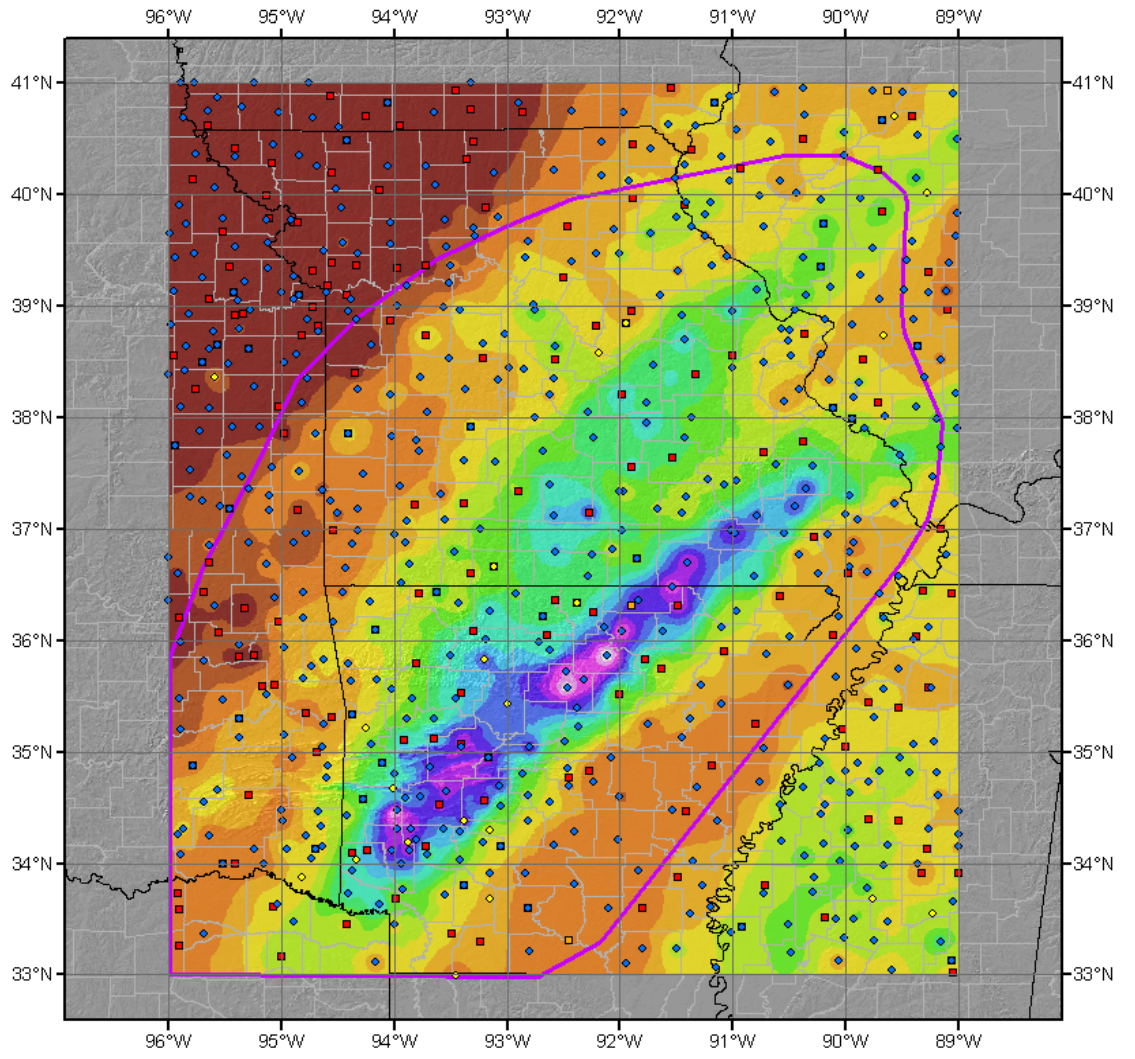
Storm 1219 - Big Fork, AR December 1 (0100Z) - 5 (0500Z), 1982

MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

Area (mi^2)	Duration (hours)										
	1	3	6	12	18	24	36	48	72	96	total
0.3	2.41	5.36	6.75	10.00	13.44	14.58	15.16	15.51	15.92	15.92	15.92
1	2.36	5.16	6.60	9.73	13.05	14.15	14.73	15.09	15.45	15.45	15.45
10	2.34	5.16	6.60	9.73	13.05	14.15	14.73	15.09	15.45	15.45	15.45
25	2.30	5.09	6.46	9.38	13.00	14.15	14.73	15.09	15.45	15.45	15.45
50	2.23	4.96	6.24	9.35	12.77	13.68	14.73	15.01	15.32	15.45	15.45
100	2.13	4.75	6.02	9.02	12.07	13.68	14.41	14.73	14.98	15.16	15.16
150	2.04	4.55	5.84	8.86	12.05	13.34	14.19	14.50	14.71	14.90	14.90
200	1.96	4.38	5.78	8.59	12.02	13.18	14.12	14.12	14.45	14.80	14.80
300	1.79	4.20	5.64	8.55	11.57	13.09	13.94	14.02	14.35	14.60	14.60
400	1.75	4.03	5.53	8.43	11.51	12.68	13.75	13.92	14.25	14.40	14.40
500	1.71	3.86	5.46	8.29	11.42	12.59	13.56	13.82	14.15	14.19	14.19
1,000	1.53	3.18	5.09	7.72	10.88	12.24	12.88	13.32	13.60	13.72	13.72
2,000	1.37	3.10	4.72	7.34	10.39	11.75	12.53	12.73	13.00	13.17	13.17
5,000	1.08	2.49	4.02	6.61	9.46	10.83	11.67	11.90	12.14	12.22	12.22
10,000	0.91	1.95	3.45	5.84	8.37	9.60	10.75	10.94	11.23	11.33	11.33
20,000	0.75	1.73	2.81	4.74	6.92	8.07	9.24	9.69	10.01	10.05	10.05
50,000	0.45	1.16	2.20	3.55	5.01	5.75	7.39	7.67	7.97	8.07	8.07
138,276	0.20	0.55	1.05	1.82	2.66	3.49	4.34	4.72	4.95	5.10	5.10




SPAS 1219 Storm Center Mass Curve Zone 1
December 1 (600UTC) to December 5 (500UTC), 1982
Lat: 35.87083333 Lon: -92.12083333
Incremental
Accumulated
15.92
Incremental Precipitation (in)
Accumulated Precipitation (in)
Index Hour
0.0
0.5
1.0
1.5
2.0
2.5
0
5
10
15
20
40
60
80



Total Precipitation (96 hours)
SPAS #1219
12/01/1982 0100 UTC - 12/05/1982 0500 UTC

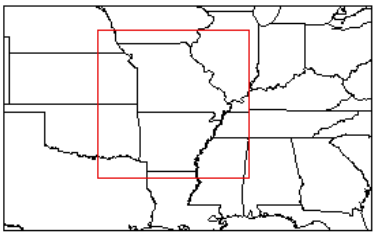
Daily
Hourly
Hourly Pseudo
Supplemental

0 25 50 100 150 Miles

Precipitation (inches)

0.00 - 1.00	4.01 - 5.00	8.01 - 9.00	12.01 - 13.00
1.01 - 2.00	5.01 - 6.00	9.01 - 10.00	13.01 - 14.00
2.01 - 3.00	6.01 - 7.00	10.01 - 11.00	14.01 - 15.00
3.01 - 4.00	7.01 - 8.00	11.01 - 12.00	15.01 - 16.00

N



11/21/2011

Forest City, MN June 20, 1983
Transpositioned Grid Points: 1-4, 6-9, 12-16, 18-20
Storm Type: MCC

Storm Name:	**SPAS 1035-Forest City, MN**
Storm Date:	**21-Jun-1983**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date	**6-Jul**	
	Lat	**Long**
Storm center location	**45.24 N**	**94.54 W**
Storm Rep dew point location	**44.02 N**	**92.94 W**
Transposition dewpoint location	**39.78 N**	**80.40 W**
Grid point location	**41.00 N**	**82.00 W**

Moisture Inflow Direction:	**SE @ 110**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**1,100**	feet
Storm Duration	**12**	hours

The storm representative dew point is	**72.0 F**	with total precipitable water above sea level of				**2.47**	inches.
The in-place maximum dew point is	**79.0 F**	with total precipitable water above sea level of				**3.44**	inches.
The transpositioned maximum dew point is	**77.0 F**	with total precipitable water above sea level of				**3.14**	inches.
The in-place storm elevation is	**1,100**	which subtracts	**0.250**	inches of precipitable water at		**72.0 F**	
The in-place storm elevation is	**1,100**	which subtracts	**0.310**	inches of precipitable water at		**79.0 F**	
The transposition basin elevation at	**900**	which subtracts	**0.240**	inches of precipitable water at		**77.0 F**	
The inflow barrier/basin elevation height is	**900**	which subtracts	**0.240**	inches of precipitable water at		**77.0 F**	

The in-place storm maximization factor is	**1.50**
The transposition/elevation to basin factor is	**0.93**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.39**

Notes: 1.61 calculated, but 1.50 used based on HMR 51 and HMR 55A guidance. DAD values taken from SPAS 1035. 12hr average Td taken from KRST, MCW, and KMSP 9hr ave from 06-20-83 22Z to 06-21-83 06Z

Observed Storm Depth-Area-Duration

	1 Hours	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**3.7**	**8.4**	**13.8**	**13.9**	**13.9**	-	**16.5**	**16.5**	-	**16.5**
10 sq miles	**3.3**	**7.7**	**12.7**	**12.7**	**12.7**	-	**15.3**	**15.3**	-	**15.3**
100 sq miles	**2.6**	**6.2**	**10.2**	**10.2**	**10.2**	-	**12.8**	**12.8**	-	**12.8**
200 sq miles	**2.4**	**5.8**	**9.4**	**9.5**	**9.5**	-	**12.0**	**12.0**	-	**12.0**
500 sq miles	**2.2**	**5.0**	**7.9**	**8.0**	**8.0**	-	**9.9**	**9.9**	-	**10.0**
1000 sq miles	**2.0**	**4.5**	**6.5**	**6.6**	**6.6**	-	**7.9**	**7.9**	-	**7.9**
5000 sq miles	**1.1**	**2.4**	**3.4**	**3.4**	**3.4**	-	**4.0**	**4.0**	-	**4.0**
10000 sq miles	-	-	-	-	-	-	-	-	-	-
20000 sq miles	-	-	-	-	-	-	-	-	-	-

Adjusted Storm Depth-Area-Duration

	1 Hours	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**5.1**	**11.6**	**19.2**	**19.3**	**19.3**	-	**23.0**	**23.0**	-	**23.0**
10 sq miles	**4.6**	**10.7**	**17.7**	**17.7**	**17.7**	-	**21.3**	**21.3**	-	**21.3**
100 sq miles	**3.6**	**8.7**	**14.2**	**14.2**	**14.2**	-	**17.8**	**17.8**	-	**17.8**
200 sq miles	**3.3**	**8.0**	**13.0**	**13.1**	**13.1**	-	**16.6**	**16.6**	-	**16.6**
500 sq miles	**3.1**	**7.0**	**11.0**	**11.1**	**11.1**	-	**13.8**	**13.8**	-	**13.9**
1000 sq miles	**2.8**	**6.2**	**9.1**	**9.1**	**9.1**	-	**11.0**	**11.0**	-	**11.0**
5000 sq miles	**1.5**	**3.4**	**4.7**	**4.7**	**4.7**	-	**5.6**	**5.6**	-	**5.6**
10000 sq miles	-	-	-	-	-	-	-	-	-	-
20000 sq miles	-	-	-	-	-	-	-	-	-	-

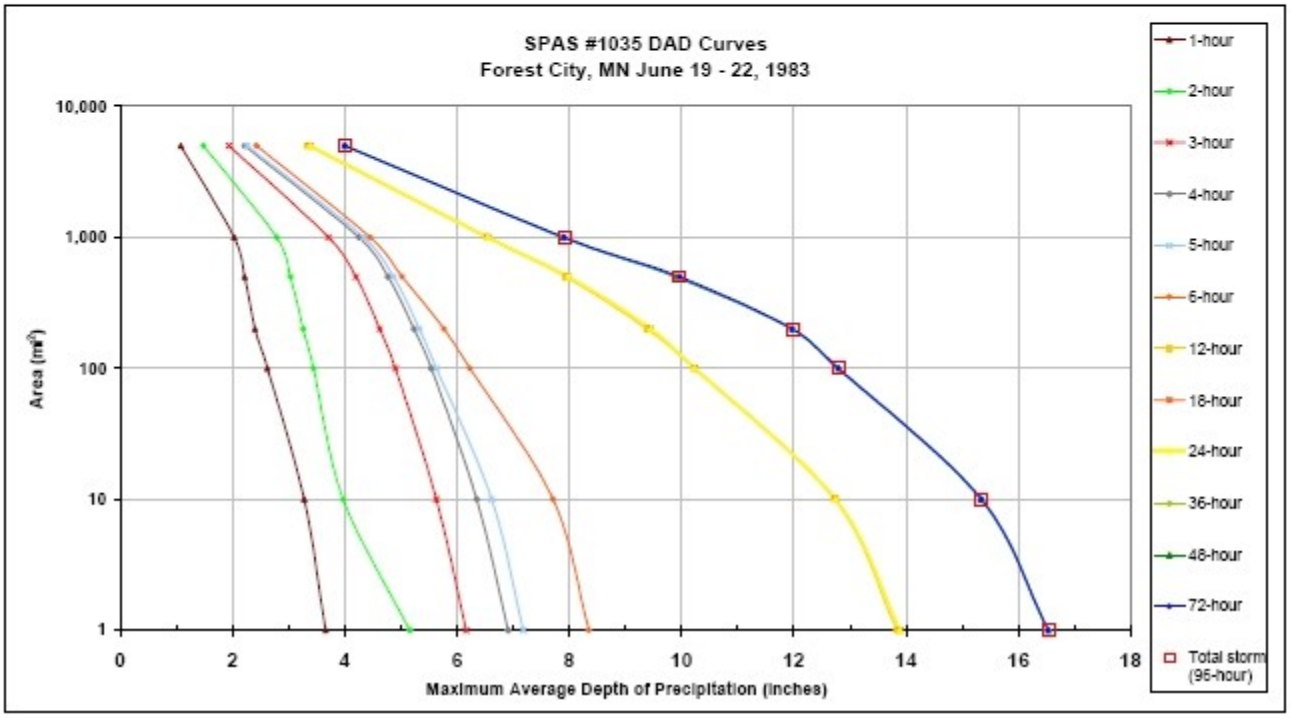
Storm or Storm Center Name	**SPAS 1035-Forest City, MN**	
Storm Date(s)	21-Jun-1983	
Storm Type	MCC-Thunderstorm Complex	
Storm Location	45.24 N	94.54 W
Storm Center Elevation	1,100	
Precipitation Total & Duration	17.00 Inches 12-hours NCDC Storm Data report	
Storm Representative Dewpoint	72.0 F	12
Storm Representative Dewpoint Location	44.02 N	92.94 W
Maximum Dewpoint	79.0 F	
Moisture Inflow Vector	SE @ 110	
In-place Maximization Factor	1.50	
Temporal Transposition (Date)	6-Jul	
Transposition Dewpoint Location	39.78 N	80.40 W
Transposition Maximum Dewpoint	77.0 F	
Transposition Adjustment Factor	**0.93**	
Grid Point Elevation	900	
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.39**	

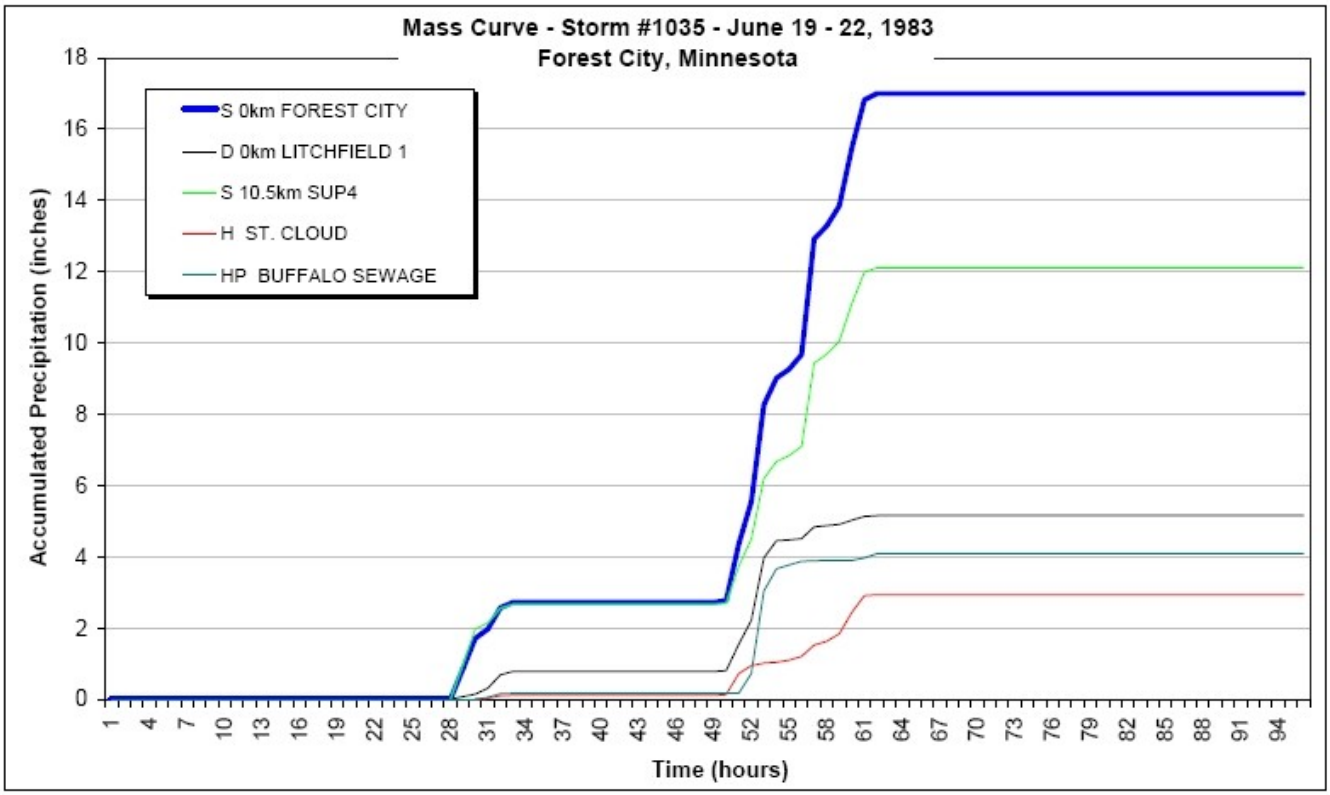
Forest City, MN June 20, 1983 Moisture Inflow Analysis

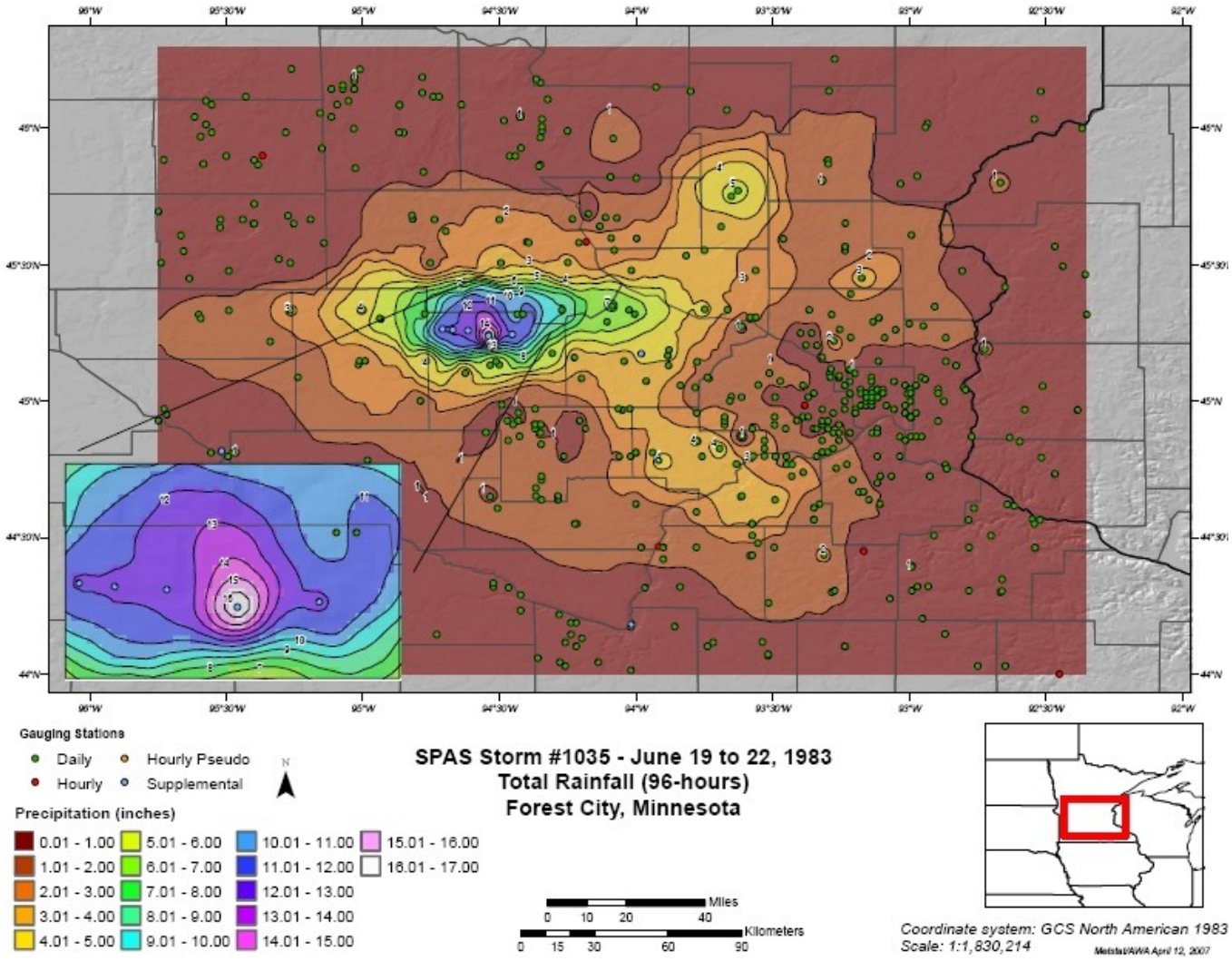
Storm 1035 - Forest City, MN June 19 - 22, 1983

MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

Area (mi^2)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	total
1	3.66	5.16	6.16	6.91	7.18	8.35	13.84	13.89	13.89	16.53	16.53	16.53	16.53	16.53
10	3.28	3.97	5.63	6.35	6.62	7.71	12.73	12.74	12.74	15.34	15.34	15.34	15.34	15.34
100	2.62	3.44	4.90	5.54	5.63	6.23	10.23	10.23	10.23	12.79	12.79	12.79	12.79	12.79
200	2.40	3.26	4.62	5.23	5.33	5.77	9.38	9.45	9.45	11.97	11.97	11.97	11.97	11.97
500	2.22	3.03	4.20	4.77	4.87	5.02	7.94	7.96	7.96	9.90	9.90	9.97	9.97	9.97
1,000	2.03	2.79	3.71	4.25	4.33	4.45	6.54	6.55	6.55	7.89	7.89	7.91	7.91	7.91
5,000	1.08	1.48	1.94	2.22	2.26	2.43	3.35	3.36	3.36	4.00	4.00	4.00	4.01	4.01




Mass Curve - Storm #1035 - June 19 - 22, 1983
Forest City, Minnesota
S 0km FOREST CITY
D 0km LITCHFIELD 1
S 10.5km SUP4
H ST. CLOUD
HP BUFFALO SEWAGE
Accumulated Precipitation (inches)
Time (hours)


96°W
95°30'W
95°W
94°30'W
94°W
93°30'W
93°W
92°30'W
92°W
46°N
45°30'N
45°N
44°30'N
44°N
Gauging Stations
Daily
Hourly
Hourly Pseudo
Supplemental
N
Precipitation (inches)
0.01 - 1.00
1.01 - 2.00
2.01 - 3.00
3.01 - 4.00
4.01 - 5.00
5.01 - 6.00
6.01 - 7.00
7.01 - 8.00
8.01 - 9.00
9.01 - 10.00
10.01 - 11.00
11.01 - 12.00
12.01 - 13.00
13.01 - 14.00
14.01 - 15.00
15.01 - 16.00
16.01 - 17.00
SPAS Storm #1035 - June 19 to 22, 1983
Total Rainfall (96-hours)
Forest City, Minnesota
Miles
0 10 20 40
Kilometers
0 15 30 60 90
Coordinate system: GCS North American 1983
Scale: 1:1,830,214
MetstatAWA April 12, 2007

Big Rapids, MI September 9, 1986
Transpositioned Grid Points: 1-2, 6-8, 12-23
Storm Type: Synoptic/Convective

Storm Name:	**SPAS 1206 Big Rapids, MI**
Storm Date:	**9/11/1986**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date 1-Sep

	Lat	Long
Storm center location	**43.61 N**	**85.31 W**
Storm Rep dew point location	**41.36 N**	**88.68 W**
Transposition dewpoint location	**38.25 N**	**85.25 W**
Grid point location	**41.00 N**	**82.00 W**

Moisture Inflow Direction:	**SW @ 230**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**1,000**	feet
Storm Duration	**24**	feet

The storm representative dew point is	**70.5 F**	with total precipitable water above sea level of				**2.31**	inches.
The in-place maximum dew point is	**77.0 F**	with total precipitable water above sea level of				**3.14**	inches.
The transpositioned maximum dew point is	**76.0 F**	with total precipitable water above sea level of				**2.99**	inches.
The in-place storm elevation is	**1,000**	which subtracts	**0.220**	inches of precipitable water at		**70.5 F**	
The in-place storm elevation is	**1,000**	which subtracts	**0.255**	inches of precipitable water at		**77.0 F**	
The transposition basin elevation at	**900**	which subtracts	**0.230**	inches of precipitable water at		**76.0 F**	
The inflow barrier/basin elevation height is	**900**	which subtracts	**0.230**	inches of precipitable water at		**76.0 F**	

The in-place storm maximization factor is	**1.38**
The transposition/elevation to basin factor is	**0.96**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.32**

Notes: DAD values taken from SPAS 1206. Storm representative dew point value was based on maximum 24-hr Td values between September 8-12, 1986 at KMMO. Values were selected in region where temperature did not vary more than a 1-degree over a large area.

Observed Storm Depth-Area-Duration

	1 Hours	3 Hours	6 Hours	12 Hours	18 Hours	24 Hours	36 Hours	48 Hours	72 Hours
1 sq miles	**2.7**	**4.3**	**4.7**	**6.1**	**7.6**	**9.7**	**11.3**	**12.7**	**13.0**
10 sq miles	**2.6**	**4.2**	**4.6**	**6.0**	**7.6**	**9.7**	**11.3**	**12.7**	**13.0**
100 sq miles	**2.2**	**3.5**	**3.9**	**5.8**	**7.5**	**9.4**	**11.2**	**12.7**	**13.0**
200 sq miles	**2.0**	**3.2**	**3.8**	**5.6**	**7.3**	**9.3**	**11.1**	**12.6**	**12.9**
500 sq miles	**1.7**	**2.7**	**3.6**	**5.4**	**7.1**	**9.0**	**10.9**	**12.3**	**12.6**
1000 sq miles	**1.4**	**2.1**	**3.4**	**5.2**	**6.9**	**8.6**	**10.7**	**11.9**	**12.2**
2000 sq miles	**1.1**	**1.9**	**3.0**	**4.9**	**6.5**	**8.1**	**10.3**	**11.2**	**11.6**
5000 sq miles	**0.7**	**1.6**	**2.7**	**4.4**	**6.0**	**7.5**	**9.7**	**10.6**	**10.7**
10000 sq miles	**0.5**	**1.2**	**2.2**	**3.8**	**5.3**	**6.6**	**8.7**	**9.5**	**9.5**
20000 sq miles	**0.3**	**0.9**	**1.6**	**3.1**	**4.2**	**5.4**	**7.4**	**7.9**	**8.1**

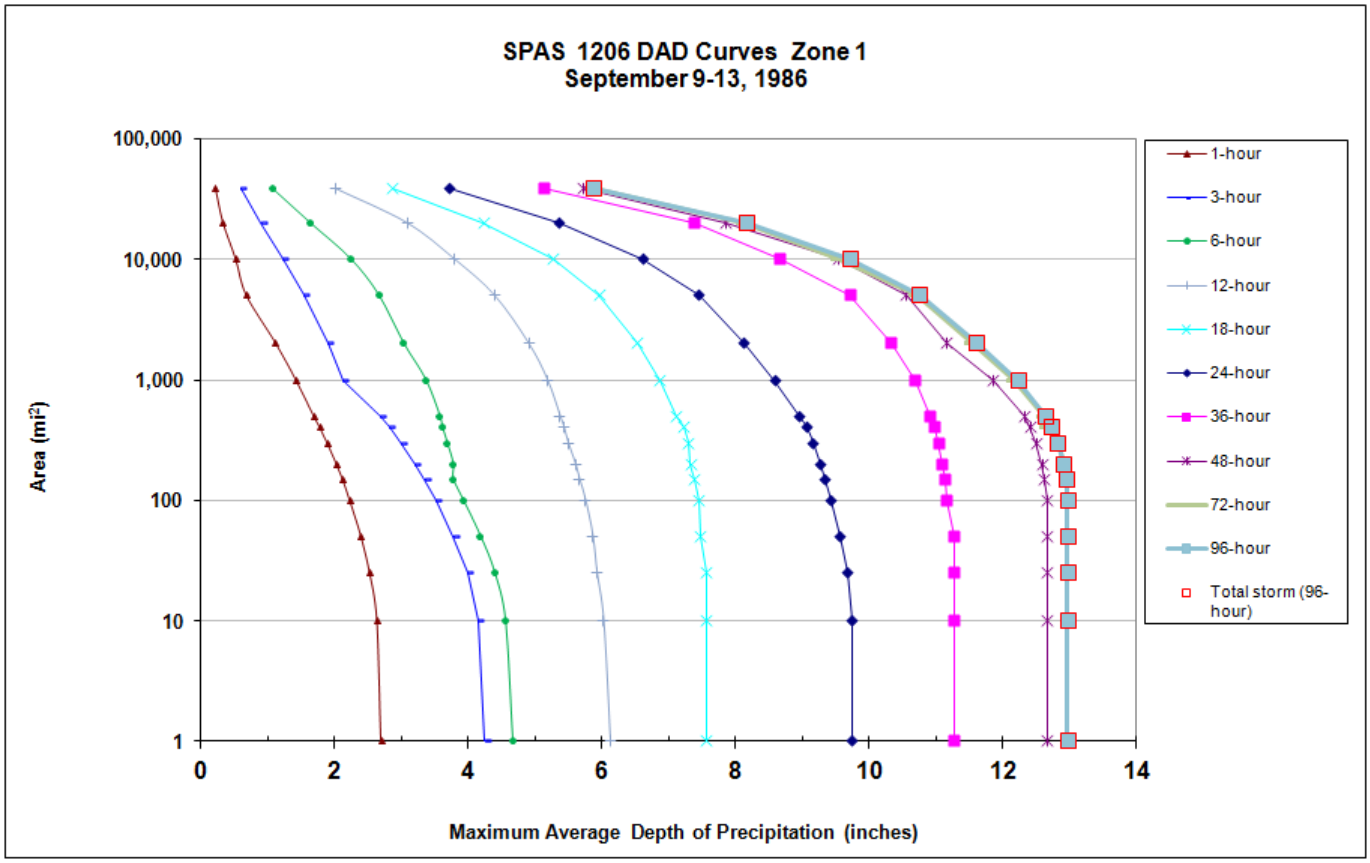
Adjusted Storm Depth-Area-Duration

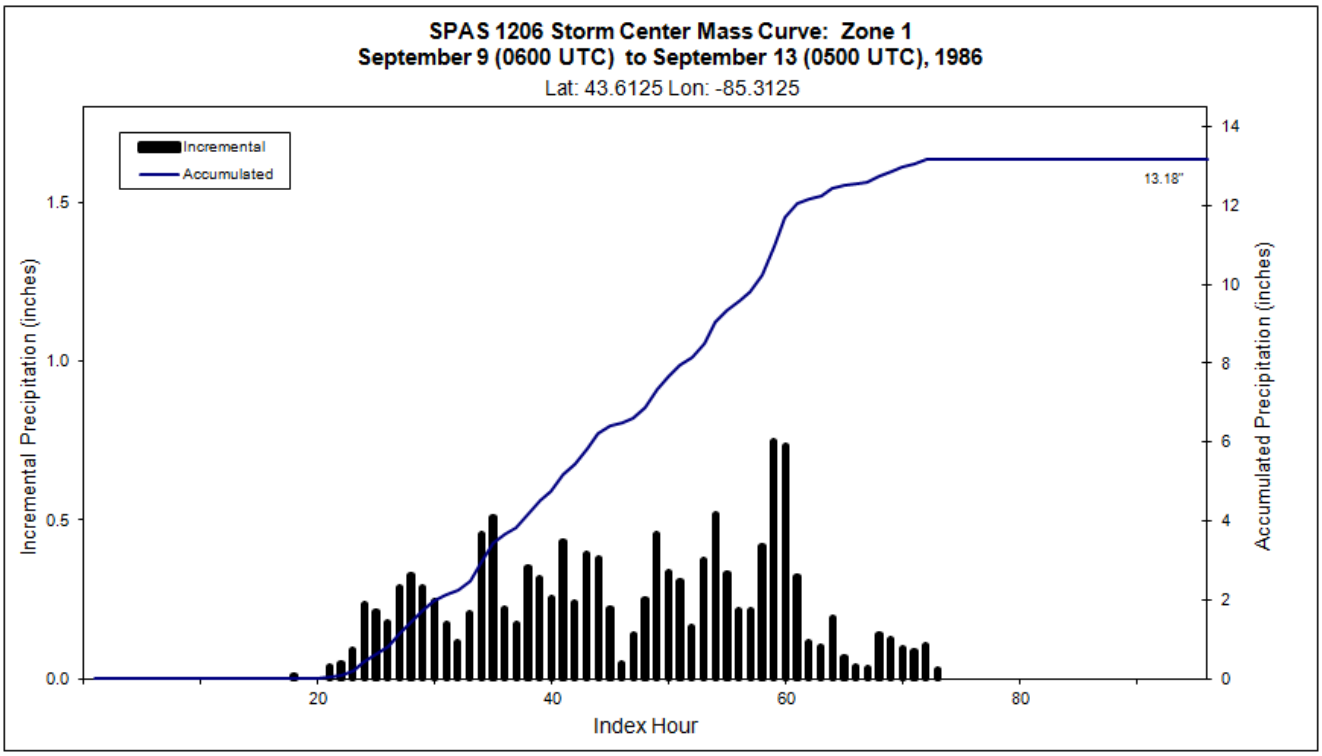
	1 Hours	3 Hours	6 Hours	12 Hours	18 Hours	24 Hours	36 Hours	48 Hours	72 Hours
1 sq miles	**3.6**	**5.6**	**6.2**	**8.1**	**10.0**	**12.9**	**14.9**	**16.8**	**17.2**
10 sq miles	**3.5**	**5.5**	**6.0**	**8.0**	**10.0**	**12.9**	**14.9**	**16.8**	**17.2**
100 sq miles	**3.0**	**4.7**	**5.2**	**7.6**	**9.9**	**12.5**	**14.8**	**16.8**	**17.2**
200 sq miles	**2.7**	**4.2**	**5.0**	**7.4**	**9.7**	**12.3**	**14.7**	**16.7**	**17.1**
500 sq miles	**2.2**	**3.6**	**4.7**	**7.1**	**9.4**	**11.9**	**14.5**	**16.3**	**16.7**
1000 sq miles	**1.9**	**2.8**	**4.4**	**6.9**	**9.1**	**11.4**	**14.2**	**15.7**	**16.1**
2000 sq miles	**1.5**	**2.5**	**4.0**	**6.5**	**8.7**	**10.8**	**13.7**	**14.8**	**15.3**
5000 sq miles	**0.9**	**2.1**	**3.5**	**5.8**	**7.9**	**9.9**	**12.9**	**14.0**	**14.2**
10000 sq miles	**0.7**	**1.6**	**3.0**	**5.0**	**7.0**	**8.7**	**11.5**	**12.6**	**12.6**
20000 sq miles	**0.4**	**1.2**	**2.2**	**4.1**	**5.6**	**7.1**	**9.8**	**10.4**	**10.8**

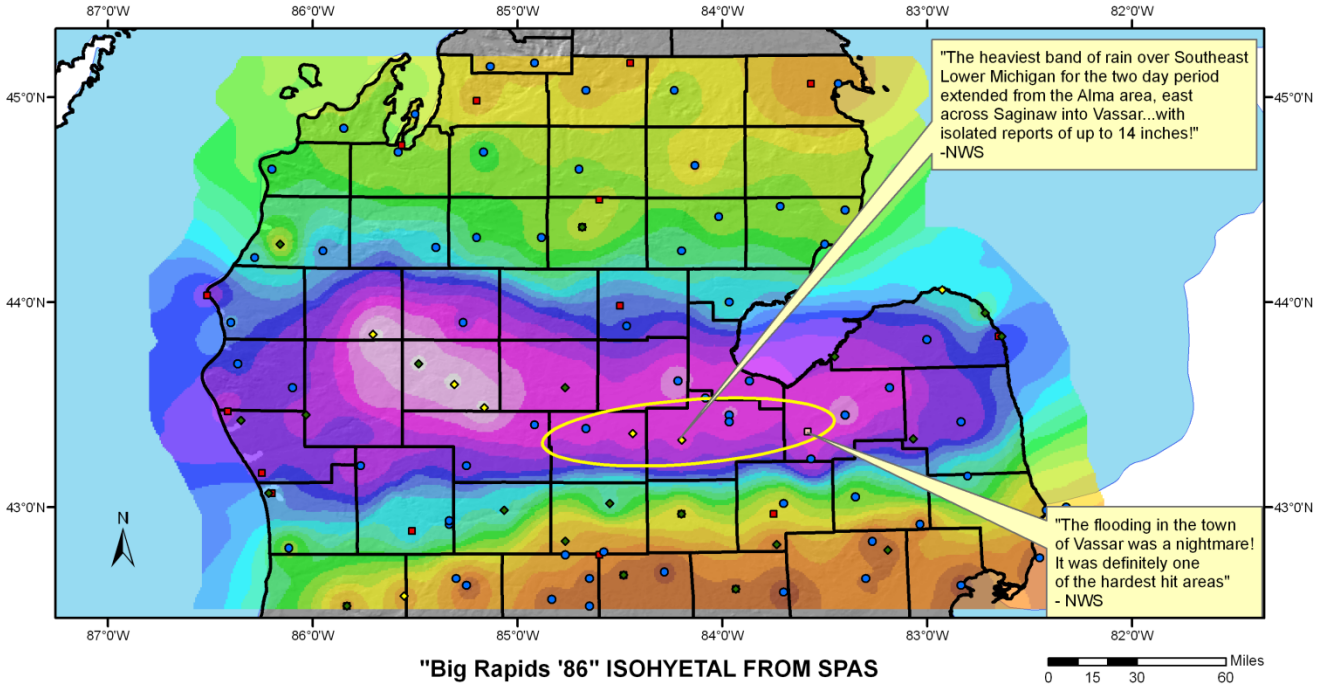
Storm or Storm Center Name	**SPAS 1206 Big Rapids, MI**	
Storm Date(s)	9/11/1986	
Storm Type	Synoptic	
Storm Location	43.61 N	85.31 W
Storm Center Elevation	1,000	
Precipitation Total & Duration	13.18 Inches	72-hours
Storm Representative Dewpoint	70.5 F	24
Storm Representative Dewpoint Location	41.36 N	88.68 W
Maximum Dewpoint	77.0 F	
Moisture Inflow Vector	SW @ 230	Miles
In-place Maximization Factor	**1.38**	
Temporal Transposition (Date)	1-Sep	
Transposition Dewpoint Location	38.25 N	85.25 W
Transposition Maximum Dewpoint	76.0 F	
Transposition Adjustment Factor	**0.96**	
Grid Point Elevation	900	
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.32**	

Big Rapids, MI September 9, 1986 Moisture Inflow Analysis

Storm 1206 - Sep 9 (0600 UTC) - Sep 13 (0500 UTC), 1986 MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)											
	Duration (hours)										
Area (mi^2)	1	3	6	12	18	24	36	48	72	96	Total
0	2.73	4.29	4.69	6.18	7.69	9.86	11.42	12.86	13.18	13.18	13.18
1	2.7	4.25	4.66	6.12	7.57	9.74	11.28	12.66	12.97	12.97	12.97
10	2.64	4.15	4.55	6.02	7.57	9.74	11.28	12.66	12.97	12.97	12.97
25	2.53	3.99	4.39	5.92	7.56	9.68	11.28	12.66	12.97	12.97	12.97
50	2.4	3.78	4.18	5.86	7.48	9.57	11.28	12.66	12.97	12.97	12.97
100	2.23	3.52	3.92	5.75	7.45	9.44	11.17	12.66	12.97	12.97	12.97
150	2.12	3.35	3.77	5.66	7.39	9.35	11.14	12.63	12.96	12.96	12.96
200	2.03	3.21	3.77	5.6	7.33	9.28	11.1	12.59	12.91	12.91	12.91
300	1.89	2.99	3.68	5.49	7.29	9.16	11.04	12.5	12.82	12.82	12.82
400	1.78	2.82	3.61	5.43	7.22	9.07	10.98	12.41	12.67	12.73	12.73
500	1.69	2.69	3.57	5.37	7.12	8.96	10.92	12.33	12.63	12.65	12.65
1,000	1.42	2.13	3.36	5.18	6.87	8.59	10.69	11.86	12.17	12.23	12.23
2,000	1.12	1.9	3.03	4.9	6.54	8.13	10.33	11.17	11.55	11.61	11.61
5,000	0.68	1.55	2.66	4.39	5.96	7.45	9.71	10.56	10.72	10.75	10.75
10,000	0.52	1.23	2.24	3.79	5.27	6.61	8.67	9.54	9.54	9.71	9.71
20,000	0.33	0.9	1.63	3.08	4.23	5.36	7.39	7.86	8.13	8.17	8.17
38,326	0.22	0.6	1.07	2.02	2.87	3.73	5.13	5.72	5.88	5.88	5.88




SPAS 1206 Storm Center Mass Curve: Zone 1
September 9 (0600 UTC) to September 13 (0500 UTC), 1986
Lat: 43.6125 Lon: -85.3125
Incremental
Accumulated
13.18"
Incremental Precipitation (inches)
Accumulated Precipitation (inches)
Index Hour
0.0
0.5
1.0
1.5
0
2
4
6
8
10
12
14
20
40
60
80



"Big Rapids '86" ISOHYETAL FROM SPAS

Total 96-hour Rainfall (inches)
09/09/1986 0600 UTC - 09/13/1986 0500 UTC
SPAS #1206

Legend

0.00 - 0.50	3.01 - 3.50	6.01 - 6.50	10.01 - 11.00	Daily	Hourly Pseudo
0.51 - 1.00	3.51 - 4.00	6.51 - 7.00	11.01 - 12.00	Hourly	Supplemental
1.01 - 1.50	4.01 - 4.50	7.01 - 7.50	12.01 - 13.00	Hourly Estimated	Supplemental Est.
1.51 - 2.00	4.51 - 5.00	7.51 - 8.00	13.01 - 14.00	Hourly Est. Pseudo	
2.01 - 2.50	5.01 - 5.50	8.01 - 9.00			
2.51 - 3.00	5.51 - 6.00	9.01 - 10.00			

METSTAT
04/22/2011

Minneapolis, MN July 23, 1987
Transpositioned Grid Points: All
Storm Type: MCC

Storm Name:	**Minneapolis, MN SPAS 1210**
Storm Date:	**July 23-24, 1987**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date	**15-Jul**

	Lat	Long
Storm center location	**44.89 N**	**93.40 W**
Storm Rep dew point location	**44.54 N**	**95.16 W**
Transposition dewpoint location	**40.65 N**	**83.65 W**
Grid point location	**41.00 N**	**82.00 W**

Moisture Inflow Direction:	**WSW @ 90**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**900**	feet
Storm Duration	**6**	hours

The storm representative dew point is	**78.0 F**	with total precipitable water above sea level of				**3.29**	inches.
The in-place maximum dew point is	**81.5 F**	with total precipitable water above sea level of				**3.83**	inches.
The transpositioned maximum dew point is	**78.5 F**	with total precipitable water above sea level of				**3.37**	inches.
The in-place storm elevation is	**900**	which subtracts	**0.250**	inches of precipitable water at		**78.0 F**	
The in-place storm elevation is	**900**	which subtracts	**0.290**	inches of precipitable water at		**81.5 F**	
The transposition basin elevation at	**900**	which subtracts	**0.260**	inches of precipitable water at		**78.5 F**	
The inflow barrier/basin elevation height is	**900**	which subtracts	**0.260**	inches of precipitable water at		**78.5 F**	

The in-place storm maximization factor is	**1.16**
The transposition/elevation to basin factor is	**0.88**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.02**

Notes: Storm representative dew point value was based on maximum 6-hr Td values July 23, 1987 at Redwood Falls, MN. This was fromt eh EPRI analysis. The Td climatology maps produced during the Nebraska statewide PMP study were used to maximized this event.

Observed Storm Depth-Area-Duration

	1 Hours	3 Hours	6 Hours	12 Hours	18 Hours	24 Hours	36 Hours	48 Hours	72 Hours
1 sq miles	**5.0**	**9.8**	**11.1**	**11.3**	**11.4**	**11.4**	**11.4**	**11.4**	**12.0**
10 sq miles	**4.3**	**8.7**	**10.7**	**11.2**	**11.3**	**11.3**	**11.3**	**11.3**	**11.9**
100 sq miles	**3.0**	**7.3**	**9.4**	**10.1**	**10.2**	**10.2**	**10.2**	**10.2**	**10.9**
200 sq miles	**2.6**	**6.6**	**8.5**	**9.3**	**9.3**	**9.4**	**9.4**	**9.4**	**10.0**
500 sq miles	**2.1**	**5.3**	**7.0**	**7.6**	**7.9**	**8.0**	**8.0**	**8.0**	**8.6**
1000 sq miles	**1.6**	**4.1**	**5.8**	**6.6**	**6.7**	**6.8**	**6.8**	**6.8**	**7.3**
2000 sq miles	**1.1**	**2.9**	**4.5**	**5.5**	**5.5**	**5.6**	**5.6**	**5.6**	**5.9**
5000 sq miles	**0.7**	**1.5**	**2.7**	**3.6**	**3.6**	**3.8**	**3.8**	**3.8**	**4.1**
10000 sq miles	**0.4**	**0.9**	**1.9**	**2.5**	**2.6**	**2.6**	**2.6**	**2.6**	**2.8**
20000 sq miles	-	-	-	-	-	-	-	-	-

Adjusted Storm Depth-Area-Duration

	1 Hours	3 Hours	6 Hours	12 Hours	18 Hours	24 Hours	36 Hours	48 Hours	72 Hours
1 sq miles	**5.1**	**10.0**	**11.4**	**11.6**	**11.7**	**11.7**	**11.7**	**11.7**	**12.2**
10 sq miles	**4.3**	**8.9**	**10.9**	**11.5**	**11.5**	**11.5**	**11.5**	**11.5**	**12.2**
100 sq miles	**3.1**	**7.5**	**9.6**	**10.3**	**10.4**	**10.4**	**10.4**	**10.4**	**11.1**
200 sq miles	**2.7**	**6.7**	**8.7**	**9.4**	**9.5**	**9.6**	**9.6**	**9.6**	**10.3**
500 sq miles	**2.1**	**5.4**	**7.2**	**7.8**	**8.1**	**8.2**	**8.2**	**8.2**	**8.8**
1000 sq miles	**1.6**	**4.2**	**5.9**	**6.7**	**6.8**	**6.9**	**7.0**	**7.0**	**7.4**
2000 sq miles	**1.2**	**3.0**	**4.6**	**5.6**	**5.7**	**5.7**	**5.7**	**5.7**	**6.0**
5000 sq miles	**0.7**	**1.6**	**2.8**	**3.7**	**3.7**	**3.9**	**3.9**	**3.9**	**4.2**
10000 sq miles	**0.4**	**0.9**	**1.9**	**2.6**	**2.6**	**2.7**	**2.7**	**2.7**	**2.8**
20000 sq miles	-	-	-	-	-	-	-	-	-

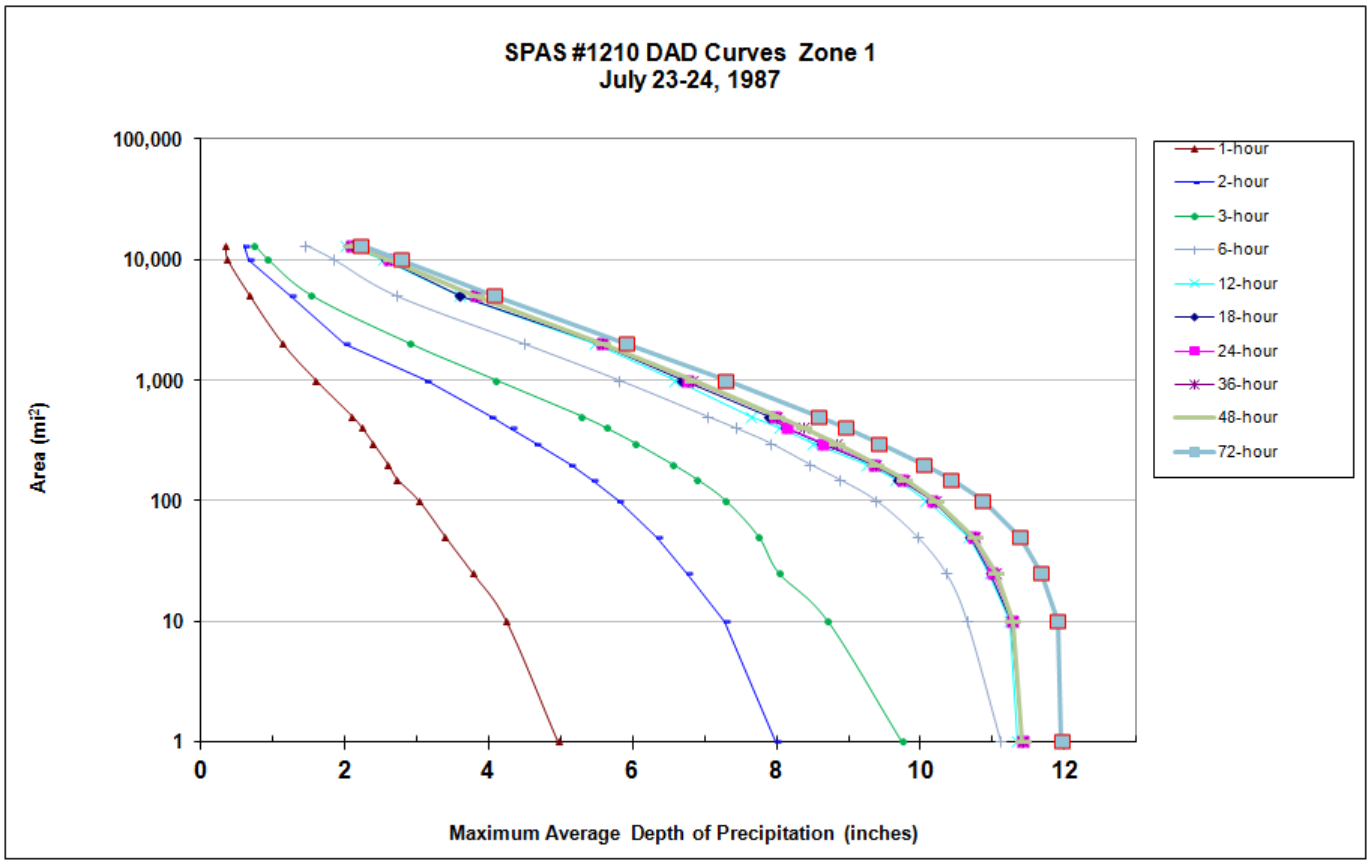
Storm or Storm Center Name	**Minneapolis, MN SPAS 1210**	
Storm Date(s)	July 23-24, 1987	
Storm Type	MCC	
Storm Location	44.89 N	93.40 W
Storm Center Elevation	900	
Precipitation Total & Duration	12.13 Inches	72-hours
Storm Representative Dewpoint	78.0 F	6
Storm Representative Dewpoint Location	44.54 N	95.16 W
Maximum Dewpoint	81.5 F	
Moisture Inflow Vector	WSW @ 90	
In-place Maximization Factor	**1.16**	
Temporal Transposition (Date)	15-Jul	
Transposition Dewpoint Location	40.65 N	83.65 W
Transposition Maximum Dewpoint	78.5 F	
Transposition Adjustment Factor	**0.88**	
Grid Point Elevation	900	
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.02**	

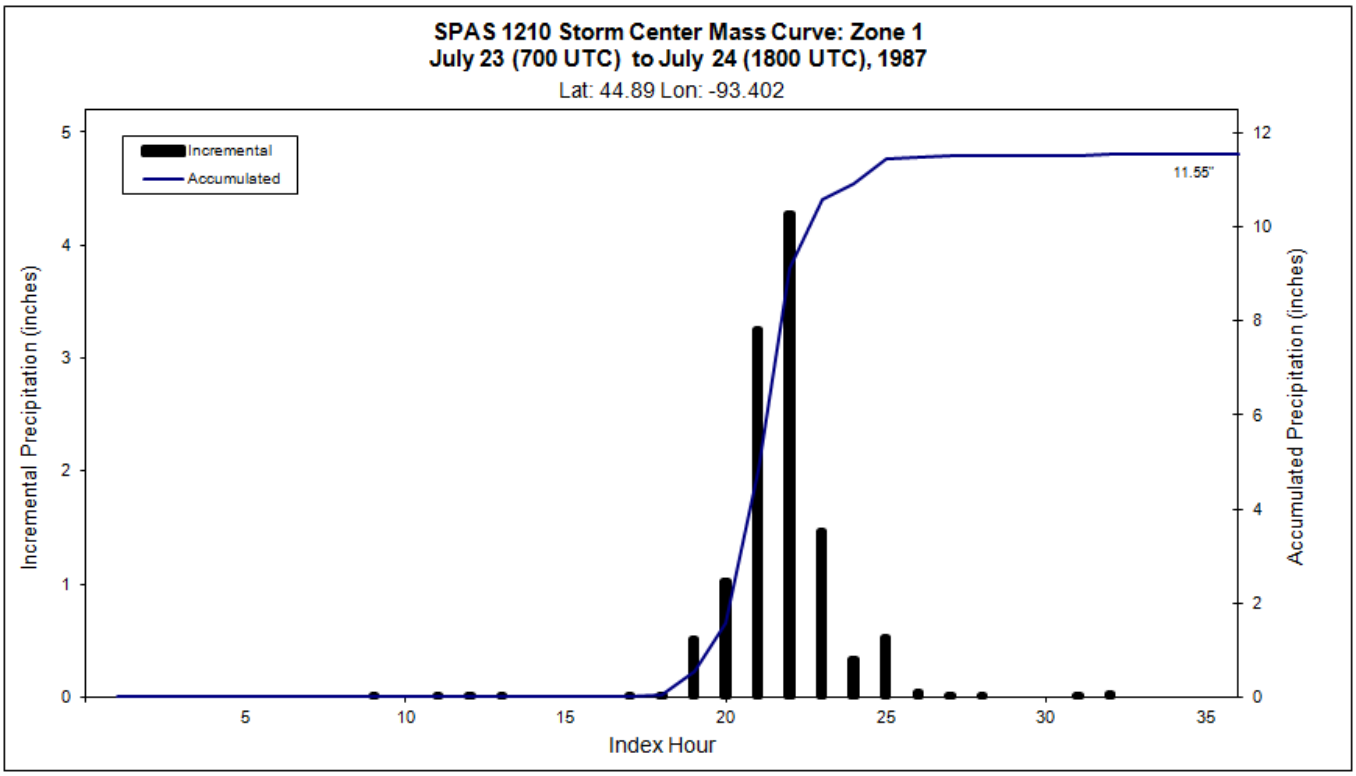
Minneapolis, MN July 23, 1987 Moisture Inflow Analysis

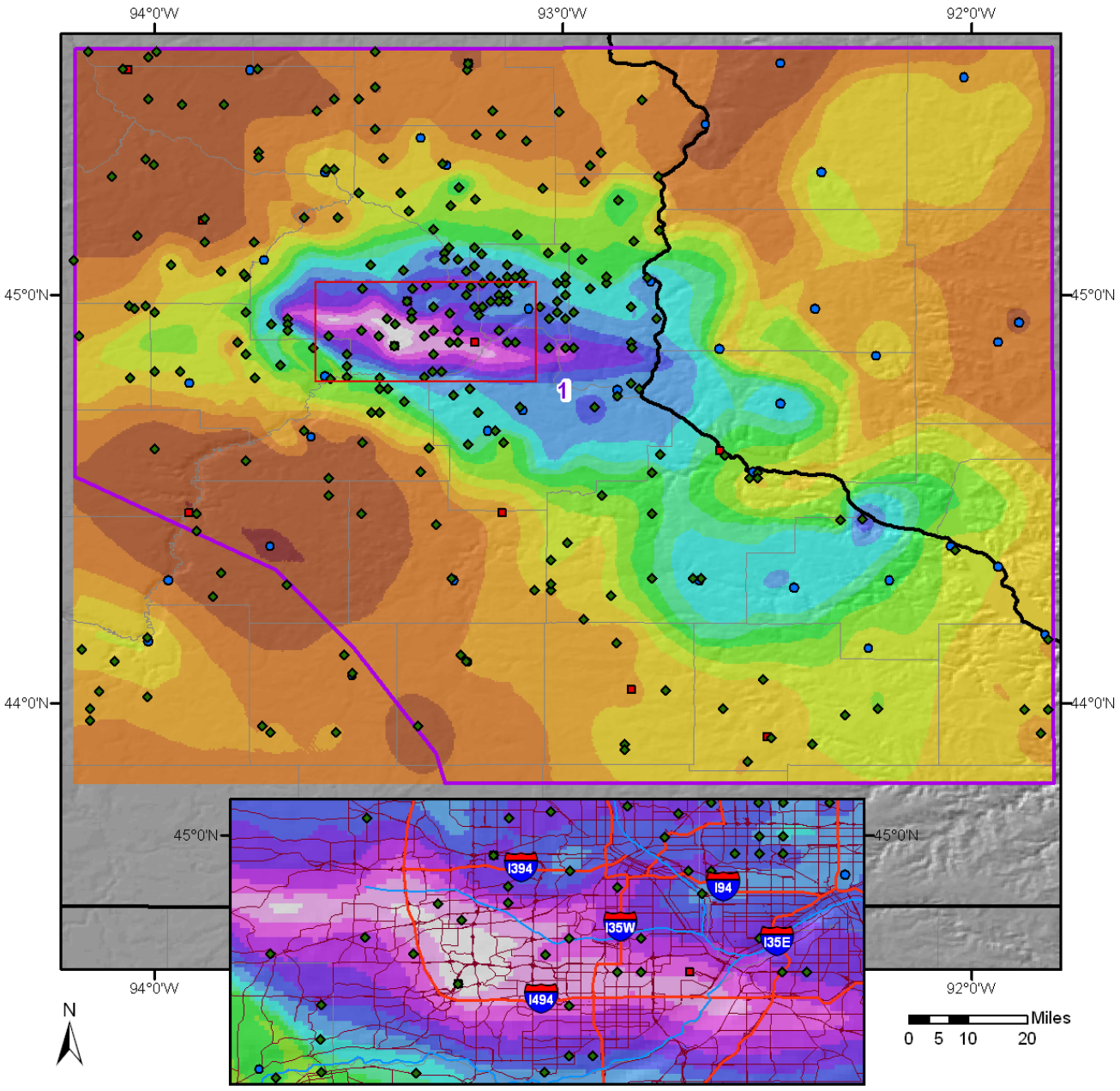
Storm 1210 - July 23 (0700 UTC) - July 24 (1800 UTC),1987

MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

	Duration (hours)										
Area (mi^2)	1	2	3	6	12	18	24	36	48	72	Total
0	5.16	8.19	10	11.24	11.5	11.54	11.55	11.55	11.55	12.13	12.13
1	4.97	7.99	9.75	11.12	11.34	11.41	11.42	11.42	11.42	11.96	11.96
10	4.25	7.27	8.72	10.65	11.24	11.27	11.28	11.28	11.28	11.91	11.91
25	3.78	6.76	8.04	10.36	10.96	10.98	11.01	11.05	11.05	11.68	11.68
50	3.4	6.33	7.76	9.96	10.67	10.7	10.73	10.75	10.75	11.39	11.39
100	3.03	5.8	7.3	9.39	10.07	10.16	10.17	10.21	10.21	10.87	10.87
150	2.73	5.43	6.9	8.88	9.66	9.7	9.75	9.78	9.78	10.43	10.43
200	2.6	5.12	6.56	8.47	9.25	9.33	9.37	9.39	9.39	10.04	10.04
300	2.39	4.65	6.04	7.92	8.51	8.62	8.65	8.83	8.83	9.43	9.43
400	2.24	4.3	5.64	7.44	8.05	8.13	8.15	8.39	8.39	8.97	8.97
500	2.1	4.02	5.3	7.04	7.64	7.89	7.98	8.01	8.01	8.58	8.58
1,000	1.59	3.12	4.1	5.81	6.59	6.69	6.77	6.83	6.83	7.29	7.29
2,000	1.13	2	2.91	4.49	5.48	5.54	5.59	5.59	5.59	5.92	5.92
5,000	0.67	1.25	1.54	2.72	3.6	3.6	3.82	3.82	3.82	4.08	4.08
10,000	0.36	0.66	0.93	1.85	2.54	2.58	2.62	2.63	2.63	2.78	2.78
13,158	0.34	0.59	0.74	1.46	2.02	2.05	2.09	2.09	2.09	2.22	2.22




SPAS 1210 Storm Center Mass Curve: Zone 1
July 23 (700 UTC) to July 24 (1800 UTC), 1987
Lat: 44.89 Lon: -93.402
Incremental
Accumulated
11.55"
Incremental Precipitation (inches)
Accumulated Precipitation (inches)
Index Hour
0
1
2
3
4
5
0
2
4
6
8
10
12
5
10
15
20
25
30
35



ISOHYETAL FROM SPAS #1210 - "Twin Cities Super Storm"
Total 36-hour Rainfall (inches)
07/23/1987 0700 UTC - 07/24/1987 1800 UTC

Inches

<= 0.02	2.51 - 3.00	7.01 - 8.00	Daily
0.03 - 0.50	3.01 - 3.50	8.01 - 9.00	Hourly
0.51 - 1.00	3.51 - 4.00	9.01 - 10.00	Hourly Pseudo
1.01 - 1.50	4.01 - 5.00	10.01 - 11.00	Supplemental
1.51 - 2.00	5.01 - 6.00	11.01 - 11.55	
2.01 - 2.50	6.01 - 7.00	dadzones_1210	

Aurora College, IL July 17, 1996
Transpositioned Grid Points: All
Storm Type: Synoptic/Convective

Storm Name:	**SPAS 1029-Aurora College, IL**
Storm Date:	**17-Jul-1996**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date	**15-Jul**	
	Lat	**Long**
Storm center location	**41.75 N**	**88.33 W**
Storm Rep dew point location	**38.63 N**	**92.24 W**
Transposition dewpoint location	**37.88 N**	**85.91 W**
Grid point location	**41.00 N**	**82.00 W**

Moisture Inflow Direction:	**SW @ 300**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**700**	feet
Storm Duration	**24**	hours

The storm representative dew point is	**74.0 F**	with total precipitable water above sea level of				**2.73**	inches.
The in-place maximum dew point is	**80.5 F**	with total precipitable water above sea level of				**3.68**	inches.
The transpositioned maximum dew point is	**79.0 F**	with total precipitable water above sea level of				**3.44**	inches.
The in-place storm elevation is	**700**	which subtracts	**0.170**	inches of precipitable water at		**74.0 F**	
The in-place storm elevation is	**700**	which subtracts	**0.220**	inches of precipitable water at		**80.5 F**	
The transposition basin elevation at	**900**	which subtracts	**0.260**	inches of precipitable water at		**79.0 F**	
The inflow barrier/basin elevation height is	**900**	which subtracts	**0.260**	inches of precipitable water at		**79.0 F**	

The in-place storm maximization factor is	**1.35**
The transposition/elevation to basin factor is	**0.92**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.24**

Notes: DAD values taken from SPAS 1029. 24hr average Td from 07-17-96 0000 CDT to 07-17-96 2300 CDT.

Observed Storm Depth-Area-Duration

	1 Hour	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**5.4**	**12.0**	**12.9**	**16.0**	**17.3**	-	-	-	-	-
10 sq miles	**4.8**	**11.0**	**12.2**	**15.5**	**16.9**	-	-	-	-	-
100 sq miles	**3.3**	**9.5**	**10.9**	**14.2**	**15.7**	-	-	-	-	-
200 sq miles	**2.7**	**8.9**	**10.4**	**13.6**	**15.0**	-	-	-	-	-
500 sq miles	**2.2**	**7.8**	**9.7**	**12.0**	**13.5**	-	-	-	-	-
1000 sq miles	**1.8**	**7.0**	**8.9**	**10.8**	**12.0**	-	-	-	-	-
5000 sq miles	**0.9**	**4.2**	**5.6**	**7.0**	**8.0**	-	-	-	-	-
10000 sq miles	**0.5**	**2.6**	**3.8**	**4.9**	**5.6**	-	-	-	-	-
20000 sq miles	-	**1.5**	**2.3**	**3.0**	**3.6**	-	-	-	-	-

Adjusted Storm Depth-Area-Duration

	1 Hour	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**6.7**	**14.9**	**16.1**	**19.9**	**21.5**	-	-	-	-	-
10 sq miles	**6.0**	**13.7**	**15.2**	**19.3**	**21.0**	-	-	-	-	-
100 sq miles	**4.1**	**11.8**	**13.6**	**17.7**	**19.5**	-	-	-	-	-
200 sq miles	**3.3**	**11.0**	**12.9**	**16.9**	**18.6**	-	-	-	-	-
500 sq miles	**2.7**	**9.7**	**12.0**	**14.9**	**16.7**	-	-	-	-	-
1000 sq miles	**2.2**	**8.7**	**11.1**	**13.5**	**15.0**	-	-	-	-	-
5000 sq miles	**1.1**	**5.2**	**7.0**	**8.7**	**10.0**	-	-	-	-	-
10000 sq miles	**0.7**	**3.2**	**4.7**	**6.1**	**7.0**	-	-	-	-	-
20000 sq miles	-	**1.8**	**2.9**	**3.7**	**4.5**	-	-	-	-	-

Storm or Storm Center Name	**SPAS 1029-Aurora College, IL**	
Storm Date(s)	17-Jul-1996	
Storm Type	Synoptic-Thunderstorms	
Storm Location	41.75 N	88.33 W
Storm Center Elevation	700	
Precipitation Total & Duration	18.24 in 24hrs from SPAS 1029, Highest recorded amount was 16.91 inches	
Storm Representative Dewpoint	74.0 F	24
Storm Representative Dewpoint Location	38.63 N	92.24 W
Maximum Dewpoint	80.5 F	
Moisture Inflow Vector	SW @ 300	
In-place Maximization Factor	1.00	
Temporal Transposition (Date)	15-Jul	
Transposition Dewpoint Location	37.88 N	85.91 W
Transposition Maximum Dewpoint	79.0 F	
Transposition Adjustment Factor	**0.92**	
Grid Point Elevation	900	
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.24**	

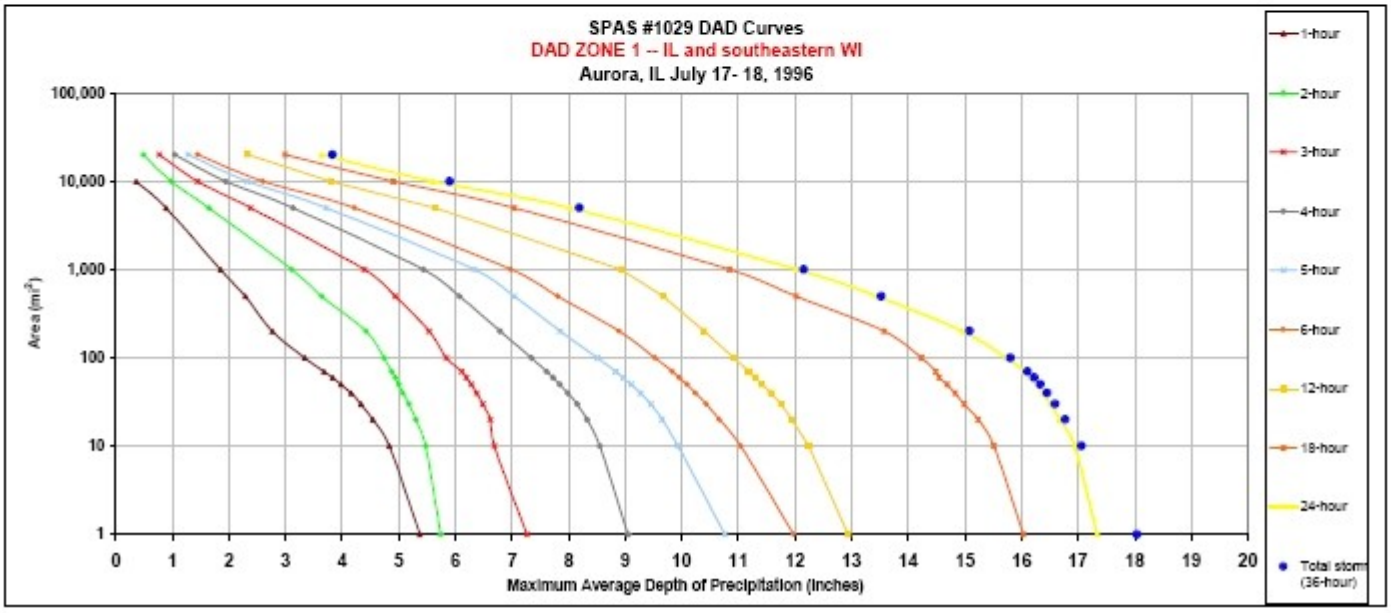
Aurora College, IL July 17, 1996 Moisture Inflow Analysis

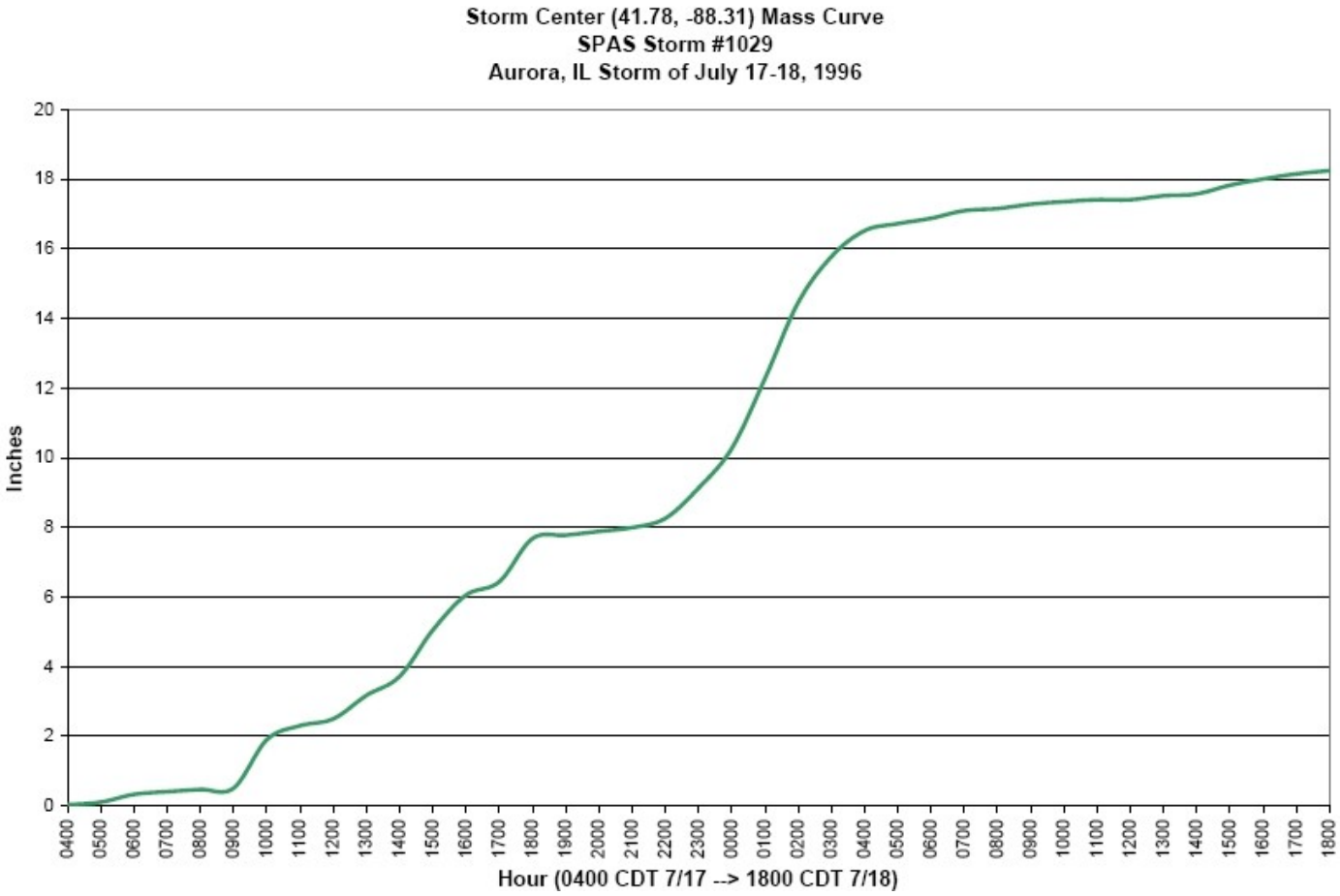
Storm 1029 - Aurora, IL July 17- 18, 1996

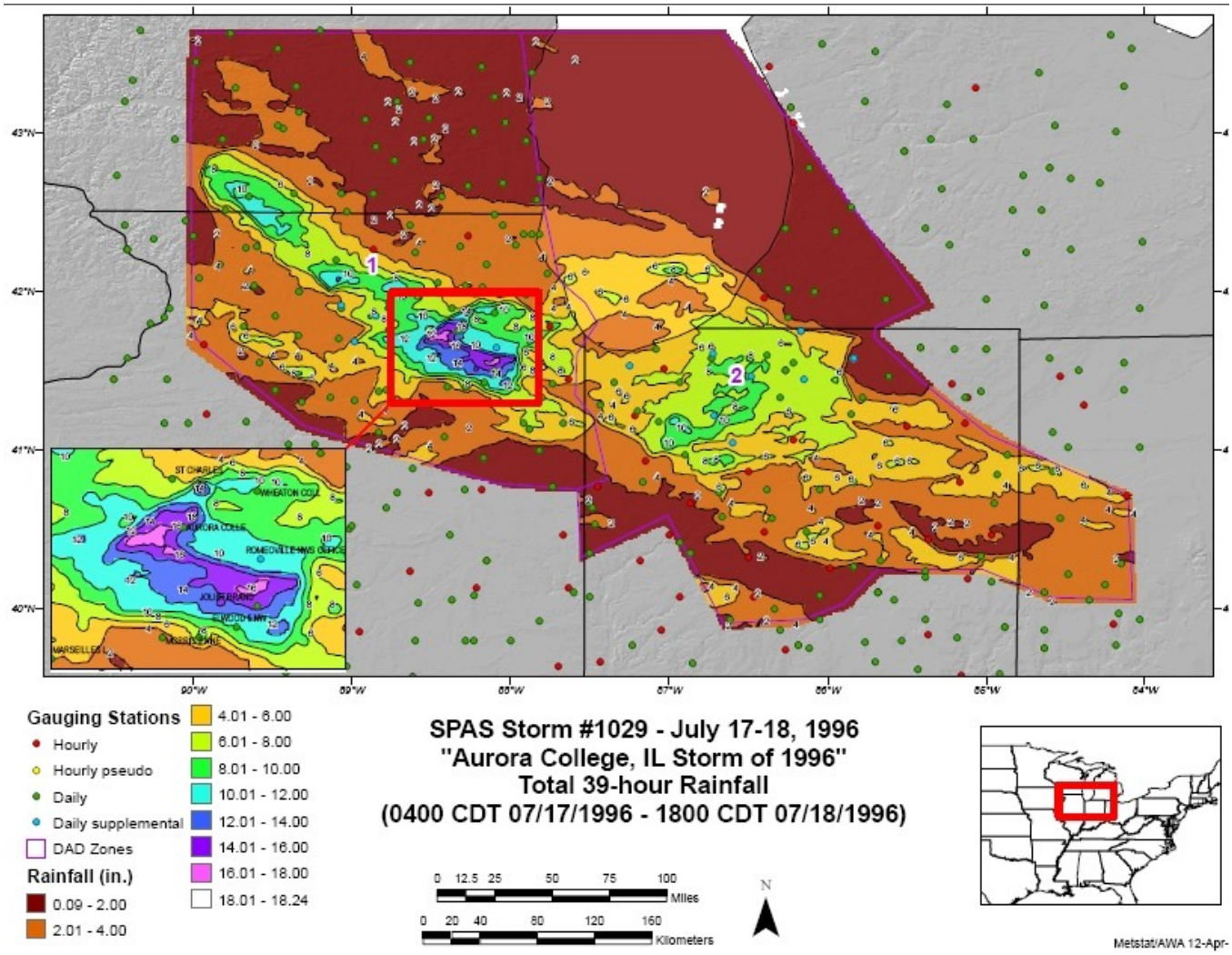
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

Area (mi^2)	Duration (hours)									
	1	2	3	4	5	6	12	18	24	total (36-hr)
1	5.37	5.74	7.26	9.05	10.76	11.97	12.93	16.03	17.33	18.04
10	4.83	5.47	6.69	8.55	9.93	11.04	12.24	15.51	16.94	17.06
20	4.54	5.30	6.61	8.32	9.65	10.66	11.94	15.23	16.67	16.77
30	4.33	5.18	6.48	8.15	9.45	10.43	11.75	14.98	16.51	16.59
40	4.16	5.07	6.37	7.98	9.27	10.24	11.57	14.82	16.37	16.45
50	3.98	5.00	6.28	7.84	9.10	10.09	11.42	14.68	16.27	16.33
60	3.83	4.94	6.19	7.72	8.96	9.95	11.29	14.54	16.15	16.22
70	3.68	4.87	6.11	7.61	8.83	9.83	11.18	14.48	16.04	16.10
100	3.34	4.74	5.84	7.34	8.51	9.52	10.92	14.23	15.73	15.80
200	2.76	4.42	5.53	6.79	7.85	8.89	10.39	13.57	14.95	15.06
500	2.29	3.64	4.94	6.07	7.04	7.81	9.67	12.02	13.45	13.52
1,000	1.85	3.11	4.39	5.43	6.33	6.98	8.92	10.84	12.04	12.15
5,000	0.89	1.64	2.38	3.13	3.72	4.22	5.64	7.04	8.02	8.19
10,000	0.36	0.98	1.45	1.94	2.33	2.60	3.60	4.90	5.60	5.90
20,000		0.49	0.77	1.04	1.28	1.45	2.33	2.99	3.63	3.83

Total area size = 21,026 sq-mi




Storm Center (41.78, -88.31) Mass Curve
SPAS Storm #1029
Aurora, IL Storm of July 17-18, 1996
Inches
0
2
4
6
8
10
12
14
16
18
20
0400
0500
0600
0700
0800
0900
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
2000
2100
2200
2300
0000
0100
0200
0300
0400
0500
0600
0700
0800
0900
1000
1100
1200
1300
1400
1500
1600
1700
1800
Hour (0400 CDT 7/17 --> 1800 CDT 7/18)


43°N
42°N
41°N
40°N
90°W
89°W
88°W
87°W
86°W
85°W
84°W
1
2
ST CHARLES
WHEATON COLL
AURORA COLLEGE
ROMEOVILLE NWS OFFICE
JOLIET ARMY
PLAINFIELD
MARSEILLES
Gauging Stations
Hourly
Hourly pseudo
Daily
Daily supplemental
DAD Zones
Rainfall (in.)
0.09 - 2.00
2.01 - 4.00
4.01 - 6.00
6.01 - 8.00
8.01 - 10.00
10.01 - 12.00
12.01 - 14.00
14.01 - 16.00
16.01 - 18.00
18.01 - 18.24
SPAS Storm #1029 - July 17-18, 1996
"Aurora College, IL Storm of 1996"
Total 39-hour Rainfall
(0400 CDT 07/17/1996 - 1800 CDT 07/18/1996)
0 12.5 25 50 75 100
Miles
0 20 40 80 120 160
Kilometers
N
Metstat/AWA 12-Apr-

Fall River, KS June 30, 2007
Transpositioned Grid Points: 1
Storm Type: Synoptic/Convective

Storm Name:	**SPAS 1228 Fall River, KS**
Storm Date:	**6/28/2007 - 7/2/2007**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 1

Temporal Transposition Date	**15-Jul**	
	Lat	**Long**
Storm center location	**37.63 N**	**96.05 W**
Storm Rep dew point location	**31.00 N**	**95.50 W**
Transposition dewpoint location	**31.37 N**	**84.95 W**
Grid point location	**38.00 N**	**85.50 W**

Moisture Inflow Direction:	**SSE @ 460**	miles
Grid Point Elevation	**600**	feet
Storm Elevation	**900**	feet
Storm Duration	**24**	hours

The storm representative dew point is	**76.5 F**	with total precipitable water above sea level of				**3.07**	inches.
The in-place maximum dew point is	**80.0 F**	with total precipitable water above sea level of				**3.60**	inches.
The transpositioned maximum dew point is	**79.5 F**	with total precipitable water above sea level of				**3.52**	inches.
The in-place storm elevation is	**900**	which subtracts	**0.240**	inches of precipitable water at		**76.5 F**	
The in-place storm elevation is	**900**	which subtracts	**0.270**	inches of precipitable water at		**80.0 F**	
The transposition basin elevation at	**600**	which subtracts	**0.180**	inches of precipitable water at		**79.5 F**	
The inflow barrier/basin elevation height is	**600**	which subtracts	**0.180**	inches of precipitable water at		**79.5 F**	

The in-place storm maximization factor is	**1.18**
The transposition/elevation to basin factor is	**1.00**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.18**

Notes: DAD values taken from SPAS 1228. Storm representative dew point value was based on maximum 24-hr Td values between June 27-28, 2007 at KDKR and KUTS.

Observed Storm Depth-Area-Duration

	1 Hours	3 Hours	6 Hours	12 Hours	18 Hours	24 Hours	36 Hours	48 Hours	72 Hours
1 sq miles	**4.6**	**6.4**	**8.9**	**11.0**	**14.4**	**14.5**	**17.2**	**22.1**	**24.8**
10 sq miles	**4.2**	**6.3**	**8.8**	**10.7**	**13.8**	**13.9**	**17.1**	**21.9**	**24.8**
100 sq miles	**3.1**	**5.1**	**7.6**	**10.2**	**12.7**	**13.0**	**15.7**	**18.1**	**21.7**
200 sq miles	**2.8**	**4.7**	**7.0**	**9.6**	**11.8**	**11.9**	**14.8**	**17.1**	**20.7**
500 sq miles	**2.2**	**3.5**	**5.9**	**8.4**	**10.4**	**10.7**	**13.2**	**15.5**	**19.2**
1000 sq miles	**1.6**	**3.3**	**4.8**	**7.2**	**9.0**	**10.0**	**12.1**	**14.2**	**18.1**
2000 sq miles	**1.1**	**2.4**	**3.9**	**6.0**	**7.8**	**9.0**	**10.8**	**12.6**	**16.0**
5000 sq miles	**0.7**	**1.8**	**2.9**	**4.7**	**6.3**	**6.4**	**9.0**	**10.4**	**13.7**
10000 sq miles	**0.4**	**1.4**	**2.2**	**3.7**	**5.1**	**6.0**	**7.5**	**8.7**	**11.1**
20000 sq miles	**0.3**	**0.6**	**1.5**	**2.7**	**3.8**	**4.6**	**5.7**	**7.0**	**9.2**

Adjusted Storm Depth-Area-Duration

	1 Hours	3 Hours	6 Hours	12 Hours	18 Hours	24 Hours	36 Hours	48 Hours	72 Hours
1 sq miles	**5.4**	**7.6**	**10.5**	**13.0**	**17.0**	**17.1**	**20.3**	**26.1**	**29.4**
10 sq miles	**4.9**	**7.5**	**10.4**	**12.6**	**16.3**	**16.4**	**20.2**	**25.9**	**29.4**
100 sq miles	**3.7**	**6.1**	**9.0**	**12.1**	**15.1**	**15.4**	**18.5**	**21.4**	**25.7**
200 sq miles	**3.3**	**5.5**	**8.3**	**11.4**	**13.9**	**14.1**	**17.5**	**20.2**	**24.4**
500 sq miles	**2.6**	**4.2**	**6.9**	**9.9**	**12.2**	**12.6**	**15.7**	**18.4**	**22.7**
1000 sq miles	**1.9**	**3.9**	**5.6**	**8.5**	**10.7**	**11.9**	**14.3**	**16.8**	**21.4**
2000 sq miles	**1.3**	**2.8**	**4.6**	**7.1**	**9.3**	**10.6**	**12.8**	**14.9**	**19.0**
5000 sq miles	**0.8**	**2.2**	**3.5**	**5.6**	**7.4**	**7.5**	**10.6**	**12.3**	**16.2**
10000 sq miles	**0.5**	**1.7**	**2.5**	**4.4**	**6.0**	**7.1**	**8.9**	**10.3**	**13.1**
20000 sq miles	**0.3**	**0.7**	**1.7**	**3.2**	**4.5**	**5.4**	**6.7**	**8.2**	**10.9**

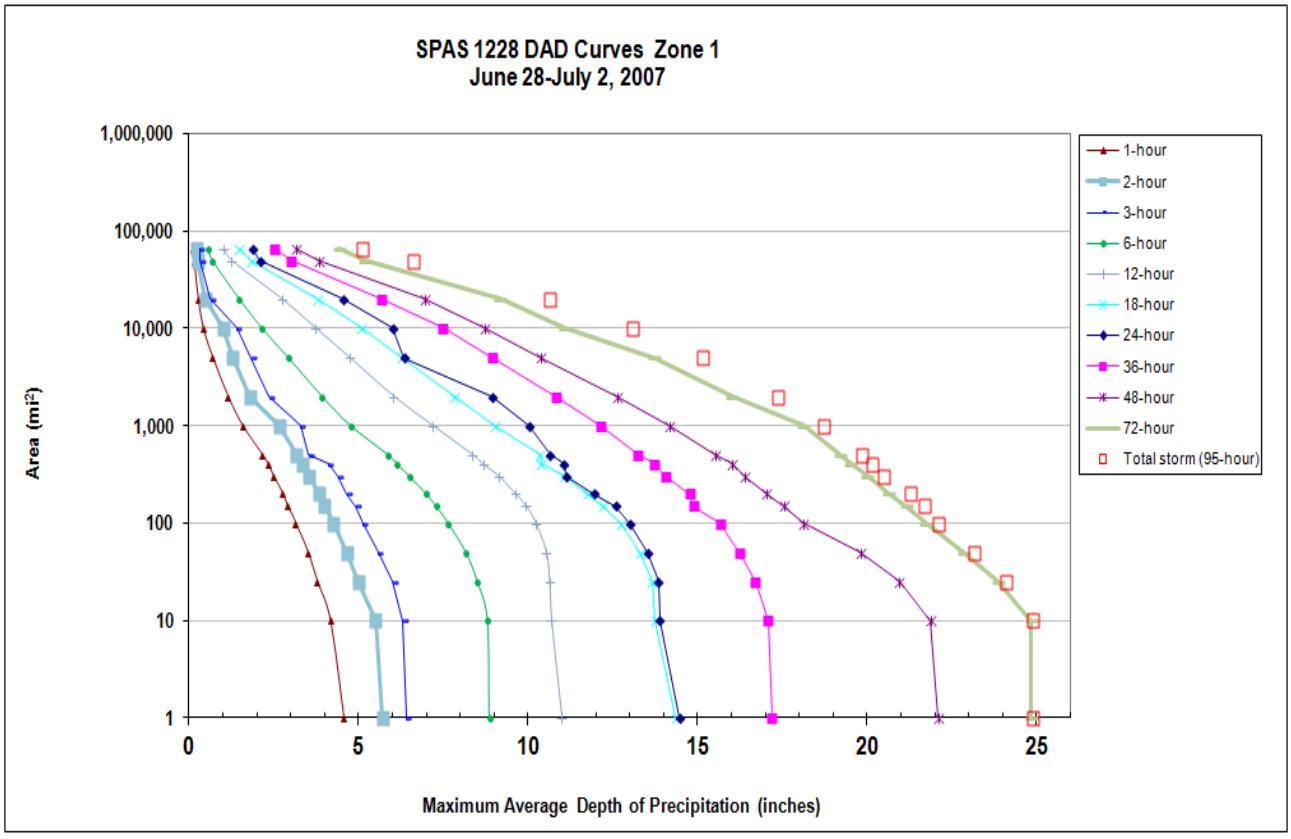
Storm or Storm Center Name	**SPAS 1228 Fall River, KS**	
Storm Date(s)	6/28/2007 - 7/2/2007	
Storm Type	Synoptic	
Storm Location	37.63 N	96.05 W
Storm Center Elevation	900	
Precipitation Total & Duration	25.50 Inches 95-hours	
Storm Representative Dewpoint	76.5 F	24
Storm Representative Dewpoint Location	31.00 N	95.50 W
Maximum Dewpoint	80.0 F	
Moisture Inflow Vector	SSE @ 460	Miles
In-place Maximization Factor	**1.18**	
Temporal Transposition (Date)	15-Jul	
Transposition Dewpoint Location	31.37 N	84.95 W
Transposition Maximum Dewpoint	79.5 F	
Transposition Adjustment Factor	**1.00**	
Grid Point Elevation	600	
Inflow Barrier Height	600	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.18**	

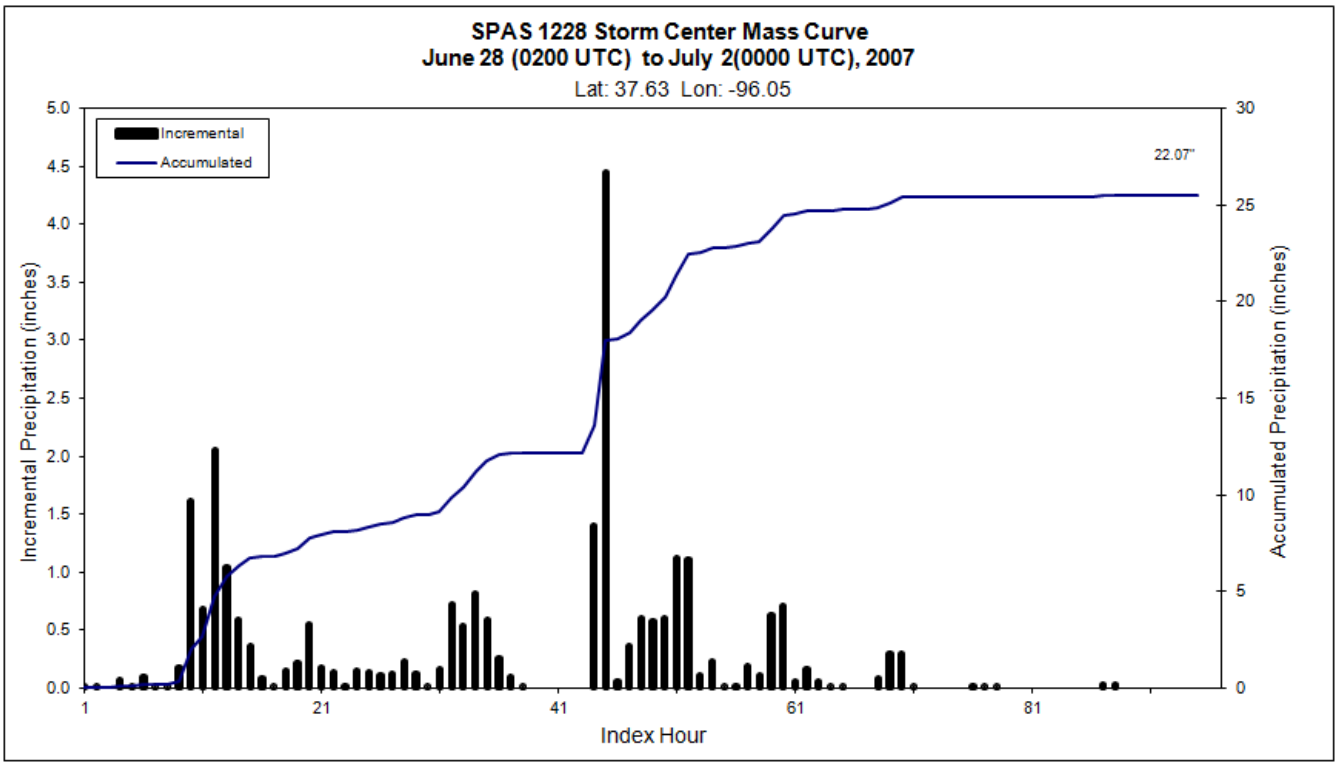
Fall River, KS June 30, 2007 Moisture Inflow Analysis

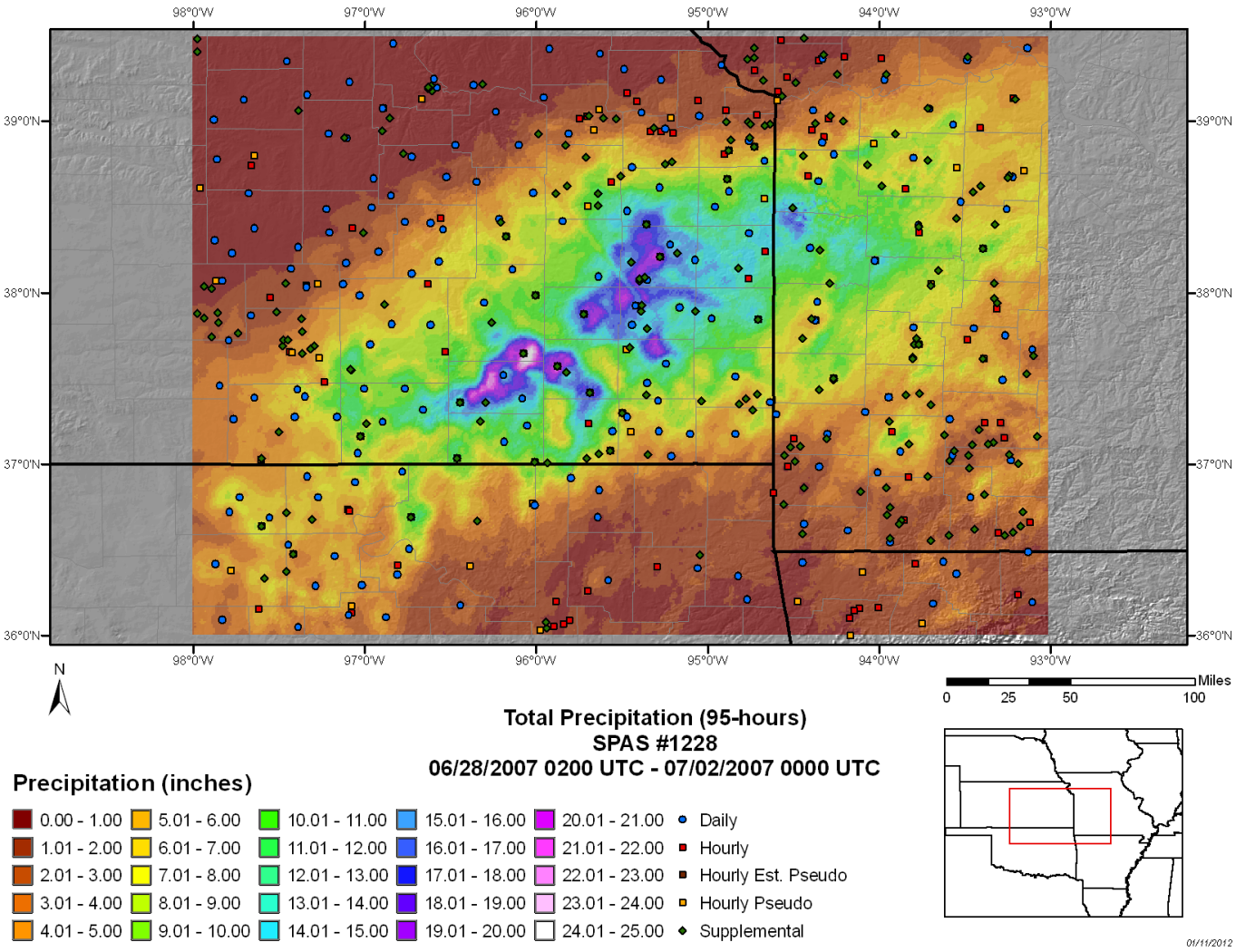
Storm 1228 - June 28 (0200 UTC) - July 2 (0000 UTC), 2007

MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

	Duration (hours)										
Area (mi^2)	1	2	3	6	12	18	24	36	48	72	Total
0.4	4.68	5.84	6.6	9.12	11.37	14.72	14.91	17.72	22.66	25.43	25.50
1	4.56	5.7	6.41	8.86	10.99	14.35	14.46	17.2	22.09	24.84	24.90
10	4.16	5.5	6.31	8.81	10.69	13.76	13.89	17.08	21.88	24.84	24.90
25	3.78	4.99	6.02	8.51	10.63	13.66	13.85	16.71	20.96	23.86	24.10
50	3.5	4.66	5.58	8.17	10.53	13.31	13.53	16.24	19.81	22.86	23.18
100	3.14	4.26	5.12	7.64	10.22	12.73	13.01	15.68	18.13	21.74	22.11
150	2.9	4	4.91	7.28	9.93	12.22	12.58	14.89	17.55	21.16	21.69
200	2.76	3.83	4.65	6.99	9.61	11.77	11.94	14.76	17.05	20.65	21.28
300	2.49	3.54	4.4	6.5	9.14	11.07	11.13	14.05	16.39	20.02	20.49
400	2.33	3.35	4.11	6.15	8.67	10.39	11.07	13.73	16.03	19.53	20.17
500	2.16	3.18	3.52	5.87	8.36	10.36	10.65	13.24	15.53	19.21	19.84
1,000	1.57	2.66	3.29	4.76	7.18	9.02	10.04	12.13	14.17	18.13	18.71
2,000	1.14	1.79	2.37	3.92	6.03	7.83	8.95	10.82	12.62	16.03	17.37
5,000	0.69	1.29	1.83	2.92	4.73	6.29	6.35	8.96	10.39	13.73	15.17
10,000	0.41	1	1.4	2.15	3.74	5.09	6.01	7.5	8.72	11.08	13.09
20,000	0.26	0.48	0.63	1.48	2.73	3.79	4.55	5.68	6.95	9.18	10.66
50,000	0.14	0.25	0.34	0.68	1.24	1.84	2.11	3.02	3.82	5.21	6.63
65,761	0.12	0.23	0.31	0.55	1.03	1.48	1.87	2.51	3.15	4.44	5.10




SPAS 1228 Storm Center Mass Curve
June 28 (0200 UTC) to July 2(0000 UTC), 2007
Lat: 37.63 Lon: -96.05
Incremental
Accumulated
22.07"
Incremental Precipitation (inches)
Accumulated Precipitation (inches)
Index Hour
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
0
5
10
15
20
25
30
1
21
41
61
81



Total Precipitation (95-hours)
SPAS #1228
06/28/2007 0200 UTC - 07/02/2007 0000 UTC

Precipitation (inches)

0.00 - 1.00	5.01 - 6.00	10.01 - 11.00	15.01 - 16.00	20.01 - 21.00	Daily
1.01 - 2.00	6.01 - 7.00	11.01 - 12.00	16.01 - 17.00	21.01 - 22.00	Hourly
2.01 - 3.00	7.01 - 8.00	12.01 - 13.00	17.01 - 18.00	22.01 - 23.00	Hourly Est. Pseudo
3.01 - 4.00	8.01 - 9.00	13.01 - 14.00	18.01 - 19.00	23.01 - 24.00	Hourly Pseudo
4.01 - 5.00	9.01 - 10.00	14.01 - 15.00	19.01 - 20.00	24.01 - 25.00	Supplemental

01/11/2012

Hokah, MN August 18, 2007
Transpositioned Grid Points: All
Storm Type: Synoptic/Convective

Storm Name:	**Hokah, MN-SPAS 1048**
Storm Date:	**18-Aug-2007**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date	**3-Aug**	
	Lat	**Long**
Storm center location	**43.81 N**	**91.63 W**
Storm Rep dew point location	**38.91 N**	**93.85 W**
Transposition dewpoint location	**36.10 N**	**84.49 W**
Grid point location	**41.00 N**	**82.00 W**

Moisture Inflow Direction:	**SSW @ 360**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**1,000**	feet
Storm Duration	**24**	hours

The storm representative dew point is	**74.0 F**	with total precipitable water above sea level of				**2.73**	inches.
The in-place maximum dew point is	**80.5 F**	with total precipitable water above sea level of				**3.68**	inches.
The transpositioned maximum dew point is	**78.5 F**	with total precipitable water above sea level of				**3.37**	inches.
The in-place storm elevation is	**1,000**	which subtracts	**0.240**	inches of precipitable water at		**74.0 F**	
The in-place storm elevation is	**1,000**	which subtracts	**0.300**	inches of precipitable water at		**80.5 F**	
The transposition basin elevation at	**900**	which subtracts	**0.260**	inches of precipitable water at		**78.5 F**	
The inflow barrier/basin elevation height is	**900**	which subtracts	**0.260**	inches of precipitable water at		**78.5 F**	

The in-place storm maximization factor is	**1.36**
The transposition/elevation to basin factor is	**0.92**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.25**

Notes: DAD values taken from SPAS 1048. 24hr ave Td from KIXD, KLXT, KMCI, KMKC, KOJC, KSTJ, KSZL 17th 00Z to 18th 00Z

Observed Storm Depth-Area-Duration

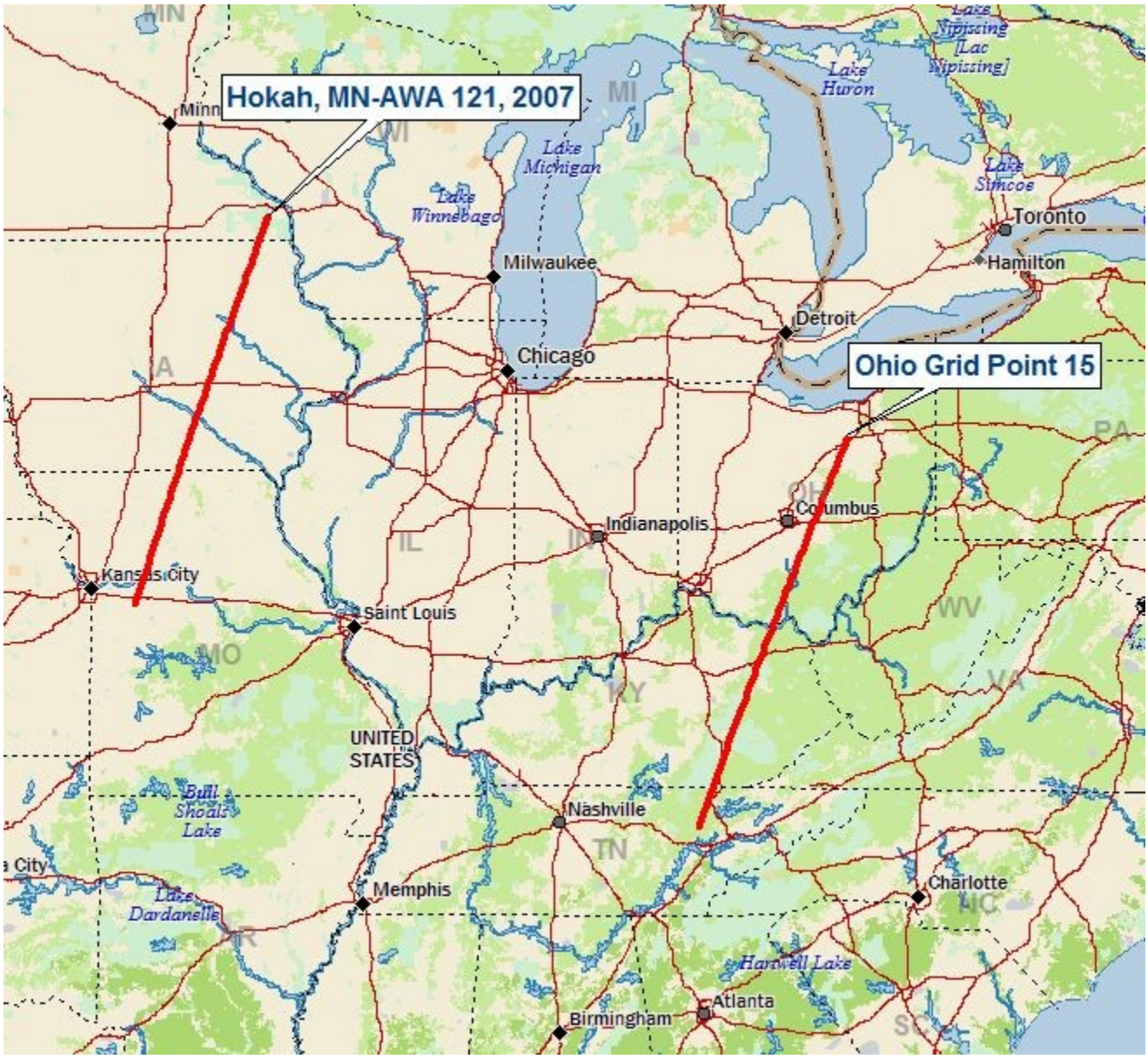
	1 Hour	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**2.12**	**7.6**	**11.6**	**14.6**	**17.1**	-	**17.6**	**18.2**	-	**18.3**
10 sq miles	**2.12**	**7.5**	**11.1**	**13.9**	**16.0**	-	**16.3**	**17.0**	-	**17.2**
100 sq miles	**2.09**	**6.3**	**9.4**	**11.5**	**13.3**	-	**13.9**	**14.8**	-	**15.1**
200 sq miles	**2.03**	**6.0**	**8.9**	**11.0**	**12.6**	-	**13.4**	**14.2**	-	**14.5**
500 sq miles	**1.79**	**5.5**	**8.1**	**10.1**	**11.6**	-	**12.3**	**13.0**	-	**13.3**
1000 sq miles	**1.53**	**5.0**	**7.3**	**9.2**	**10.5**	-	**11.1**	**11.8**	-	**12.1**
2000 sq miles	**0.95**	**4.4**	**6.2**	**8.1**	**9.3**	-	**9.9**	**10.5**	-	**10.8**
5000 sq miles	**0.87**	**3.5**	**5.2**	**6.5**	**7.6**	-	**8.2**	**8.8**	-	**9.0**
10000 sq miles	**0.63**	**2.7**	**4.0**	**5.4**	**6.1**	-	**6.8**	**7.3**	-	**7.5**
20000 sq miles	**0.41**	**1.8**	**3.0**	**4.0**	**4.5**	-	**5.1**	**5.6**	-	**5.9**

Adjusted Storm Depth-Area-Duration

	1 Hour	6 Hours	12 Hours	18 Hours	24 Hours	30 Hours	36 Hours	48 Hours	60 Hours	72 Hours
1 sq miles	**2.6**	**9.4**	**14.5**	**18.2**	**21.3**	-	**21.9**	**22.7**	-	**22.8**
10 sq miles	**2.6**	**9.3**	**13.8**	**17.3**	**19.9**	-	**20.3**	**21.2**	-	**21.4**
100 sq miles	**2.6**	**7.9**	**11.7**	**14.4**	**16.5**	-	**17.4**	**18.4**	-	**18.9**
200 sq miles	**2.5**	**7.5**	**11.1**	**13.7**	**15.7**	-	**16.7**	**17.7**	-	**18.1**
500 sq miles	**2.2**	**6.9**	**10.1**	**12.6**	**14.5**	-	**15.3**	**16.2**	-	**16.6**
1000 sq miles	**1.9**	**6.2**	**9.1**	**11.4**	**13.1**	-	**13.9**	**14.8**	-	**15.1**
2000 sq miles	**1.2**	**5.4**	**7.7**	**10.1**	**11.6**	-	**12.3**	**13.1**	-	**13.4**
5000 sq miles	**1.1**	**4.3**	**6.5**	**8.1**	**9.5**	-	**10.2**	**11.0**	-	**11.2**
10000 sq miles	**0.8**	**3.4**	**5.0**	**6.7**	**7.6**	-	**8.5**	**9.1**	-	**9.4**
20000 sq miles	**0.5**	**2.3**	**3.8**	**5.0**	**5.6**	-	**6.4**	**7.0**	-	**7.3**

Storm or Storm Center Name	**Hokah, MN-SPAS 1048**	
Storm Date(s)	18-Aug-2007	
Storm Type	Synoptic/Thunderstorms	
Storm Location	43.81 N	91.63 W
Storm Center Elevation	1,000	
Precipitation Total & Duration	18.93 Inches 72-hours-SPAS 1048	
Storm Representative Dewpoint	74.0 F	24
Storm Representative Dewpoint Location	38.91 N	93.85 W
Maximum Dewpoint	80.5 F	
Moisture Inflow Vector	SSW @ 360	
In-place Maximization Factor	**1.36**	
Temporal Transposition (Date)	3-Aug	
Transposition Dewpoint Location	36.10 N	84.49 W
Transposition Maximum Dewpoint	78.5 F	
Transposition Adjustment Factor	**0.92**	
Grid Point Elevation	900	
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**1.25**	

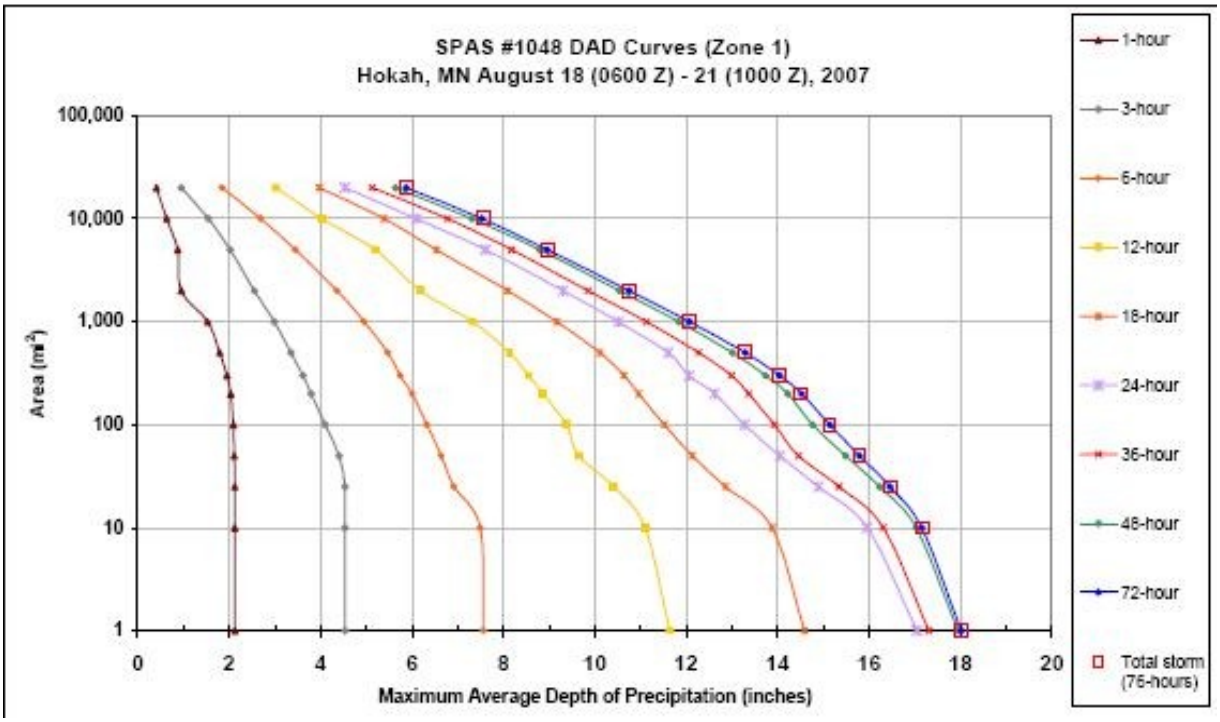
Hokah, MN August 18, 2007 Moisture Inflow Analysis

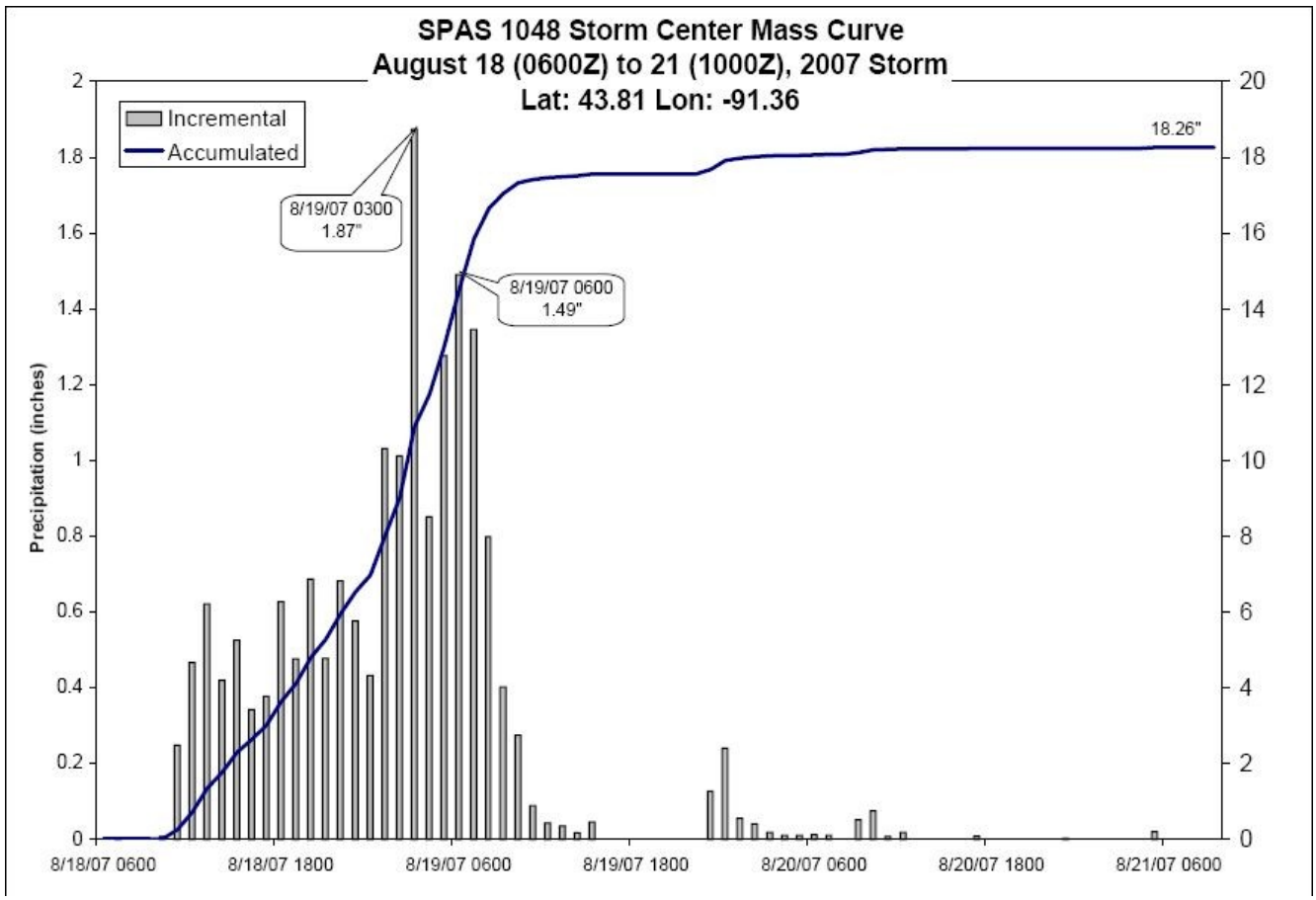


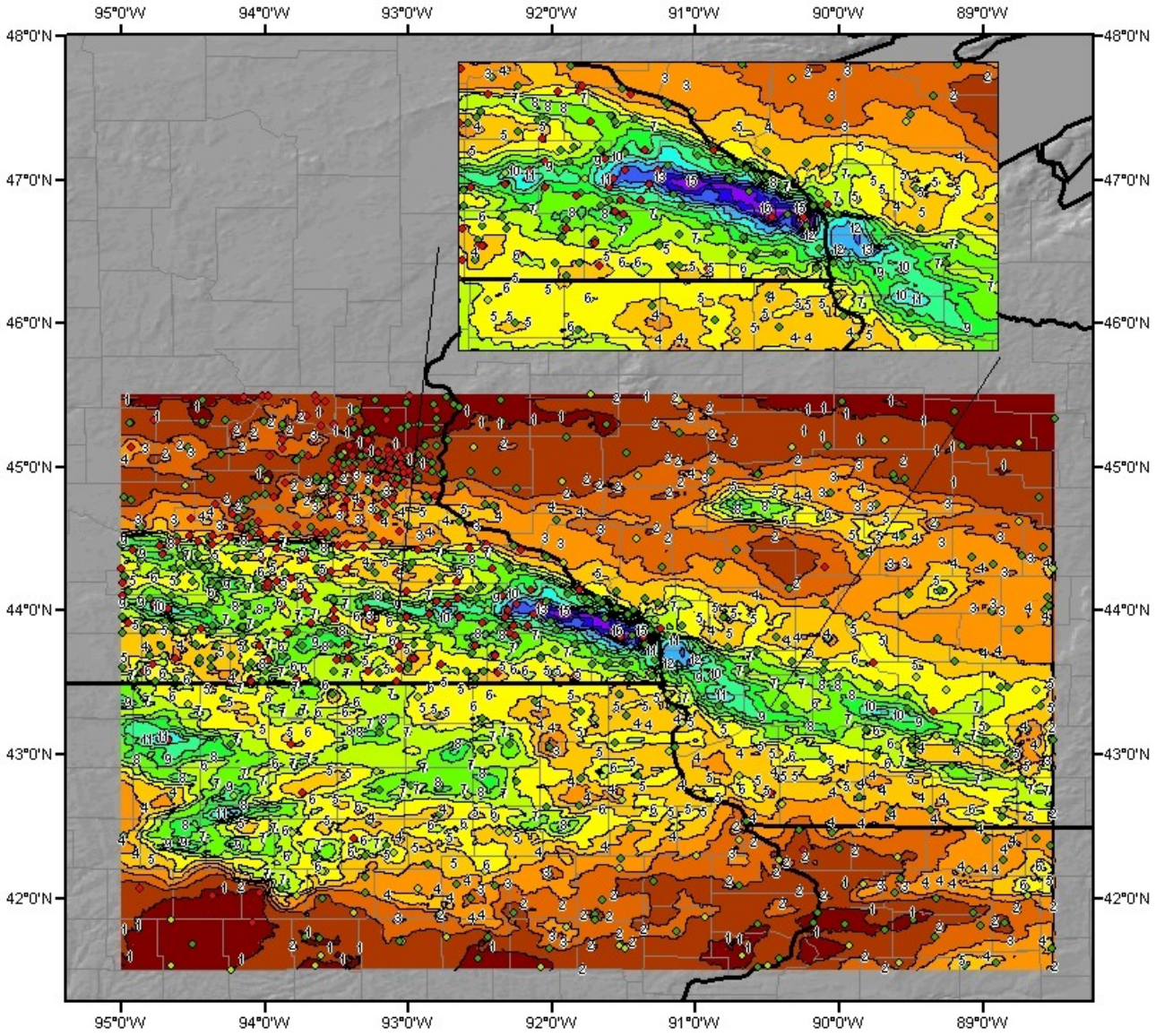
Storm 1048 - Hokah, MN August 18 - August 21, 2007

MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

Area (mi^2)	Duration (hours)									
	1	3	6	12	18	24	36	48	72	Total
0.24	2.45	4.77	7.85	11.89	14.88	17.31	17.55	18.19	18.26	18.26
1	2.12	4.53	7.56	11.64	14.59	17.05	17.31	17.95	18.02	18.02
10	2.12	4.53	7.49	11.10	13.88	15.96	16.31	17.03	17.15	17.17
25	2.12	4.53	6.92	10.42	12.86	14.89	15.34	16.23	16.45	16.46
50	2.11	4.40	6.64	9.65	12.13	14.05	14.46	15.49	15.79	15.79
100	2.09	4.10	6.33	9.37	11.52	13.27	13.93	14.76	15.14	15.14
200	2.03	3.79	6.00	8.87	10.96	12.62	13.37	14.22	14.52	14.52
300	1.95	3.61	5.74	8.55	10.64	12.06	12.99	13.74	14.04	14.04
500	1.79	3.35	5.47	8.13	10.11	11.60	12.27	13.01	13.29	13.30
1,000	1.53	2.99	4.95	7.33	9.17	10.51	11.13	11.84	12.07	12.07
2,000	0.95	2.55	4.36	6.18	8.09	9.30	9.85	10.54	10.75	10.76
5,000	0.87	2.02	3.45	5.19	6.53	7.61	8.18	8.79	8.96	8.98
10,000	0.63	1.54	2.69	4.02	5.39	6.09	6.78	7.31	7.53	7.55
20,000	0.41	0.95	1.84	3.02	3.97	4.53	5.13	5.63	5.87	5.90




SPAS 1048 Storm Center Mass Curve
August 18 (0600Z) to 21 (1000Z), 2007 Storm
Lat: 43.81 Lon: -91.36
Incremental
Accumulated
8/19/07 0300
1.87"
8/19/07 0600
1.49"
18.26"
Precipitation (inches)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
0
2
4
6
8
10
12
14
16
18
20
8/18/07 0600
8/18/07 1800
8/19/07 0600
8/19/07 1800
8/20/07 0600
8/20/07 1800
8/21/07 0600



Total Rainfall (76-hours)
Hokah, MN 2007 Storm
Storm #1048 August 18 (0600 Z) to 21 (1000 Z), 2007

Miles
0 25 50 100
Kilometers
0 45 90 180 270

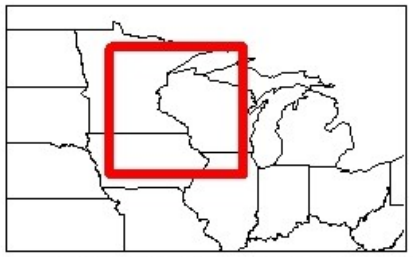
Gauging Stations

Daily Hourly Hourly Pseudo Supplemental

Precipitation (inches)

0.00 - 1.00	5.01 - 6.00	10.01 - 11.00	15.01 - 16.00
1.01 - 2.00	6.01 - 7.00	11.01 - 12.00	16.01 - 17.00
2.01 - 3.00	7.01 - 8.00	12.01 - 13.00	17.01 - 18.00
3.01 - 4.00	8.01 - 9.00	13.01 - 14.00	18.01 - 19.00
4.01 - 5.00	9.01 - 10.00	14.01 - 15.00	

N



Coordinate system: GCS North American 1983
Scale: 1:4,350,819

MesoRAWA May 12, 2008

Douglasville, GA September 19, 2009
Transpositioned Grid Points: 1-2, 6-9
Storm Type: Synoptic/Convective

Storm Name:	**SPAS 1218 - Georgia**
Storm Date:	**9/19-22/2009**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 1

Temporal Transposition Date **5-Sep**

	Lat	Long
Storm center location	**33.87 N**	**84.76 W**
Storm Rep Td location	**30.66 N**	**85.42 W**
Transposition Td location	**34.79 N**	**86.16 W**
Grid point location	**38.00 N**	**85.50 W**

Moisture Inflow Direction:	**SSW @ 225**	miles
Grid Point Elevation	**600**	feet
Storm Elevation	**1,000**	feet
Storm Duration	**24**	hours

The storm representative Td is	**76.0 F**	with total precipitable water above sea level of			**2.99**	inches.
The in-place maximum Td is	**77.5 F**	with total precipitable water above sea level of			**3.22**	inches.
The transpositioned maximum Td is	**76.5 F**	with total precipitable water above sea level of			**3.07**	inches.
The in-place storm elevation is	**1,000**	which subtracts	**0.260**	inches of precipitable water at	**76.0 F**	
The in-place storm elevation is	**1,000**	which subtracts	**0.280**	inches of precipitable water at	**77.5 F**	
The transposition storm elevation at	**600**	which subtracts	**0.16**	inches of precipitable water at	**76.5 F**	
The moisture inflow barrier height is	**600**	which subtracts	**0.16**	inches of precipitable water at	**76.5 F**	

The in-place maximization factor is	**1.08**
The transposition/elevation factor is	**0.99**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**1.06**

Notes: Storm representative Td value was based on 24-hr surface dewpoint values between September 20-21 along with Hysplit backward trajectory. Values were selected in region where temperature did not vary more than a degree over a large area. Used the average of KMAI, KPAM, KOZR.

Observed Storm Depth-Area-Duration

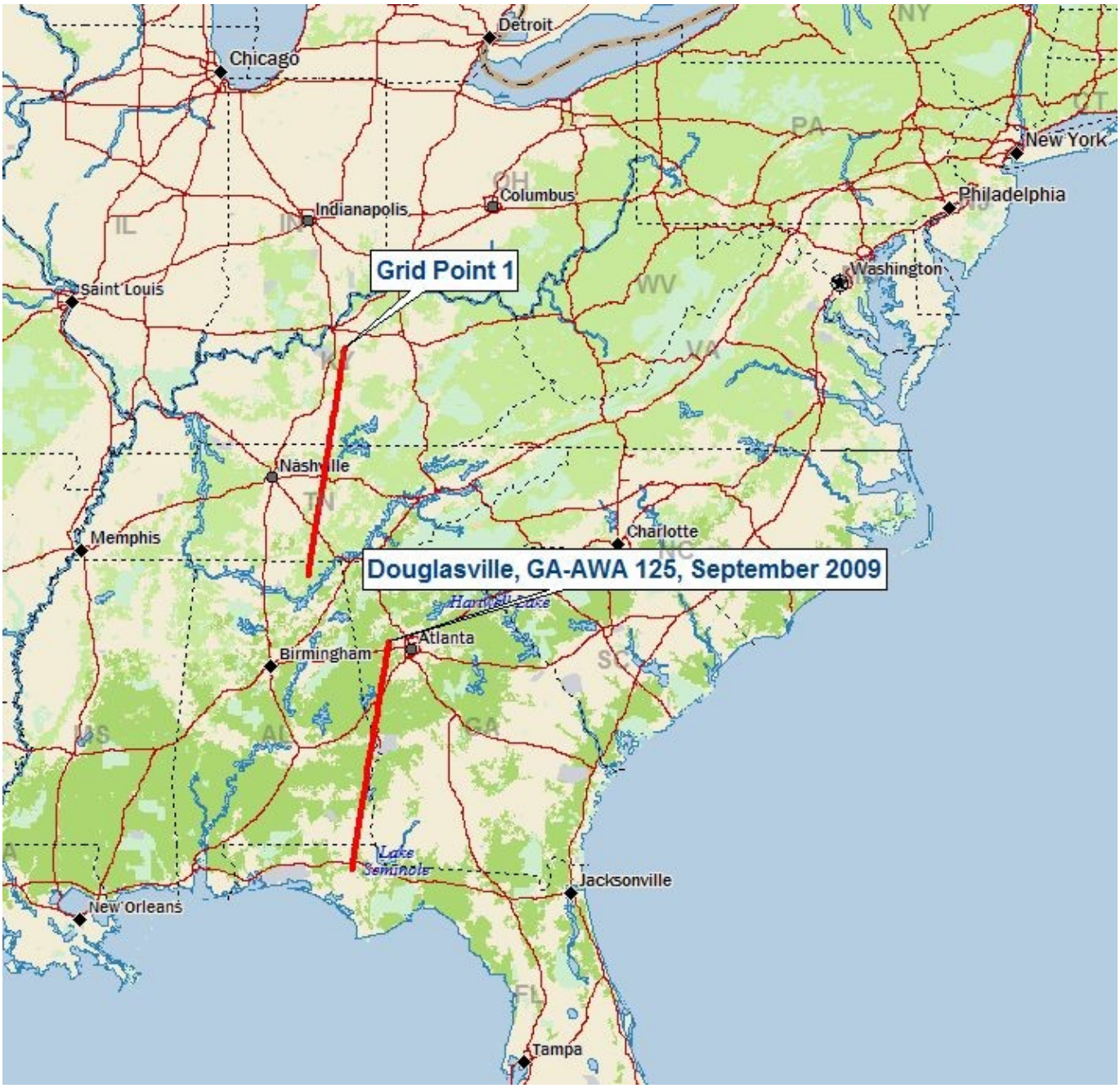
	1 Hours	6 Hours	12 Hours	18 Hours	24 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**4.9**	**15.0**	**18.8**	**19.2**	**20.6**	**22.8**	**24.0**	-	**24.4**
100 sq miles	**2.7**	**10.5**	**15.6**	**16.3**	**18.8**	**20.5**	**21.2**	-	**21.8**
200 sq miles	**2.3**	**9.2**	**14.1**	**15.1**	**16.8**	**19.0**	**19.4**	-	**20.2**
500 sq miles	**1.8**	**7.1**	**10.6**	**12.2**	**14.3**	**15.8**	**16.1**	-	**17.2**
1000 sq miles	**1.2**	**5.5**	**8.1**	**9.8**	**10.7**	**13.0**	**13.2**	-	**14.5**
2000 sq miles	**1.0**	**3.8**	**5.2**	**7.4**	**8.2**	**9.6**	**10.9**	-	**12.2**
5000 sq miles	**0.6**	**2.2**	**3.0**	**4.9**	**5.7**	**7.2**	**7.8**	-	**8.8**
10000 sq miles	**0.3**	**1.5**	**1.9**	**3.1**	**4.0**	**4.7**	**4.8**	-	**6.1**
20000 sq miles	-	-	-	-	-	-	-	-	-

Adjusted Storm Depth-Area-Duration

	1 Hours	6 Hours	12 Hours	18 Hours	24 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**5.2**	**15.9**	**20.0**	**20.4**	**22.0**	**24.3**	**25.5**	-	**26.0**
100 sq miles	**2.9**	**11.2**	**16.6**	**17.3**	**20.0**	**21.8**	**22.6**	-	**23.2**
200 sq miles	**2.5**	**9.8**	**15.0**	**16.1**	**17.9**	**20.2**	**20.6**	-	**21.5**
500 sq miles	**1.9**	**7.5**	**11.3**	**13.0**	**15.2**	**16.8**	**17.1**	-	**18.3**
1000 sq miles	**1.3**	**5.8**	**8.6**	**10.4**	**11.4**	**13.8**	**14.1**	-	**15.4**
2000 sq miles	**1.1**	**4.0**	**5.6**	**7.9**	**8.7**	**10.2**	**11.6**	-	**13.0**
5000 sq miles	**0.6**	**2.4**	**3.2**	**5.2**	**6.1**	**7.6**	**8.3**	-	**9.4**
10000 sq miles	**0.4**	**1.6**	**2.1**	**3.3**	**4.2**	**5.0**	**5.1**	-	**6.5**
20000 sq miles	-	-	-	-	-	-	-	-	-

Storm or Storm Center Name	**SPAS 1218 - Georgia**	
Storm Date(s)	9/19-22/2009	
Storm Type	Synoptic	
Storm Location	33.87 N	84.76 W
Storm Center Elevation	1,000	
Precipitation Total & Duration (10 sq mi)	25.37 inches in 72 hours	
Storm Representative Td	76.0 F	
Storm Representative Td Location	30.66 N	85.42 W
In-place Maximum Td	77.5 F	
Moisture Inflow Vector	SSW @ 225	
In-place Maximization Factor	1.08	
Temporal Transposition (Date)	5-Sep	
Transposition Td Location	34.79 N	86.16 W
Transposition Maximum Td	76.5 F	
Transposition Adjustment Factor	0.99	
Grid Point Elevation	600	
Inflow Barrier Height	600	
Elevation Adjustment Factor	**1.08**	
Total Adjustment Factor	**1.00**	

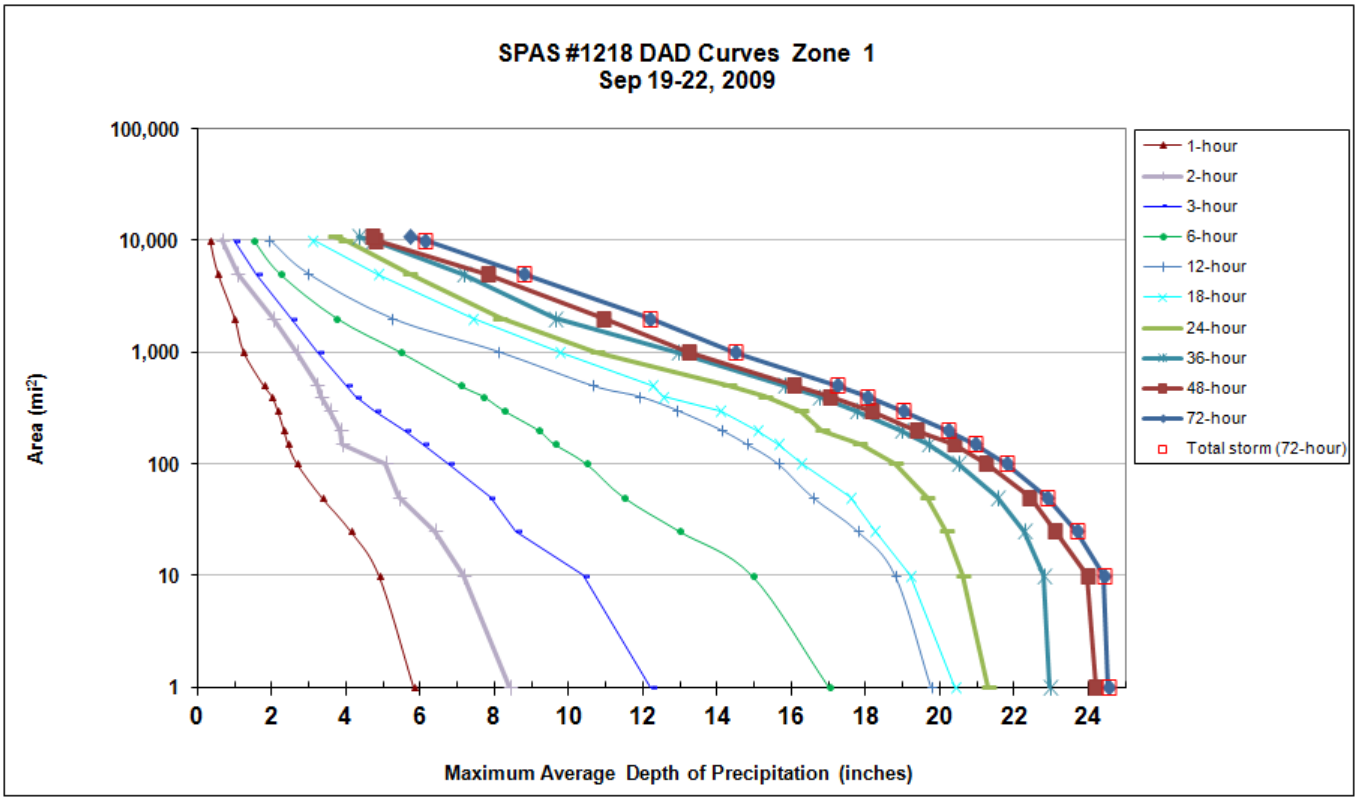
Douglasville, GA September 19, 2009 Moisture Inflow Analysis

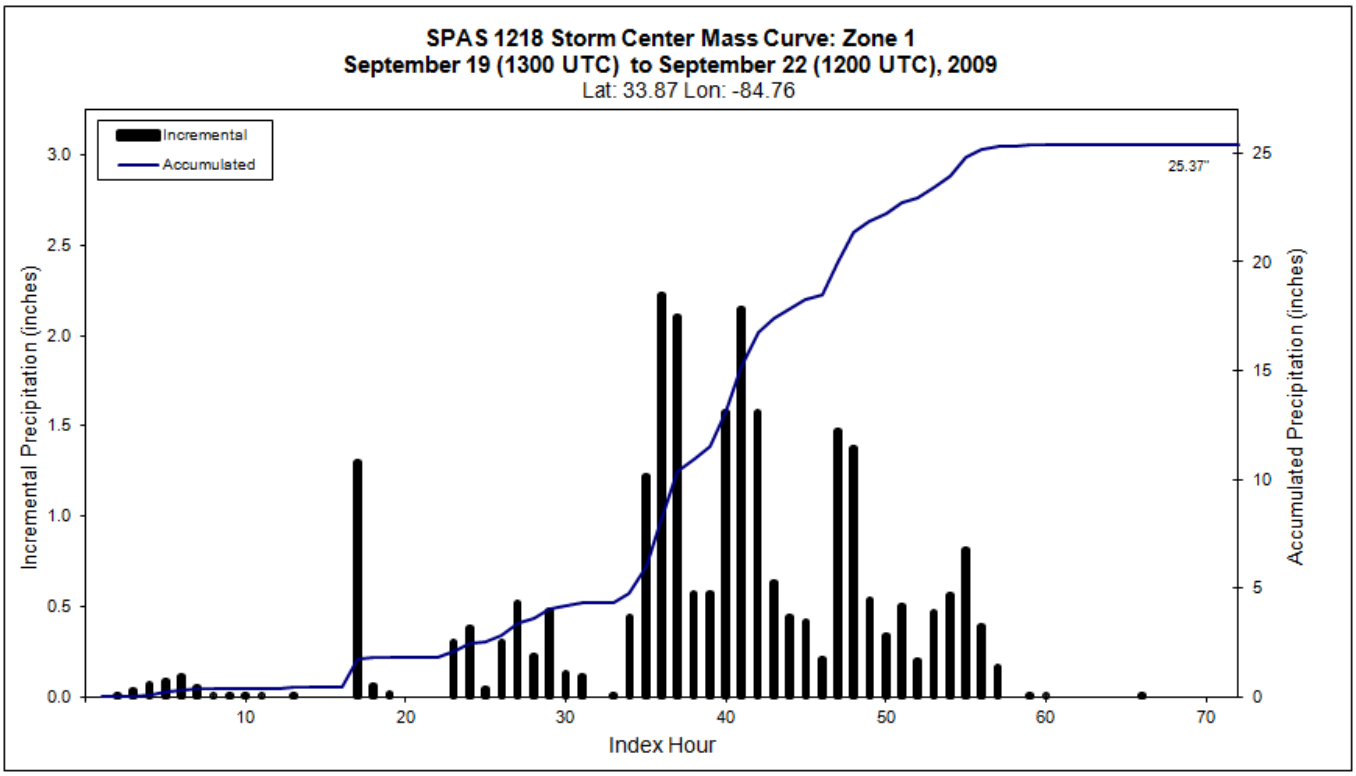


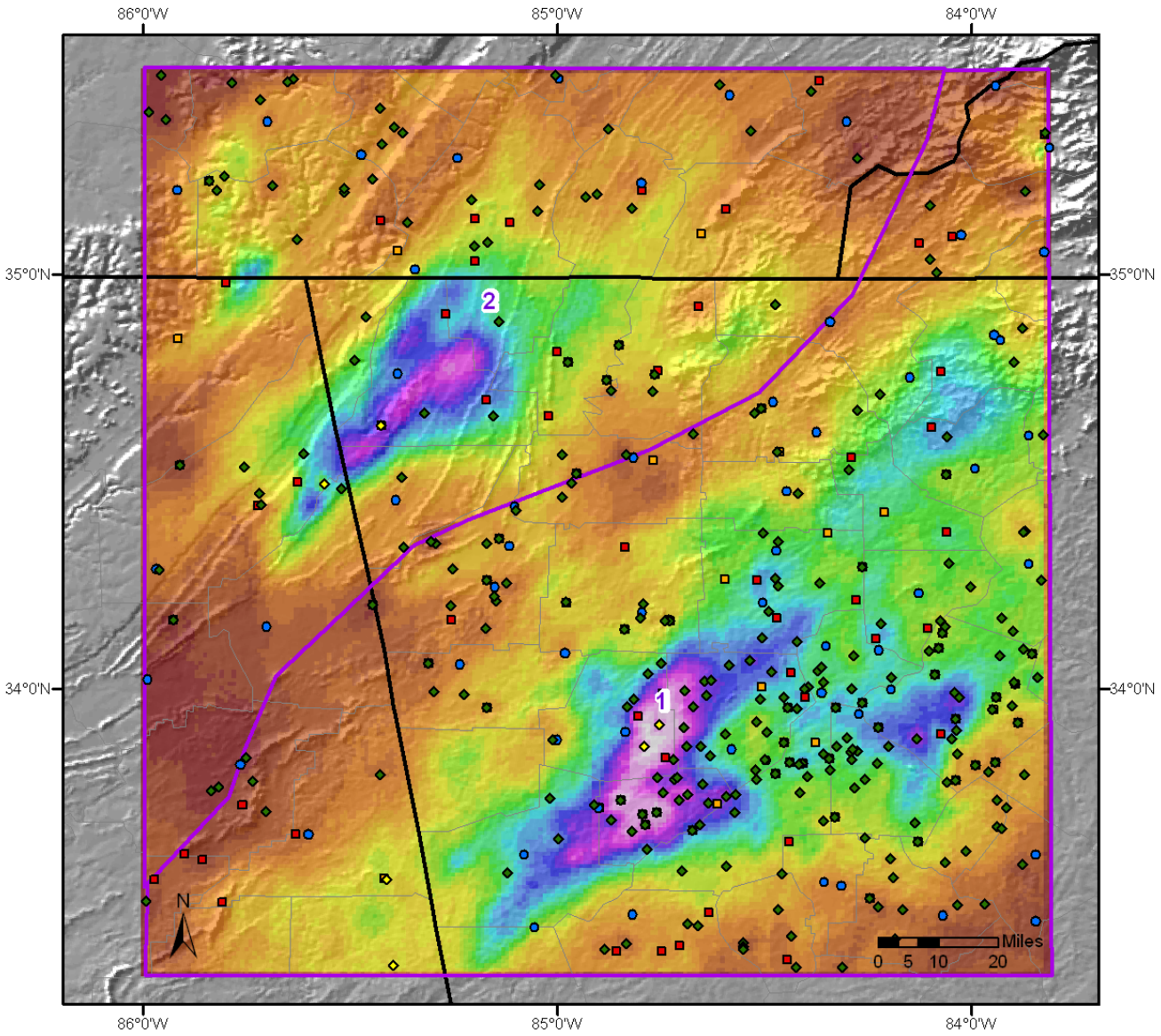
Storm 1218 - September 19 (1300 UTC) - September 22 (1200 UTC), 2009

MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

	Duration (hours)										
Area (mi^2)	1	2	3	6	12	18	24	36	48	72	Total
0.4	5.94	8.82	12.98	17.36	20.31	21.07	22.82	23.83	24.95	25.37	25.37
1	5.84	8.42	12.20	17.03	19.76	20.42	21.29	22.97	24.19	24.54	24.54
10	4.90	7.17	10.39	14.95	18.79	19.21	20.63	22.80	23.97	24.41	24.41
25	4.13	6.39	8.58	12.98	17.77	18.25	20.18	22.26	23.10	23.69	23.69
50	3.35	5.42	7.87	11.49	16.57	17.60	19.63	21.56	22.41	22.89	22.89
100	2.68	5.05	6.76	10.48	15.63	16.27	18.79	20.48	21.24	21.79	21.79
150	2.44	3.90	6.07	9.62	14.78	15.63	17.85	19.67	20.36	20.93	20.93
200	2.33	3.86	5.57	9.18	14.10	15.09	16.82	18.97	19.35	20.22	20.22
300	2.16	3.58	4.78	8.25	12.92	14.09	16.26	17.73	18.16	19.00	19.00
400	2.01	3.32	4.27	7.70	11.89	12.55	15.29	16.73	17.03	18.04	18.04
500	1.78	3.22	4.01	7.07	10.63	12.24	14.32	15.80	16.07	17.22	17.22
1,000	1.24	2.69	3.24	5.45	8.11	9.77	10.74	12.95	13.24	14.48	14.48
2,000	1.00	2.02	2.50	3.75	5.22	7.40	8.15	9.62	10.93	12.17	12.17
5,000	0.55	1.08	1.60	2.22	2.97	4.87	5.73	7.17	7.81	8.80	8.80
10,000	0.33	0.65	0.98	1.51	1.93	3.10	3.97	4.69	4.79	6.12	6.12
10,922	0.31	0.59	0.87	1.37	1.89	3.06	3.68	4.33	4.71	5.72	5.72



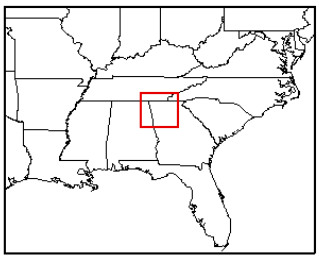

SPAS 1218 Storm Center Mass Curve: Zone 1
September 19 (1300 UTC) to September 22 (1200 UTC), 2009
Lat: 33.87 Lon: -84.76
Incremental
Accumulated
25.37"
Incremental Precipitation (inches)
Accumulated Precipitation (inches)
Index Hour
0.0
0.5
1.0
1.5
2.0
2.5
3.0
0
5
10
15
20
25
10
20
30
40
50
60
70



Total 72-hour Rainfall (Inches)
09/19/2009 1300 UTC - 09/22/2009 1300 UTC
SPAS #1218

Rainfall in Inches

1.02	4.51 - 5.00	8.51 - 9.00	15.01 - 16.00	Daily
1.03 - 1.50	5.01 - 5.50	9.01 - 9.50	16.01 - 17.00	Hourly
1.51 - 2.00	5.51 - 6.00	9.51 - 10.00	17.01 - 18.00	Hourly Pseudo
2.01 - 2.50	6.01 - 6.50	10.01 - 11.00	18.01 - 19.00	Supplemental
2.51 - 3.00	6.51 - 7.00	11.01 - 12.00	19.01 - 20.00	Supplemental Estimated
3.01 - 3.50	7.01 - 7.50	12.01 - 13.00	20.01 - 22.00	DAD Zones
3.51 - 4.00	7.51 - 8.00	13.01 - 14.00	22.01 - 24.00	
4.01 - 4.50	8.01 - 8.50	14.01 - 15.00	24.01 - 26.00	



METSTAT
09/09/2011

Warner Park, TN April 30, 2010
Transpositioned Grid Points: All
Storm Type: Synoptic/Convective

Storm Name:	**SPAS 1208 - Warner Park, TN**
Storm Date:	**5/1-3/2010**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date	**15-May**	
	Lat	**Long**
Storm center location	**36.06 N**	**86.91 W**
Storm Rep Td location	**31.50 N**	**90.00 W**
Transposition Td location	**36.44 N**	**85.09 W**
Grid point location	**41.00 N**	**82.00 W**

Moisture Inflow Direction:	**SSW @ 360**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**600**	feet
Storm Duration	**12**	hours

The storm representative Td is	**75.0 F**	with total precipitable water above sea level of				**2.85**	inches.
The in-place maximum Td is	**76.5 F**	with total precipitable water above sea level of				**3.07**	inches.
The transpositioned maximum Td is	**74.5 F**	with total precipitable water above sea level of				**2.79**	inches.
The in-place storm elevation is	**600**	which subtracts	**0.15**	inches of precipitable water at		**75.0 F**	
The in-place storm elevation is	**600**	which subtracts	**0.16**	inches of precipitable water at		**76.5 F**	
The transposition storm elevation at	**900**	which subtracts	**0.23**	inches of precipitable water at		**74.5 F**	
The moisture inflow barrier height is	**900**	which subtracts	**0.23**	inches of precipitable water at		**74.5 F**	

The in-place maximization factor is	**1.08**
The transposition/elevation factor is	**0.88**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**0.95**

Notes: Storm representative Td value was based on 12-hr surface dewpoint values between on May 1 along with Hysplit backward trajectory. Values were selected in region where temperature did not vary more than a degree over a large area. Used an average of KJAN, KMCB, KHBG, and KASD.

Observed Storm Depth-Area-Duration

	1 Hours	6 Hours	12 Hours	18 Hours	24 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**4.4**	**15.0**	**17.3**	**18.0**	**18.1**	**19.0**	**19.2**	**19.4**	-
100 sq miles	**3.7**	**13.2**	**15.9**	**16.5**	**16.6**	**18.3**	**18.5**	**18.7**	-
200 sq miles	**3.4**	**12.2**	**15.0**	**15.6**	**15.8**	**17.8**	**18.1**	**18.3**	-
500 sq miles	**2.8**	**10.6**	**13.5**	**14.3**	**14.6**	**16.8**	**17.4**	**17.7**	-
1000 sq miles	**2.3**	**9.0**	**12.6**	**13.3**	**13.5**	**16.4**	**16.9**	**17.1**	-
2000 sq miles	**1.8**	**7.4**	**11.1**	**12.0**	**12.6**	**15.7**	**16.1**	**16.4**	-
5000 sq miles	**1.4**	**5.2**	**9.2**	**10.3**	**10.9**	**14.1**	**14.8**	**15.0**	-
10000 sq miles	**1.0**	**3.8**	**7.4**	**8.4**	**8.6**	**12.2**	**13.0**	**13.1**	-
20000 sq miles	**0.7**	**2.9**	**5.4**	**6.3**	**7.2**	**10.2**	**11.0**	**11.2**	-

Adjusted Storm Depth-Area-Duration

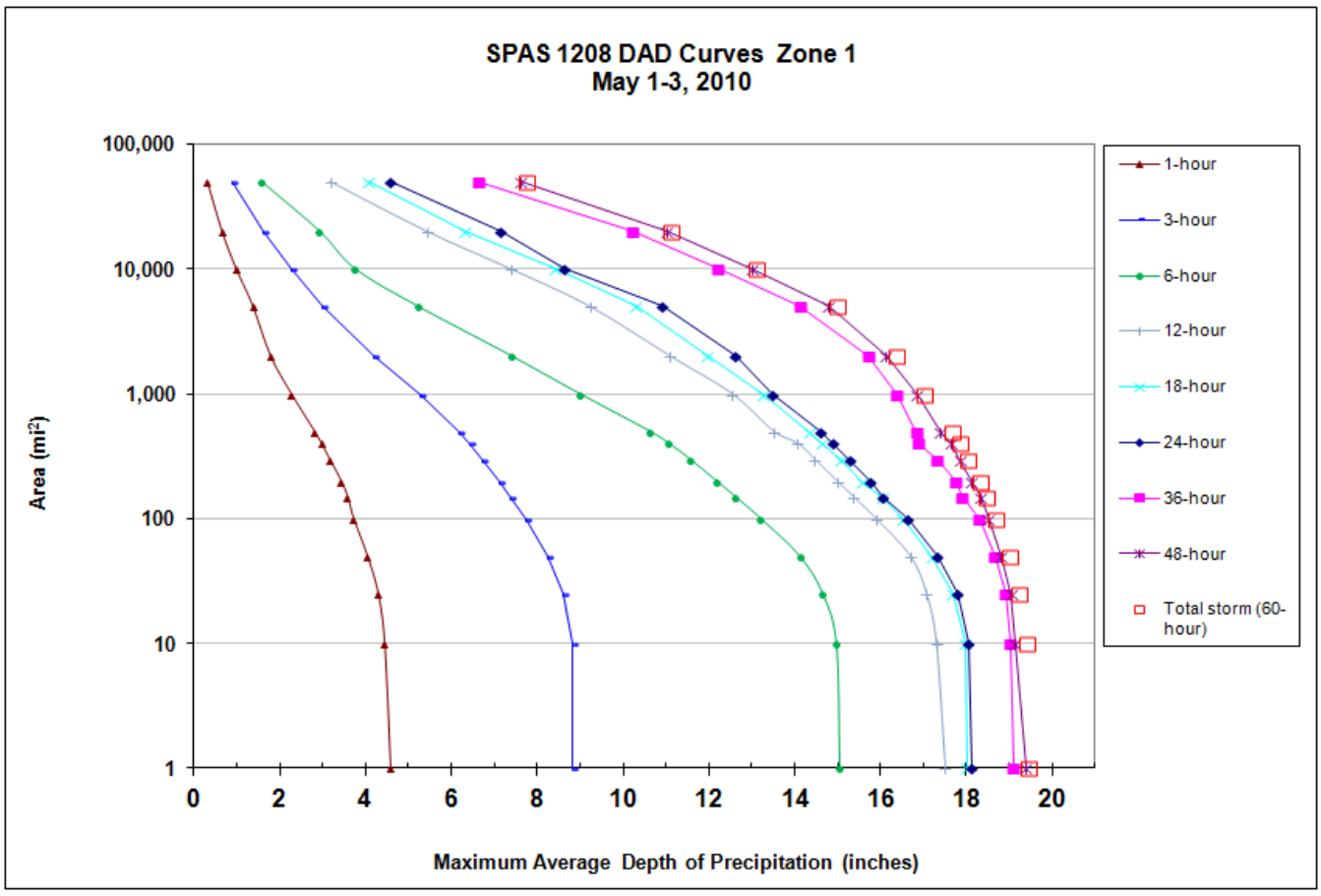
	1 Hours	6 Hours	12 Hours	18 Hours	24 Hours	36 Hours	48 Hours	60 Hours	72 Hours
10 sq miles	**4.2**	**14.2**	**16.4**	**17.0**	**17.1**	**18.1**	**18.2**	**18.4**	-
100 sq miles	**3.5**	**12.5**	**15.1**	**15.7**	**15.8**	**17.4**	**17.6**	**17.7**	-
200 sq miles	**3.3**	**11.5**	**14.2**	**14.8**	**15.0**	**16.8**	**17.2**	**17.4**	-
500 sq miles	**2.7**	**10.1**	**12.8**	**13.6**	**13.9**	**16.0**	**16.5**	**16.8**	-
1000 sq miles	**2.2**	**8.5**	**11.9**	**12.6**	**12.8**	**15.5**	**16.0**	**16.2**	-
2000 sq miles	**1.7**	**7.0**	**10.5**	**11.3**	**12.0**	**14.9**	**15.3**	**15.5**	-
5000 sq miles	**1.3**	**5.0**	**8.8**	**9.8**	**10.4**	**13.4**	**14.0**	**14.2**	-
10000 sq miles	**0.9**	**3.6**	**7.0**	**8.0**	**8.2**	**11.6**	**12.3**	**12.4**	-
20000 sq miles	**0.6**	**2.8**	**5.2**	**6.0**	**6.8**	**9.7**	**10.5**	**10.6**	-

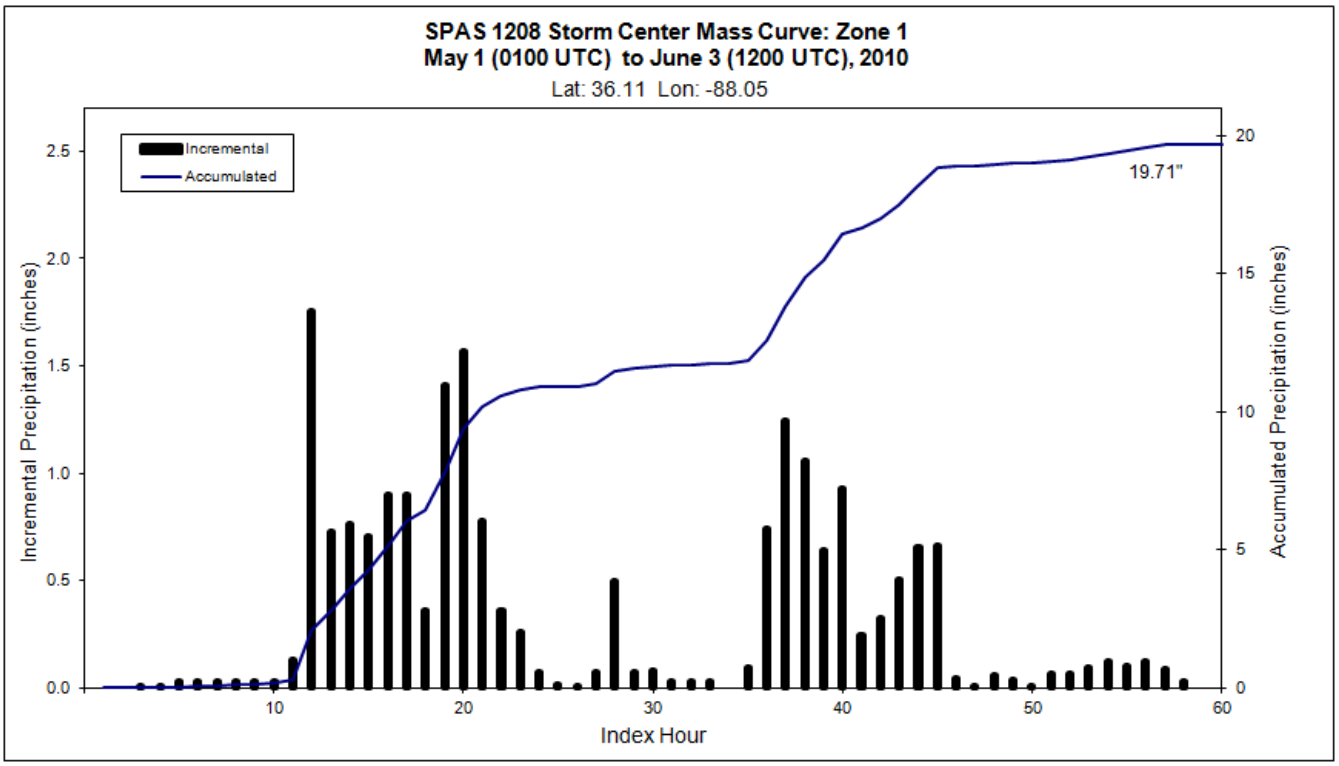
Storm or Storm Center Name	**SPAS 1208 - Warner Park, TN**	
Storm Date(s)	5/1-3/2010	
Storm Type	Synoptic	
Storm Location	36.06 N	86.91 W
Storm Center Elevation	600	feet
Precipitation Total & Duration	19.71 inches in 60 hours	
Storm Representative Td	75.0 F	
Storm Representative Td Location	31.50 N	90.00 W
In-place Maximum Td	76.5 F	
Moisture Inflow Vector	SSW @ 360	
In-place Maximization Factor	1.08	
Temporal Transposition (Date)	15-May	
Transposition Td Location	36.44 N	85.09 W
Transposition Maximum Td	74.5 F	
Transposition Adjustment Factor	0.88	
Grid Point 15 Elevation	900	feet
Inflow Barrier Height	900	feet
Barrier Adjustment Factor	1.00	
Total Adjustment Factor	**0.95**	

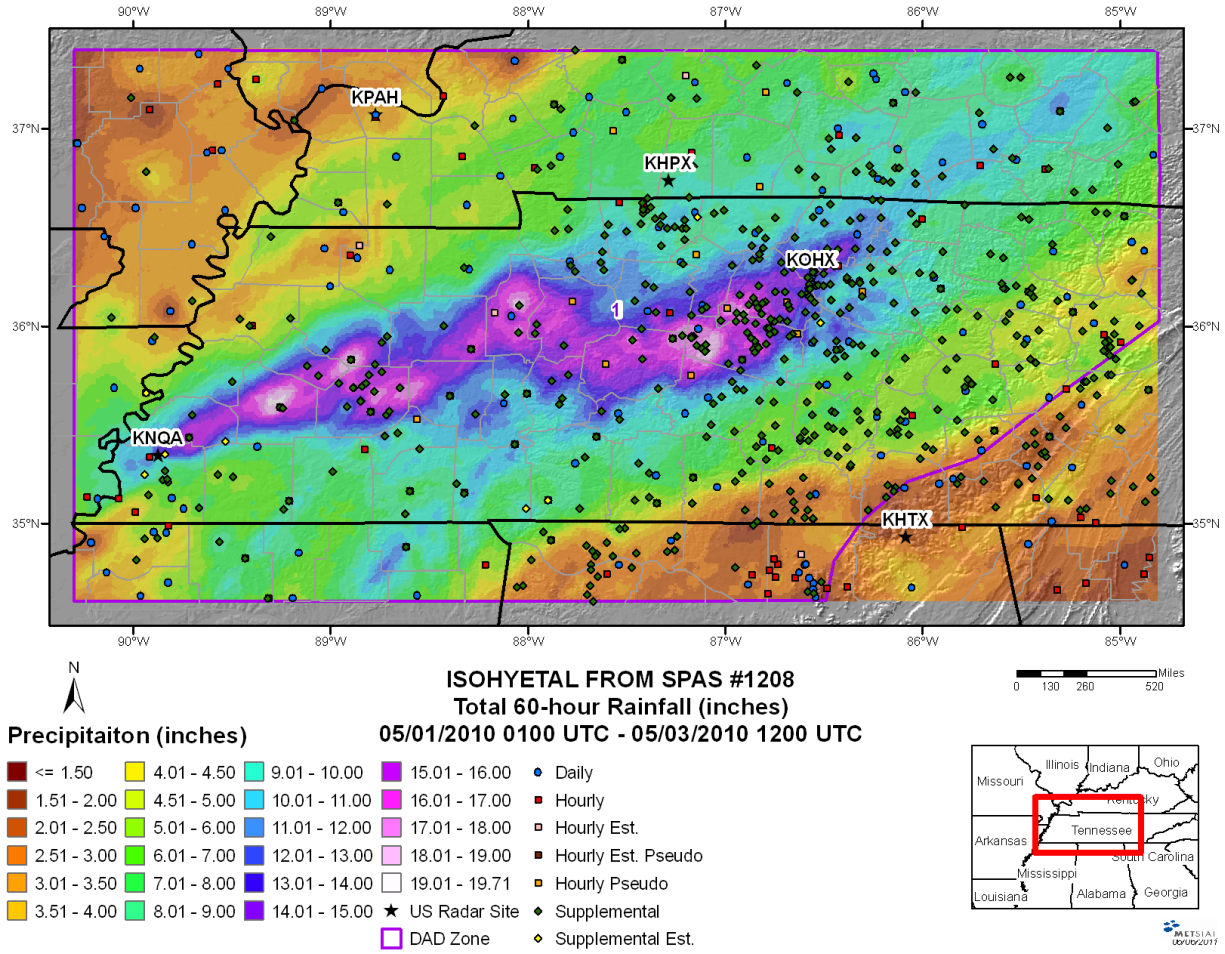
Warner Park, TN April 30, 2010 Moisture Inflow Analysis

Storm 1208 - May 1 (0100 UTC) - May 3 (1200 UTC), 2010
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

	Duration (hours)									
Area (mi^2)	1	3	6	12	18	24	36	48	60	Total
0	4.63	8.92	15.31	17.77	18.33	18.39	19.36	19.66	19.71	19.71
1	4.58	8.82	15.06	17.52	18.03	18.12	19.11	19.38	19.45	19.45
10	4.44	8.81	14.98	17.31	17.97	18.06	19.04	19.15	19.43	19.43
25	4.29	8.61	14.66	17.08	17.69	17.8	18.91	19.05	19.24	19.24
50	4.04	8.25	14.12	16.7	17.2	17.33	18.67	18.82	19.01	19.01
100	3.72	7.72	13.21	15.9	16.52	16.63	18.31	18.51	18.71	18.71
150	3.58	7.37	12.62	15.37	16.04	16.07	17.91	18.35	18.48	18.48
200	3.43	7.12	12.18	14.99	15.57	15.78	17.75	18.11	18.32	18.32
300	3.16	6.72	11.56	14.47	15.07	15.28	17.33	17.85	18.05	18.05
400	2.97	6.44	11.07	14.08	14.65	14.91	16.9	17.65	17.85	17.85
500	2.81	6.19	10.63	13.52	14.34	14.61	16.84	17.4	17.67	17.67
1,000	2.27	5.26	8.99	12.55	13.27	13.5	16.39	16.86	17.05	17.05
2,000	1.79	4.19	7.41	11.11	11.96	12.62	15.72	16.14	16.37	16.37
5,000	1.38	3	5.23	9.24	10.3	10.93	14.12	14.79	15	15.00
10,000	0.99	2.28	3.76	7.39	8.42	8.64	12.21	13	13.13	13.13
20,000	0.66	1.6	2.93	5.44	6.33	7.16	10.24	11.04	11.15	11.15
50,000	0.32	0.88	1.58	3.19	4.08	4.59	6.63	7.63	7.75	7.75




SPAS 1208 Storm Center Mass Curve: Zone 1
May 1 (0100 UTC) to June 3 (1200 UTC), 2010
Lat: 36.11 Lon: -88.05
Incremental
Accumulated
19.71"
Incremental Precipitation (inches)
Accumulated Precipitation (inches)
Index Hour
0.0
0.5
1.0
1.5
2.0
2.5
0
5
10
15
20
10
20
30
40
50
60


90°W
89°W
88°W
87°W
86°W
85°W
37°N
36°N
35°N
KPAH
KHPX
KOHX
KNQA
KHTX
1
N
ISOHYETAL FROM SPAS #1208
Total 60-hour Rainfall (inches)
05/01/2010 0100 UTC - 05/03/2010 1200 UTC
Miles
0 130 260 520
Precipitaiton (inches)
<= 1.50
1.51 - 2.00
2.01 - 2.50
2.51 - 3.00
3.01 - 3.50
3.51 - 4.00
4.01 - 4.50
4.51 - 5.00
5.01 - 6.00
6.01 - 7.00
7.01 - 8.00
8.01 - 9.00
9.01 - 10.00
10.01 - 11.00
11.01 - 12.00
12.01 - 13.00
13.01 - 14.00
14.01 - 15.00
15.01 - 16.00
16.01 - 17.00
17.01 - 18.00
18.01 - 19.00
19.01 - 19.71
US Radar Site
DAD Zone
Daily
Hourly
Hourly Est.
Hourly Est. Pseudo
Hourly Pseudo
Supplemental
Supplemental Est.
Illinois
Indiana
Ohio
Missouri
Kentucky
Arkansas
Tennessee
South Carolina
Mississippi
Louisiana
Alabama
Georgia

Dubuque, IA July 27, 2011
Transpositioned Grid Points: 1-3, 6-23
Storm Type: Synoptic/Convective

Storm Name:	**SPAS 1220 Dubuque, IA**
Storm Date:	**7/27-28/2011**
AWA Analysis Date:	**2/20/2013**

Storm Adjustment for Grid Point 15

Temporal Transposition Date **15-Jul**

	Lat	Long
Storm center location	**42.44 N**	**90.75 W**
Storm Rep dew point location	**40.95 N**	**90.27 W**
Transposition dewpoint location	**39.51 N**	**82.52 W**
Grid point location	**41.00 N**	**82.00 W**

Moisture Inflow Direction:	**SSE @ 105**	miles
Grid Point Elevation	**900**	feet
Storm Elevation	**900**	feet
Storm Duration	**12**	hours

The storm representative dew point is	**79.0 F**	with total precipitable water above sea level of			**3.44**	inches.
The in-place maximum dew point is	**81.0 F**	with total precipitable water above sea level of			**3.76**	inches.
The transpositioned maximum dew point is	**78.0 F**	with total precipitable water above sea level of			**3.29**	inches.
The in-place storm elevation is	**900**	which subtracts	**0.260**	inches of precipitable water at	**79.0 F**	
The in-place storm elevation is	**900**	which subtracts	**0.280**	inches of precipitable water at	**81.0 F**	
The transposition basin elevation at	**900**	which subtracts	**0.250**	inches of precipitable water at	**78.0 F**	
The inflow barrier/basin elevation height is	**900**	which subtracts	**0.250**	inches of precipitable water at	**78.0 F**	

The in-place storm maximization factor is	**1.09**
The transposition/elevation to basin factor is	**0.87**
The barrier adjustment factor is	**1.00**
The total adjustment factor is	**0.96**

Notes: DAD values taken from SPAS 1220. Storm representative dew point value was based on maximum 12-hr Td values between July 25-28, 2011 at WBAN 04949, 14842, and 14923.

Observed Storm Depth-Area-Duration

	1 Hours	3 Hours	6 Hours	12 Hours	18 Hours	24 Hours	36 Hours	48 Hours	72 Hours
1 sq miles	**4.1**	**9.1**	**10.6**	**14.4**	**14.7**	**14.7**			
10 sq miles	**3.9**	**8.6**	**10.2**	**13.7**	**14.4**	**14.5**			
100 sq miles	**2.9**	**5.7**	**9.1**	**12.4**	**13.2**	**13.3**			
200 sq miles	**2.3**	**5.6**	**8.8**	**11.9**	**12.6**	**12.7**			
500 sq miles	**2.1**	**4.6**	**7.9**	**10.9**	**11.7**	**11.7**			
1000 sq miles	**1.7**	**3.9**	**7.0**	**9.6**	**10.2**	**10.4**			
2000 sq miles	**1.3**	**3.0**	**5.2**	**7.7**	**8.4**	**8.6**			
5000 sq miles	**0.7**	**1.6**	**3.3**	**4.9**	**5.4**	**5.9**			
10000 sq miles	**0.4**	**1.0**	**1.9**	**2.9**	**3.5**	**3.8**			
20000 sq miles									

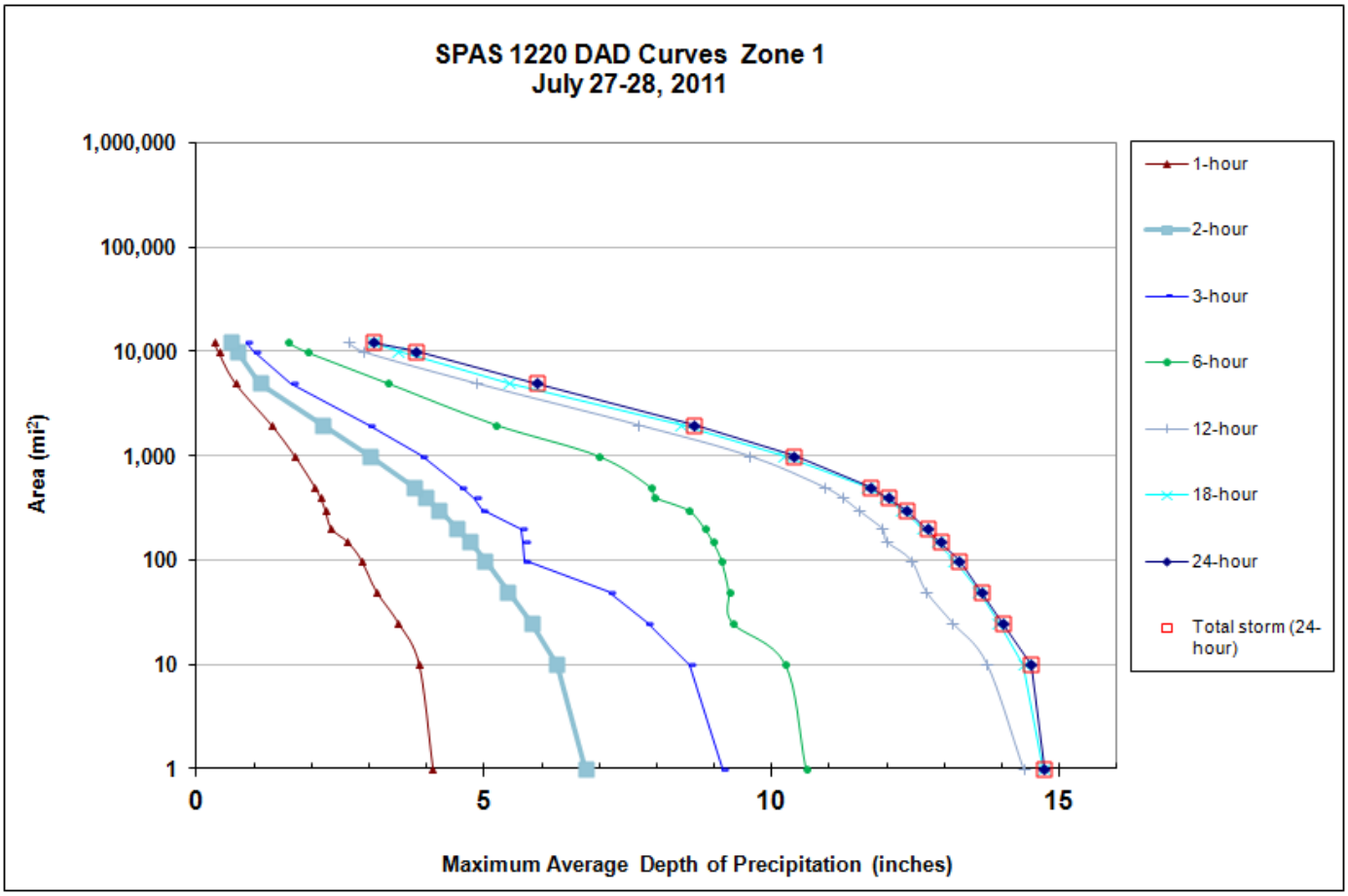
Adjusted Storm Depth-Area-Duration

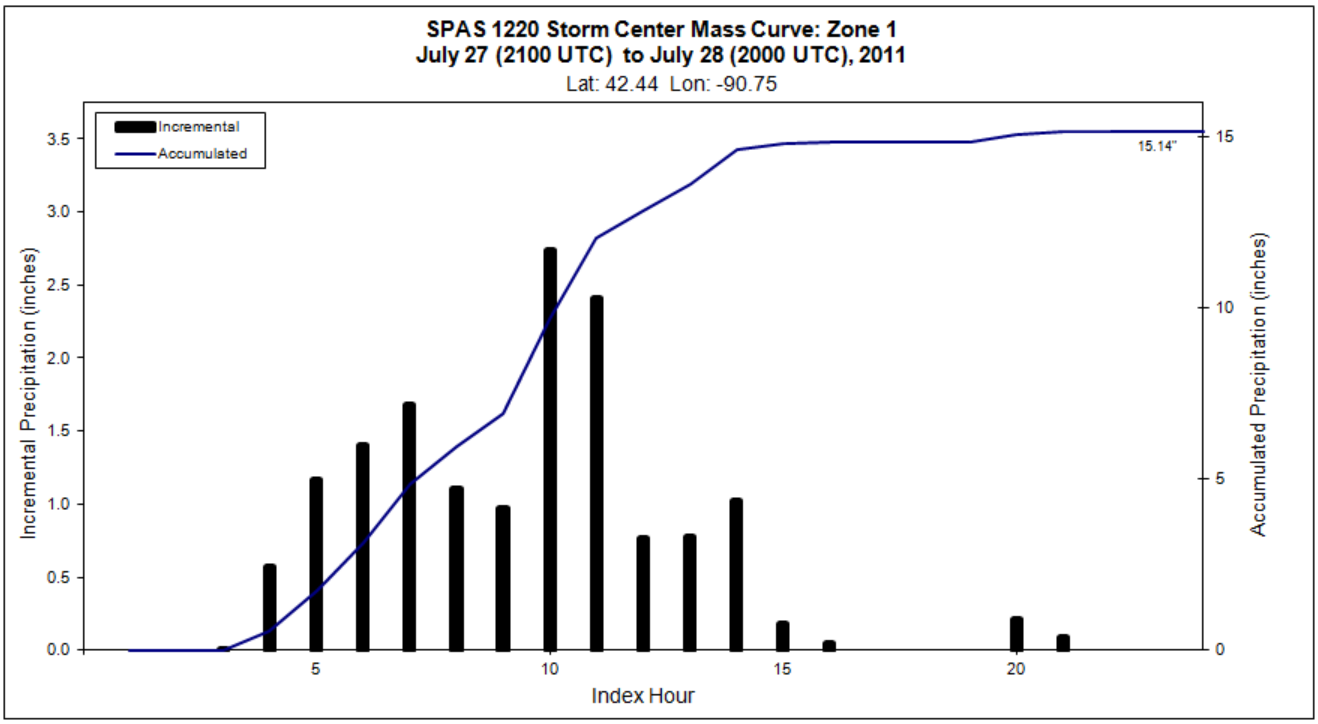
	1 Hours	3 Hours	6 Hours	12 Hours	18 Hours	24 Hours	36 Hours	48 Hours	72 Hours
1 sq miles	**3.9**	**8.7**	**10.1**	**13.7**	**14.1**	**14.1**			
10 sq miles	**3.7**	**8.2**	**9.8**	**13.1**	**13.7**	**13.9**			
100 sq miles	**2.7**	**5.4**	**8.7**	**11.9**	**12.6**	**12.7**			
200 sq miles	**2.2**	**5.4**	**8.5**	**11.4**	**12.1**	**12.1**			
500 sq miles	**2.0**	**4.4**	**7.6**	**10.4**	**11.1**	**11.2**			
1000 sq miles	**1.6**	**3.7**	**6.7**	**9.2**	**9.7**	**9.9**			
2000 sq miles	**1.2**	**2.8**	**5.0**	**7.3**	**8.0**	**8.3**			
5000 sq miles	**0.7**	**1.6**	**3.2**	**4.6**	**5.2**	**5.6**			
10000 sq miles	**0.4**	**0.9**	**1.8**	**2.8**	**3.3**	**3.6**			
20000 sq miles									

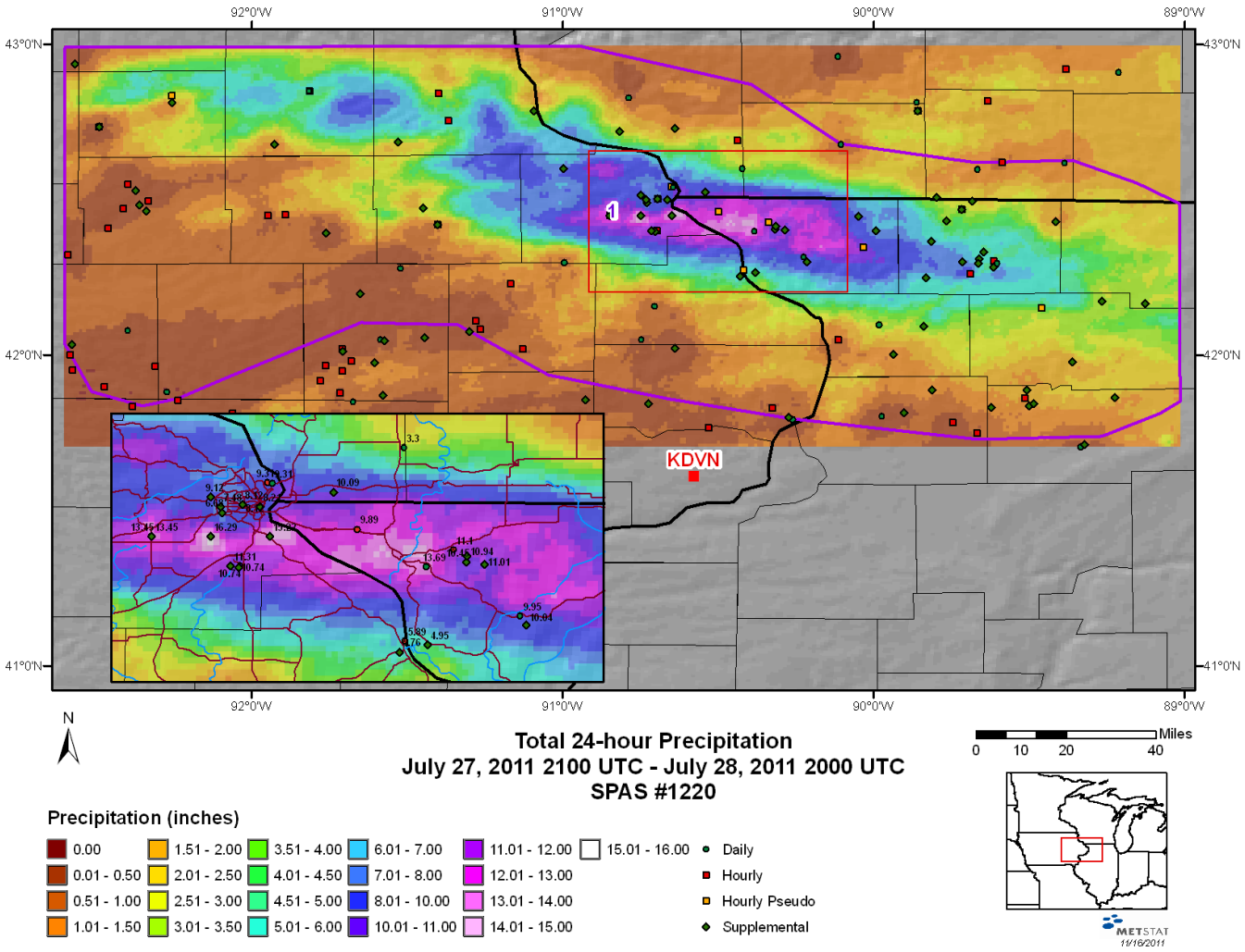
Storm or Storm Center Name	**SPAS 1220 Dubuque, IA**	
Storm Date(s)	7/27-28/2011	
Storm Type	MCC	
Storm Location	42.44 N	90.75 W
Storm Center Elevation	900	
Precipitation Total & Duration	15.14 Inches 24-hours	
Storm Representative Dewpoint	79.0 F	12
Storm Representative Dewpoint Location	40.95 N	90.27 W
Maximum Dewpoint	81.0 F	
Moisture Inflow Vector	SSE @ 105	Miles
In-place Maximization Factor	**1.09**	
Temporal Transposition (Date)	15-Jul	
Transposition Dewpoint Location	39.51 N	82.52 W
Transposition Maximum Dewpoint	78.0 F	
Transposition Adjustment Factor	**0.87**	
Grid Point Elevation	900	
Inflow Barrier Height	900	
Elevation Adjustment Factor	**1.00**	
Total Adjustment Factor	**0.96**	

Dubuque, IA July 27, 2011 Moisture Inflow Analysis

Storm 1220 - July 27 (2100 UTC) - July 28 (2000 UTC), 2011 MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)								
	Duration (hours)							
Area (mi^2)	1	2	3	6	12	18	24	Total
0.4	4.2	6.92	9.38	10.9	14.8	15.14	15.14	15.14
1	4.1	6.76	9.13	10.6	14.37	14.72	14.73	14.73
10	3.86	6.26	8.56	10.24	13.74	14.38	14.5	14.50
25	3.5	5.82	7.83	9.32	13.14	13.94	14	14.00
50	3.12	5.41	7.15	9.26	12.68	13.59	13.64	13.64
100	2.86	5.01	5.69	9.13	12.42	13.17	13.25	13.25
150	2.62	4.75	5.68	8.98	12	12.87	12.93	12.93
200	2.34	4.53	5.63	8.84	11.92	12.63	12.7	12.70
300	2.24	4.21	4.95	8.56	11.51	12.26	12.33	12.33
400	2.15	3.98	4.82	7.97	11.22	11.97	12.02	12.02
500	2.06	3.78	4.58	7.9	10.92	11.65	11.7	11.70
1,000	1.71	3.01	3.9	6.99	9.62	10.19	10.38	10.38
2,000	1.3	2.18	2.98	5.2	7.67	8.4	8.63	8.63
5,000	0.68	1.1	1.64	3.33	4.86	5.44	5.91	5.91
10,000	0.39	0.71	0.99	1.92	2.91	3.49	3.8	3.80
12,295	0.31	0.6	0.86	1.59	2.63	3.06	3.07	3.07




SPAS 1220 Storm Center Mass Curve: Zone 1
July 27 (2100 UTC) to July 28 (2000 UTC), 2011
Lat: 42.44 Lon: -90.75
Incremental
Accumulated
15.14"
Incremental Precipitation (inches)
Accumulated Precipitation (inches)
Index Hour
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
0
5
10
15
5
10
15
20


92°0'W
91°0'W
90°0'W
89°0'W
43°0'N
42°0'N
41°0'N
KDVN
N
Total 24-hour Precipitation
July 27, 2011 2100 UTC - July 28, 2011 2000 UTC
SPAS #1220
Miles
0 10 20 40
Precipitation (inches)
0.00
0.01 - 0.50
0.51 - 1.00
1.01 - 1.50
1.51 - 2.00
2.01 - 2.50
2.51 - 3.00
3.01 - 3.50
3.51 - 4.00
4.01 - 4.50
4.51 - 5.00
5.01 - 6.00
6.01 - 7.00
7.01 - 8.00
8.01 - 10.00
10.01 - 11.00
11.01 - 12.00
12.01 - 13.00
13.01 - 14.00
14.01 - 15.00
15.01 - 16.00
Daily
Hourly
Hourly Pseudo
Supplemental
METSTAT
11/16/2011