

ATTACHMENT A

A.1 RAINFALL FREQUENCY ANALYSIS AND STORM DEPTH DETERMINATION



By: AD
Chkd By:

Date: 004/21/10
Client: UNC
Description: Rainfall Frequency Analysis

Sheet 1 of 5
Job No. 1008506

Goals:

Estimate the 100-yr 24-hr, 500-yr 24-hr storm event for the St. Anthony mine drainage system.

Determine if the Type 2 Rainfall Distribution from Natural Resources Conservation Service (NRCS) is representative of the rainfall in the project study area

Tasks:

1. Obtain precipitation data from meteorological stations in the project study area
2. Select the appropriate rainfall frequency analysis method
3. Estimate the 100-yr 24-hr, 500-yr 24-hr storm events
4. Select the appropriate rainfall distribution

Assumptions:

- The site is located at approximately Lat 35.155 and Long -107.288

Analysis:

Data Selection and Organization

1. Located meteorological stations surrounding the project study area and considered the following parameters:
 - a. Period of record
 - b. Elevation
 - c. Distance from project site
 - d. Type of data (daily and/or hourly)
 - e. Data Source (Western Regional Climate Center (WRCC) / National Climatic Data Center(NCDC))

Meteorological Station	Latitude (ddmm)	Longitude (ddmm)	Elevation (meters)	Distance from Project Site (miles)	Years of Record	Data Description	Source
Laguna	35°02'	107°24'	1768	10.8	1905-1914, 1919-1921, 1927-1934, 1936-1945, 1949-1969, 1971-2004	Daily Data	WRCC (NCDC)
Laguna2	35°03'	107°25'	1770	9.5	2005-2006, 2008-2009	Daily and Hourly Data	WRCC-RAWS
Cubero	35°06'	107°31'	1890	13.2	1977-1980, 1982, 1984-2009	Daily Data	WRCC (NCDC)
Marquez	35°18'	107°18'	2326	9.5	1942-1975	Daily Data	WRCC (NCDC)

2. Purchased data for Laguna, Cubero, and Marquez from WRCC.

<http://www.wrcc.dri.edu/Climsum.html>

3. Downloaded daily and hourly data for Laguna2 from WRCC-RAWS Project
<http://www.raws.dri.edu/index.html>

4. For each station calculated:

- a. Annual Precipitation Totals (including mean, max, and min)
- b. Monthly Totals (including mean)
- c. Max 24-hr annual precipitation

Note: For the analysis, the months/years with incomplete data were not used

Rainfall Frequency Analysis Method

5. Sorted the max 24-hr annual precipitation from largest to smallest, for each station
6. For the Laguna, Cuero, and Marquez Stations the following rainfall frequency analysis methods were performed:
 - a. Type I Extremal Distribution by Fisher & Tippett (Gumbel Distribution)
 - b. Gamma Distribution
 - c. Log-Pearson Type III Distribution
7. Compared each rainfall frequency analysis method to determine which method had the best fit with the data. The Type I Extremal Distribution by Fisher & Tippett (Gumbel Distribution) was selected.
8. The Max 24-hr annual precipitation was calculated for Cubero, Marquez and Laguna* for the following return periods:
 - a. 25-year
 - b. 100-year
 - c. 500-year

*Laguna and Laguna2 were combined to extend the period of record. WRCC stated that the stations are close enough in proximity and are similar enough to be able to combine the data sets.

9. Downloaded Precipitation Frequency Estimates for the project study area from NOAA's Precipitation Frequency Data Server (PFDS).
http://dipper.nws.noaa.gov/hdsc/pfds/sa/nm_pfds.html
10. Compared max 24-hr annual precipitation for 25-yr, 100-yr, and 500-yr return periods for the three stations and the NOAA precipitation frequency estimates.

Rainfall Distribution

11. For the Laguna2 data, the 24-hr precipitation data was sorted from largest to smallest to determine the top 10 storm events from 2005 to 2009
12. Downloaded hourly data for the top 10 storms from the WRCC-RAWS webpage.
13. Hourly data was reported from 1:00 AM to 12:00 AM. If a storm began in the middle of Day 1 and continued through Day 2, data was downloaded for both days and the 24 hour time frame was adjusted to capture the entire storm event.

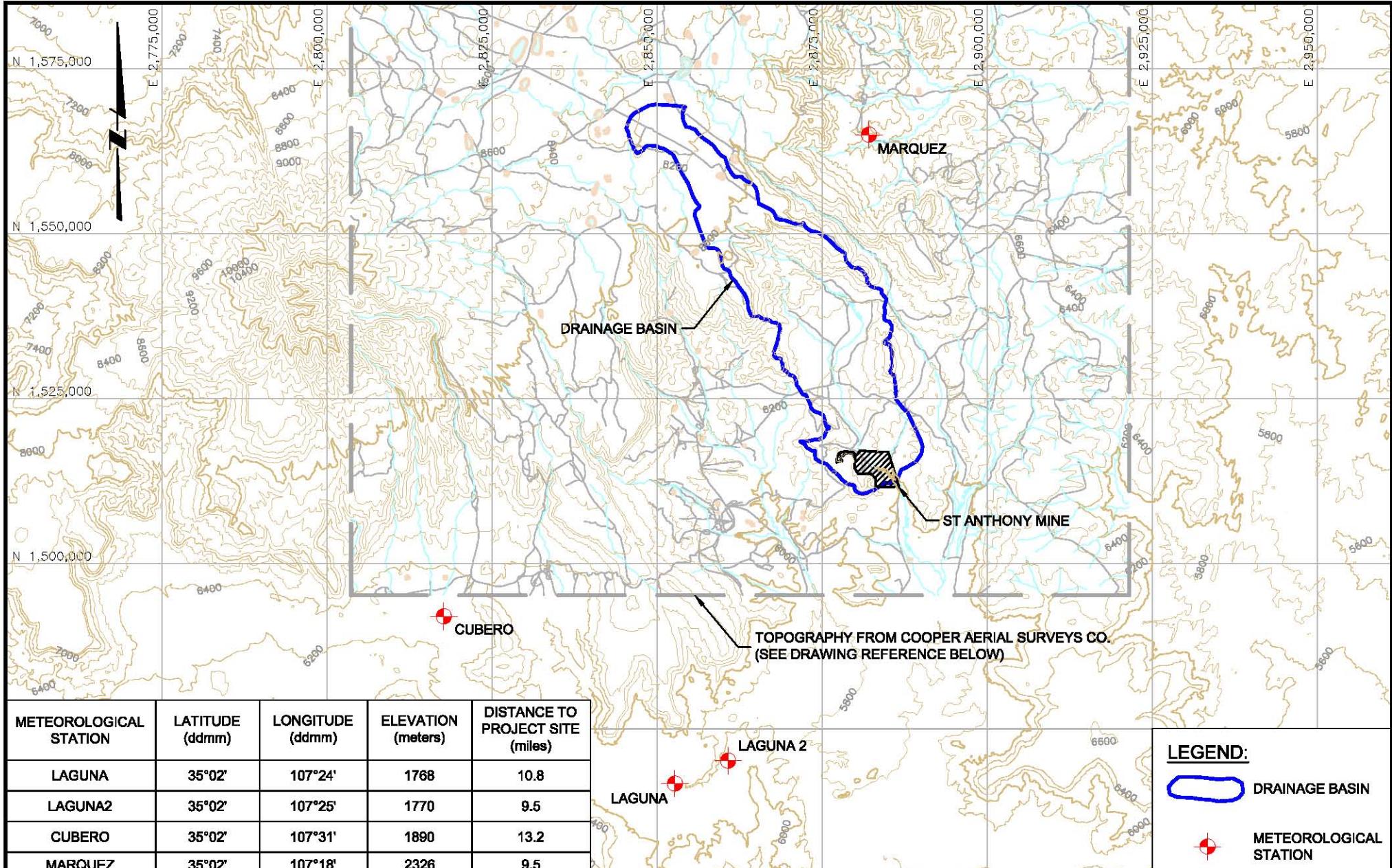
14. In order to compare multiple storms, the hourly precipitation was divided by the total 24-hr precipitation.
15. The data plotted two different ways:
 - a. 24-hr Hyetograph – the distribution of rainfall over time
 - b. 24-hr Mass Curve – cumulative rainfall over time.
16. The Type II Distribution from the NRCS was obtained using HEC-HMS and plotted with the top 10 storms. This was done in order to compare the data with the Synthetic Rainfall Distribution typically used for this area.
17. The maximum precipitation intensity estimates in 1-hr was calculated for each storm and the Type II Distribution.

Results:

Return Period	Laguna (mm)	Cubero (mm)	Marquez (mm)	NOAA Atlas 14 (mm)
25 - yr	62.3	54.0	53.5	57.4
100 - yr	77.9	66.3	64.5	71.9
500 - yr	95.8	80.5	77.2	89.2

References:

- NOAA (2006). "NOAA Atlas 14 Vol. 1 Version 4.0: Semiarid Southwest (Arizona, Southeast California, Nevada, New Mexico, Utah)", U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, 2006.
- NOAA (2010). Hydrometeorological Design Studies Center Precipitation Frequency Data Server (PFDS). Available online at http://dipper.nws.noaa.gov/hdsc/pfds/sa/nm_pfds.html.
- NRCS (2000). National Engineering Handbook: Part 630 Hydrology.
- Ven Te Chow (1988). Applied Hydrology.
- Western Regional Climate Center (WRCC) (2010a). Historical Climatological Data for Cubero, New Mexico.
- WRCC (2010b). Historical Climatological Data for Laguna, New Mexico.
- WRCC (2010c). Historical Climatological Data for Marquez, New Mexico.
- WRCC (2010d). Precipitation data from Remote Automated Weather Stations (RAWS) for Laguna, New Mexico. Available online at <http://www.raws.dri.edu/index.html>.



METEOROLOGICAL STATION	LATITUDE (ddmm)	LONGITUDE (ddmm)	ELEVATION (meters)	DISTANCE TO PROJECT SITE (miles)
LAGUNA	35°02'	107°24'	1768	10.8
LAGUNA2	35°02'	107°25'	1770	9.5
CUBERO	35°02'	107°31'	1890	13.2
MARQUEZ	35°02'	107°18'	2326	9.5

DRAWING REFERENCE:

- SURFACE TOPOGRAPHY GENERATED FROM AERIAL PHOTOGRAPHS DATED: MAY 2007, BY COOPER AERIAL SURVEYS CO.
- UNITED STATES ELEVATION DATA (NED) (30 m RESOLUTION)
- PROJECTION: STATE PLANE COORDINATE SYSTEM, ZONE: NEW MEXICO WEST. DATUM: NAD83. UNITS: U.S. FEET.

SCALE
0 20,000 FT



P.O. BOX 3077
Gallup, New Mexico 87305-3077

PROJECT LOCATION
NEW MEXICO
PROJECT
ST ANTHONY MINE
TITLE
METEOROLOGICAL STATION LOCATIONS



FIGURE 1
REVISION A
FILE NAME 1008506D001

Station Name	Latitude	Longitude	Elevation	Distance from Basin Centroid	Period of Record	
	(ddmm)	(ddmm)		(miles)		
Laguna	3502	10724	5800	14.2	4/1/1905	3/31/2006
Laguna2	35°03'07"	107°25'12"	5805	13.2	12/1/2004	3/31/2010
Cubero	3506	10731	6200	13.6	1/1/1977	12/31/2009
Marquez	3518	10718	7630	5.5	1/1/1942	10/31/1975

Meteorological Station	Latitude (ddmm)	Longitude (ddmm)	Elevation (meters)	Distance from Project Site (miles)	Years of Record	Data Description	Source
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Marquez	35°18'	107°18'	2326	9.5	1942-1975	Daily Data	WRCC (NCDC)

5280 ft/mile
3.28 ft/meters

Station Name	Distance	Distance	Elevation (feet)	Elevation (meters)
	(feet)	(miles)		
Laguna	57132	10.8	5800	1768
Laguna2	50098	9.5	5805	1770
Cubero	69454	13.2	6200	1890
Marquez	50400	9.5	7630	2326

**STATION: LAGUNA
STATE: NEW MEXICO
COOP NUMBER: 29471**

BEGIN DATE: Apr 01 1905
END DATE: Mar 31 2006

DAILY OBSERVATIONS FROM NCDC COOPERATIVE DATA

Mo = Month

Dy = Day

Obs = Time of observation (9900 = unknown).

HDD = Heating Degree Days. Base 65 deg F.

CDD = Cooling Degree Days, Base 65 deg F

PCPN = Precipitation (comma delimited files)

SNEI = Snowfall

SD = Total snow on Ground at time of observation

PAN EVAP = Pan Evaporation

Temperature in degrees Fahrenheit

Precipitation total equals rain and/or melted snowfall. In inches. T=Trace

Precipitation total

An "S" following the precipitation data denotes total is included in subsequent value.

An "A" following the precipitation data denotes total is accumulated.

All A following the precipitation data denotes total is accumulated.

----DATE----				-----TEMPERATURE-----					---PRECIPITATION---		
				Max	Min	Avg			Total	SNFL	SD
Year	Mo	Dy	Obs	(F)	(F)	(F)	HDD	CDD	(in)	(in)	(in)
1905	4	1	9900	###M	###M	#####M	#####M	#####M	0	####M	###M
1905	4	2	9900	###M	###M	#####M	#####M	#####M	0	####M	###M
1905	4	3	9900	###M	###M	#####M	#####M	#####M	0	####M	###M
1905	4	4	9900	###M	###M	#####M	#####M	#####M	0	####M	###M
1905	4	5	9900	###M	###M	#####M	#####M	#####M	0	####M	###M
1905	4	6	9900	###M	###M	#####M	#####M	#####M	0	####M	###M
1905	4	7	9900	###M	###M	#####M	#####M	#####M	0	####M	###M
1905	4	8	9900	###M	###M	#####M	#####M	#####M	0	####M	###M
1905	4	9	9900	###M	###M	#####M	#####M	#####M	0	####M	###M
1905	4	10	9900	###M	###M	#####M	#####M	#####M	0	####M	###M
1905	4	11	9900	###M	###M	#####M	#####M	#####M	0	####M	###M
1905	4	12	9900	48	41	44.5	20.5	0	0.62	####M	###M
1905	4	13	9900	56	43	49.5	15.5	0	0	####M	###M
1905	4	14	9900	64	35	49.5	15.5	0	0	####M	###M
1905	4	15	9900	67	34	50.5	14.5	0	0	####M	###M
1905	4	16	9900	71	40	55.5	9.5	0	0	####M	###M
1905	4	17	9900	73	42	57.5	7.5	0	0	####M	###M
1905	4	18	9900	72	###M	#####M	#####M	#####M	0	####M	###M
1905	4	19	9900	67	53	60	5	0	0	####M	###M

Notes:

1. 1905 missing data from Jan through March (9/12)
 2. 1915 missing data from May through December (4/12)
 3. 1916 only has data for September (1/12)
 4. 1917 missing data from May through November (5/12)
 5. 1918 only has data for Jan and April (2/12)
 6. 1919 missing data for January (11/12)
 7. 1921 missing data from August through November (8/12)
 8. 1924 only has data for January (1/12)
 9. 1927 missing data from January (11/12)
 10. 1935 only has data for January and February (2/12)
 11. 1946 missing data from Sep to Dec (8/12)
 12. 1947 missing whole year
 13. 1948 only has data from Oct to Dec (3/12)
 14. 1970 only has data for Jan, Feb, Sep through Dec (6/12)
 15. 2005 missing data from May, June, July, Oct, Dec (7/12) - Laguna (THEREFORE LAGUNA2 IS USED)
 16. 2006 only has data from Jan through March (3/12) - Laguna (THEREFORE LAGUNA2 IS USED)
 17. Laguna2 data is used for 2005, 2006, 2008, 2009

STATION: CUBERO
STATE: NEW MEXICO
COOP NUMBER: 29225

BEGIN DATE: Jan 01 1977
END DATE: Dec 31 2009

DAILY OBSERVATIONS FROM NCDC COOPERATIVE DATA

Mo = Month

$$Dy = Day$$

Obs = Time of observation (9900 = unknown).

HDD = Heating Degree Days. Base 65 deg F.

CDD = Cooling Degree Days. Base 65 deg F.

PCPN = Precipitation (comma delimited files)

SNEI = Snowfall

SD = Total snow on Ground at time of observation

DAN EVAPO = Dan Evaporation

PAN EVAP – Pan Evaporation.
Temperature in degrees Fahrenheit

Precipitation total annual rain and/or melted snowfall. In inches. T-Trees

Precipitation total

####M = Missing.

An "S" following the precipitation data denotes total is included in summaries.

An "A" following the precipitation data denotes total is accumulated.

----DATE----				-----TEMPERATURE-----					---PRECIPITATION---		
				Max	Min	Avg			Total	SNFL	SD
Year	Mo	Dy	Obs	(F)	(F)	(F)	HDD	CDD	(in)	(in)	(in)
1977	1	1	1800	52	36	44	21	0	0.17	1.4	1
1977	1	2	1800	40	23	31.5	33.5	0	0	0	OT
1977	1	3	1800	42	19	30.5	34.5	0	0.09	1	OT
1977	1	4	1800	35	19	27	38	0	0	0	OT
1977	1	5	1800	38	25	31.5	33.5	0	0.05	2	2
1977	1	6	1800	40	17	28.5	36.5	0	0	0	OT
1977	1	7	1800	42	3	22.5	42.5	0	0	0	OT
1977	1	8	1800	31	12	21.5	43.5	0	0.1	3	3
1977	1	9	1800	28	14	21	44	0	0	0	OT
1977	1	10	1800	38	-2	18	47	0	0	0	OT
1977	1	11	1800	42	0	21	44	0	0	0	OT
1977	1	12	1800	41	3	22	43	0	0	0	OT
1977	1	13	1800	45	13	29	36	0	0	0	OT
1977	1	14	1800	42	9	25.5	39.5	0	0.00T	0.0T	OT
1977	1	15	1800	45	6	25.5	39.5	0	0	0	0
1977	1	16	1800	49	8	28.5	36.5	0	0	0	0
1977	1	17	1800	47	16	31.5	33.5	0	0	0	0
1977	1	18	1800	52	15	33.5	31.5	0	0	0	0
1977	1	19	1800	54	18	36	29	0	0	0	0
1977	1	20	1800	51	18	34.5	30.5	0	0	0	0
1977	1	21	1800	43	21	32	33	0	0	0	0
1977	1	22	1800	48	30	39	26	0	0.02	0.2	0
1977	1	23	1800	45	28	36.5	28.5	0	0	0	0
1977	1	24	1800	47	26	36.5	28.5	0	0	0	0
1977	1	25	1800	49	12	30.5	34.5	0	0	0	0
1977	1	26	1800	49	15	32	33	0	0	0	0
1977	1	27	1800	45	27	36	29	0	0	0	0
1977	1	28	1800	52	25	38.5	26.5	0	0	0	0
1977	1	29	1800	48	11	29.5	35.5	0	0	0	0

Notes:

1. 1980 only has data from June to December (7/12)
 2. 1981 only has data from February to June (5/12)
 3. 1982 missing data from February and December (10/12)
 4. 1983 missing data from March, May, June, and July (8/12)
 5. 1986 missing data from February (11/12)

**STATION: MARQUEZ
STATE: NEW MEXICO
COOP NUMBER: 295467**

Notes:

1. 1969 missing data from May and Dec (10/12)
 2. 1975 missing data from Nov through Dec (10/12)

BEGIN DATE: Jan 01 1942
END DATE: Oct 31 1975

DAILY OBSERVATIONS FROM NCDC COOPERATIVE DATA

Mo = Month

Dy = Day

Obs = Time of observation (9900 = unknown).

HDD = Heating Degree Days. Base 65 deg F.

CDD = Cooling Degree Days. Base 65 deg F.

PCPN = Precipitation (comma delimited files)

SNFI = Snowfall

SD = Total snow on Ground at time of observation

PAN EVAP = Pan Evaporation

Temperature in degrees Fahrenheit

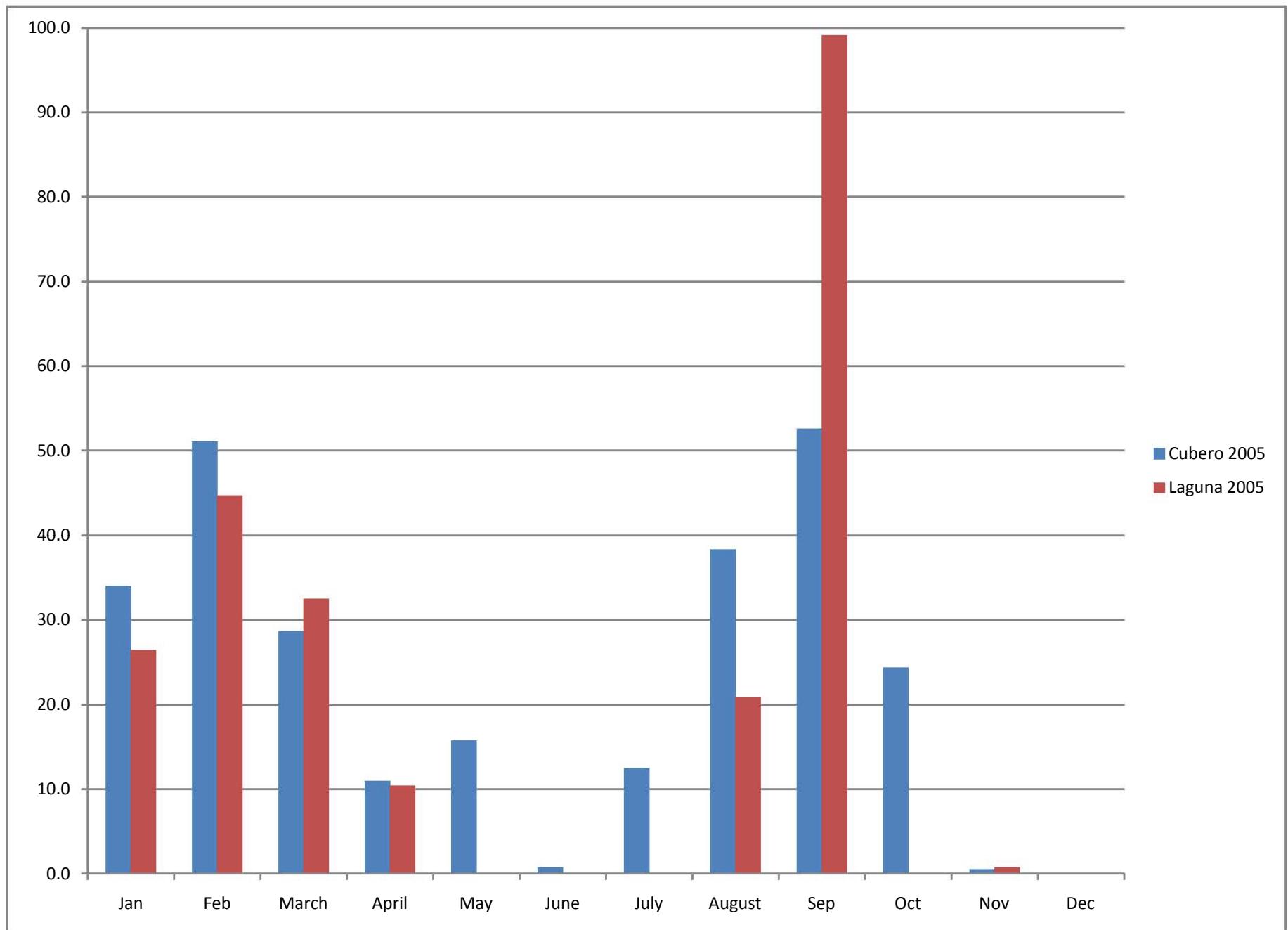
Precipitation total equals rain and/or melted snowfall. In inches. T=Trace

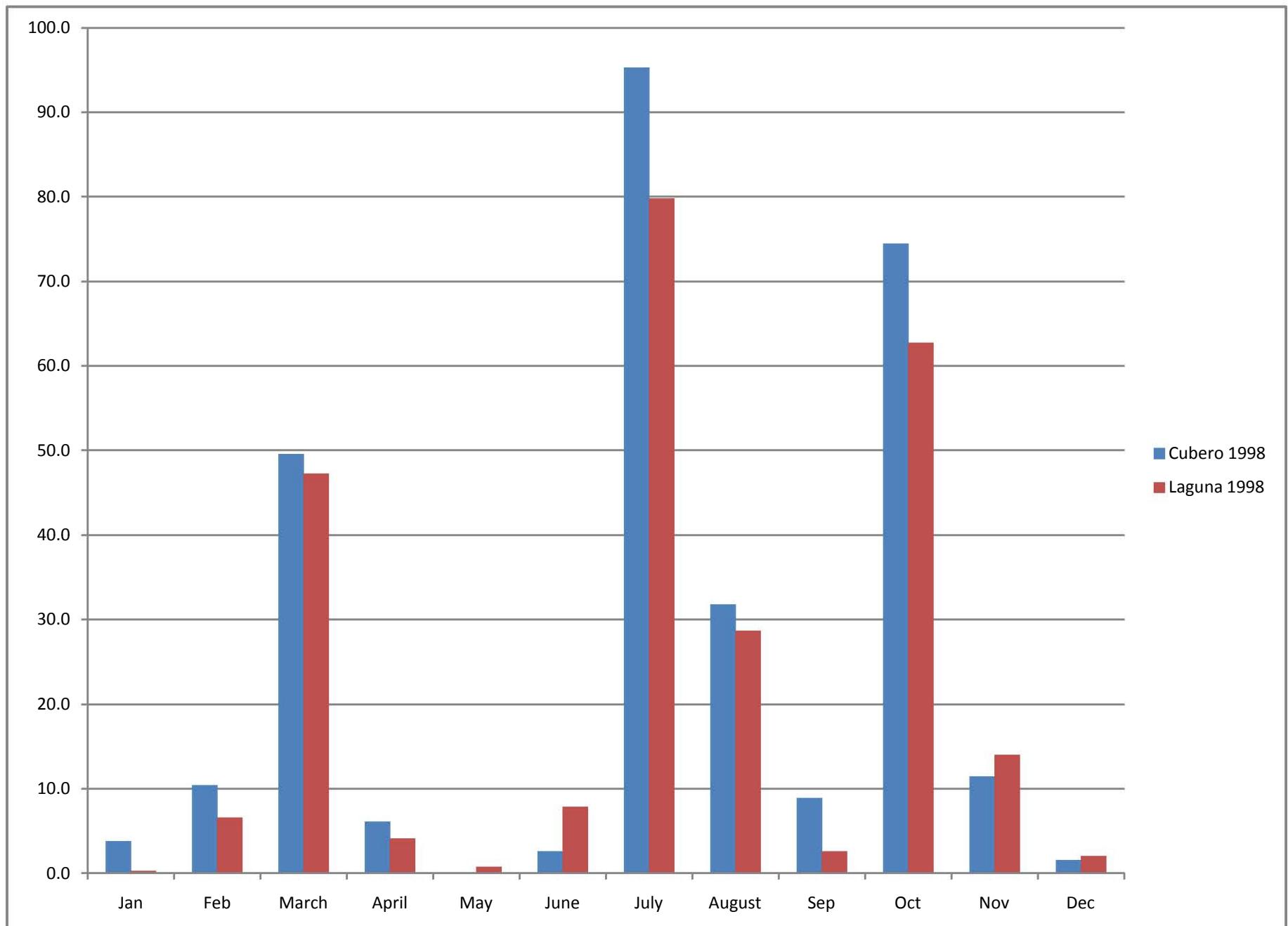
####M = Missing

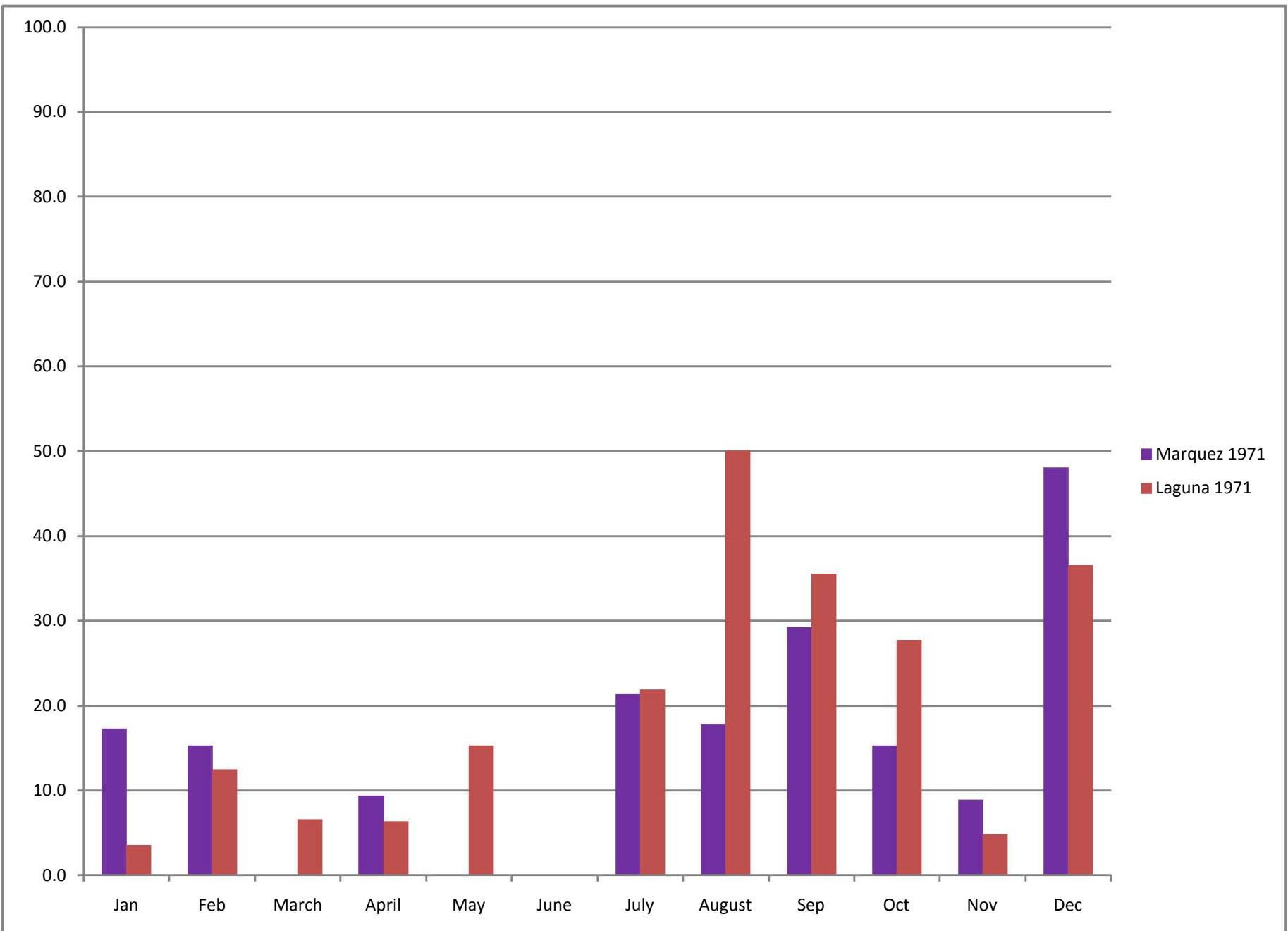
An "S" following the precipitation data denotes total is included in subsequent value

An "A" following the precipitation data denotes total is accumulated.

-----DATE-----				-----TEMPERATURE-----					----PRECIPITATION----		
				Max	Min	Avg			Total	SNFL	SD
Year	Mo	Dy	Obs	(F)	(F)	(F)	HDD	CDD	(in)	(in)	(in)
1942	1	1	9900	###M	###M	#####M	#####M	###M	0.26	###M	###M
1942	1	2	9900	###M	###M	#####M	#####M	###M	0	###M	###M
1942	1	3	9900	###M	###M	#####M	#####M	###M	0	###M	###M
1942	1	4	9900	###M	###M	#####M	#####M	###M	0	###M	###M
1942	1	5	9900	###M	###M	#####M	#####M	###M	0	###M	###M
1942	1	6	9900	###M	###M	#####M	#####M	###M	0	###M	###M
1942	1	7	9900	###M	###M	#####M	#####M	###M	0	###M	###M
1942	1	8	9900	###M	###M	#####M	#####M	###M	0	###M	###M
1942	1	9	9900	###M	###M	#####M	#####M	###M	0	###M	###M
1942	1	10	9900	###M	###M	#####M	#####M	###M	0	###M	###M
1942	1	11	9900	###M	###M	#####M	#####M	###M	0	###M	###M
1942	1	12	9900	###M	###M	#####M	#####M	###M	0	###M	###M
1942	1	13	9900	###M	###M	#####M	#####M	###M	0	###M	###M
1942	1	14	9900	###M	###M	#####M	#####M	###M	0	###M	###M
1942	1	15	9900	###M	###M	#####M	#####M	###M	0	###M	###M
1942	1	16	9900	###M	###M	#####M	#####M	###M	0	###M	###M
1942	1	17	9900	###M	###M	#####M	#####M	###M	0	###M	###M
1942	1	18	9900	###M	###M	#####M	#####M	###M	0	###M	###M
1942	1	19	9900	###M	###M	#####M	#####M	###M	0	###M	###M
1942	1	20	9900	###M	###M	#####M	#####M	###M	0	###M	###M
1942	1	21	9900	###M	###M	#####M	#####M	###M	0	###M	###M
1942	1	22	9900	###M	###M	#####M	#####M	###M	0	###M	###M
1942	1	23	9900	###M	###M	#####M	#####M	###M	0	###M	###M







Station Information - Laguna2

Location	Laguna New Mexico		
Latitude	35° 02' 22"	NESS ID	5213A71C
Longitude	107° 22' 23"	NWS ID	293304
Elevation	5773 ft.	Agency	BIA

Day	2004	2005	2006	2007	2008	2009	2010
1-Jan		0	0	0	0	0	0
2-Jan		0.13	0	0	0	0	0
3-Jan		0.15	0	0	0	0	0
4-Jan		0.04	0	0	0	0.01	0
5-Jan		0	0	0	0	0	0
6-Jan		0	0	0	0.03	0	0
7-Jan		0	0	0	0.05	0	0
8-Jan		0	0	0	0	0	0
9-Jan		0	0	0	0	0	0
10-Jan		0	0	0	0	0	0
11-Jan		0	0	0	0	0	0
12-Jan		0.04	0	0	0	0	0
13-Jan		0	0	0	0	0	0
14-Jan		0	0	0	0	0	0
15-Jan		0	0	0	0	0	0
16-Jan		0	0	0	0	0	0
17-Jan		0	0	0	0	0	0
18-Jan		0	0	0	0	0	0.18
19-Jan		0	0	0	0	0	0.17
20-Jan		0	0	0.15	0	0	0.01
21-Jan		0	0	0	0	0	0.13
22-Jan		0	0	0.08	0	0	0.22
23-Jan		0	0	0	0	0	0.01
24-Jan		0.16	0	0	0	0	0
25-Jan		0	0.14	0	0	0	0
26-Jan		0.08	0.02	0	0	0	0
27-Jan		0.21	0	0	0.03	0	0
28-Jan		0	0	0	0.05	0	0.24
29-Jan		0.07	0	0	0	0	0.07
30-Jan		0.08	0	0	0	0	0
31-Jan		0	0	0.08	0	0	0.01
1-Feb		0.06	0	0	0	0	0
2-Feb		0.11	0	0	0	0	0
3-Feb		0	0	0	0	0	0.3

STATION: LAGUNA
STATE: NEW MEXICO
COOP NUMBER: 294719

BEGIN DATE: Apr 01 1905
END DATE: Mar 31 2006

1 inch = 25.4 mm

Annal Totals		
Year	Annual Total (in)	Annual Total (mm)
1905	16.1	407.7
1906	13.1	331.5
1907	7.4	188.5
1908	8.4	212.1
1909	10.6	269.2
1910	9.1	230.6
1911	12.9	327.7
1912	8.1	205.0
1913	8.7	220.5
1914	12.7	322.8
1915	5.2	132.3
1916	1.6	41.4
1917	0.0	0.0
1918	0.4	10.7
1919	13.5	343.2
1920	13.8	350.8
1921	7.6	192.5
1922	0.0	0.0
1923	0.0	0.0
1924	0.0	0.0
1925	0.0	0.0
1926	0.0	0.0
1927	8.6	219.2
1928	8.9	224.8
1929	12.9	327.4
1930	7.1	181.4
1931	12.6	321.1
1932	10.7	271.8
1933	14.6	371.9
1934	7.3	185.7
1935	2.5	63.0
1936	7.3	185.2
1937	8.3	210.1
1938	7.6	191.8
1939	9.4	238.0
1940	13.5	343.9
1941	18.4	467.9
1942	6.0	152.4
1943	8.4	214.1
1944	11.1	281.9
1945	4.4	112.5
1946	3.5	89.4
1947	0.0	0.0
1948	1.4	34.3
1949	8.1	206.8
1950	4.0	102.4
1951	4.8	120.7
1952	6.5	164.1
1953	3.7	94.7
1954	8.2	208.5
1955	7.3	184.2
1956	2.0	49.8

Max Precip - All Data			
Year	Max (in)	Max (mm)	Date
1905	2.65	67.3	12/21/1905
1906	1.25	31.8	9/26/1906
1907	1.60	40.6	4/20/1907
1908	1.35	34.3	7/7/1908
1909	3.10	78.7	3/10/1909
1910	1.80	45.7	9/21/1910
1911	1.60	40.6	7/1/1911
1912	2.00	50.8	7/22/1912
1913	1.35	34.3	6/9/1913
1914	1.00	25.4	4/8/1914
1915	1.10	27.9	4/29/1915
1916	0.52	13.2	9/6/1916
1917	0.00	0.0	-
1918	0.27	6.9	1/20/1918
1919	1.40	35.6	7/2/1919
1920	1.90	48.3	8/2/1920
1921	1.80	45.7	7/22/1921
1922			
1923			
1924	0.00	0.0	-
1925			
1926			
1927	0.90	22.9	9/12/1927
1928	0.77	19.6	8/31/1928
1929	1.31	33.3	9/22/1929
1930	1.50	38.1	7/13/1930
1931	1.20	30.5	4/17/1931
1932	1.51	38.4	7/22/1932
1933	1.50	38.1	6/16/1933
1934	0.85	21.6	9/23/1934
1935	0.95	24.1	1/7/1935
1936	1.06	26.9	6/11/1936
1937	0.95	24.1	9/29/1937
1938	1.25	31.8	6/26/1938
1939	1.45	36.8	4/4/1939
1940	1.03	26.2	5/22/1940
1941	1.18	30.0	5/21/1941
1942	0.68	17.3	8/23/1942
1943	1.18	30.0	6/29/1943
1944	1.80	45.7	8/11/1944
1945	0.66	16.8	7/26/1945
1946	0.60	15.2	8/9/1946
1947			
1948	0.48	12.2	10/31/1948
1949	1.06	26.9	5/11/1949
1950	0.73	18.5	7/7/1950
1951	0.64	16.3	6/4/1951
1952	0.57	14.5	6/2/1952
1953	0.51	13.0	3/8/1953
1954	1.40	35.6	7/8/1954
1955	1.69	42.9	8/11/1955
1956	0.50	12.7	10/17/1956

Max Precip - Only Years with Complete Data

Year	Max (mm)
1905	67.3
1906	31.8
1907	40.6
1908	34.3
1909	78.7
1910	45.7
1911	40.6
1912	50.8
1913	34.3
1914	25.4
1919	35.6
1920	48.3
1921	45.7
1927	22.9
1928	19.6
1929	33.3
1930	38.1
1931	30.5
1932	38.4
1933	38.1
1934	21.6
1935	
1936	26.9
1937	24.1
1938	31.8
1939	36.8
1940	26.2
1941	30.0
1942	17.3
1943	30.0
1944	45.7
1945	16.8
1949	26.9
1950	18.5
1951	16.3
1952	14.5
1953	13.0
1954	35.6
1955	42.9
1956	12.7
1957	33.8
1958	28.7
1959	26.7
1960	31.5
1961	28.2
1962	26.2
1963	24.6
1964	58.7
1965	16.5
1966	44.2
1967	20.8
1968	19.1
1969	46.5

Max Precip - Only Years with Complete Data

Year	Date	Max (mm)
1905	12/21/1905	67.3
1906	9/26/1906	31.8
1907	4/20/1907	40.6
1908	7/7/1908	34.3
1909	3/10/1909	78.7
1910	9/21/1910	45.7
1911	7/1/1911	40.6
1912	7/22/1912	50.8
1913	6/9/1913	34.3
1914	4/8/1914	25.4
1919	7/2/1919	35.6
1920	8/2/1920	48.3
1921	7/22/1921	45.7
1927	9/12/1927	22.9
1928	8/31/1928	19.6
1929	9/22/1929	33.3
1930	7/13/1930	38.1
1931	4/17/1931	30.5
1932	7/22/1932	38.4
1933	6/16/1933	38.1
1934	9/23/1934	21.6
1936	6/11/1936	26.9
1937	9/29/1937	24.1
1938	6/26/1938	31.8
1939	4/4/1939	36.8
1940	5/22/1940	26.2
1941	5/21/1941	30.0
1942	8/23/1942	17.3
1943	6/29/1943	30.0
1944	8/11/1944	45.7
1945	7/26/1945	16.8
1949	5/11/1949	26.9
1950	7/7/1950	18.5
1951	6/4/1951	16.3
1952	6/2/1952	14.5
1953	3/8/1953	13.0
1		

1957	13.1	333.2
1958	8.7	221.5
1959	10.7	272.8
1960	6.3	159.5
1961	8.5	216.7
1962	9.2	233.4
1963	7.6	193.8
1964	10.3	261.6
1965	10.9	277.4
1966	8.7	220.2
1967	8.9	225.0
1968	7.8	198.9
1969	15.4	392.2
1970	2.1	52.1
1971	8.7	220.7
1972	13.7	349.0
1973	7.4	189.0
1974	10.4	263.4
1975	11.9	302.8
1976	8.0	201.9
1977	11.6	293.9
1978	10.7	270.5
1979	10.4	263.1
1980	7.4	187.7
1981	11.5	291.6
1982	10.9	276.6
1983	10.4	264.9
1984	11.9	301.8
1985	13.9	352.6
1986	14.0	355.6
1987	8.9	226.1
1988	12.9	328.2
1989	6.3	160.5
1990	16.3	413.3
1991	9.1	230.1
1992	12.2	308.9
1993	9.1	230.1
1994	12.6	321.1
1995	5.3	135.4
1996	8.7	221.7
1997	14.7	373.6
1998	10.1	256.5
1999	10.0	254.8
2000	10.1	255.3
2001	7.5	190.0
2002	9.1	230.1
2003	5.8	147.8
2004	12.1	308.1
2005	9.2	234.7
2006	0.5	11.7

Laguna2	2005	10.3	260.6
	2006	12.8	325.4
	2007	3.7	94.2
	2008	7.0	178.3
	2009	6.3	160.3

Mean	8.5	216.5
Max	18.4	467.9
Min	0.0	0.0

1957	1.33	33.8	3/20/1957
1958	1.13	28.7	9/11/1958
1959	1.05	26.7	10/30/1959
1960	1.24	31.5	10/17/1960
1961	1.11	28.2	10/29/1961
1962	1.03	26.2	10/19/1962
1963	0.97	24.6	2/12/1963
1964	2.31	58.7	7/12/1963
1965	0.65	16.5	8/2/1965
1966	1.74	44.2	7/20/1966
1967	0.82	20.8	8/19/1967
1968	0.75	19.1	7/25/1968
1969	1.83	46.5	10/22/1969
1970	0.55	14.0	9/14/1970
1971	0.67	17.0	8/6/1971
1972	1.29	32.8	10/31/1972
1973	0.82	20.8	5/14/1973
1974	1.23	31.2	10/11/1974
1975	2.86	72.6	7/11/1975
1976	1.09	27.7	8/19/1976
1977	1.11	28.2	5/13/1977
1978	1.43	36.3	5/2/1978
1979	1.10	27.9	9/15/1979
1980	0.90	22.9	8/15/1980
1981	1.00	25.4	7/12/1981
1982	0.71	18.0	8/25/1982
1983	1.26	32.0	1/21/1983
1984	0.88	22.4	10/3/1984
1985	1.67	42.4	7/16/1985
1986	1.21	30.7	10/12/1986
1987	1.08	27.4	1/16/1987
1988	1.18	30.0	7/29/1988
1989	0.84	21.3	7/26/1989
1990	1.82	46.2	7/13/1990
1991	1.00	25.4	6/30/1991
1992	1.48	37.6	5/22/1992
1993	1.84	46.7	8/30/1993
1994	1.60	40.6	8/16/1994
1995	1.30	33.0	8/24/1995
1996	1.15	29.2	10/28/1996
1997	1.88	47.8	7/29/1997
1998	1.78	45.2	3/16/1998
1999	0.87	22.1	7/10/1999
2000	1.40	35.6	3/23/2000
2001	1.32	33.5	8/4/2001
2002	1.50	38.1	9/11/2002
2003	1.25	31.8	11/13/2003
2004	1.75	44.5	4/5/2004
2005	1.20	30.5	9/6/2005
2006	0.31	7.9	3/12/2006

1957	33.8
1958	28.7
1959	26.7
1960	31.5
1961	28.2
1962	26.2
1963	24.6
1964	58.7
1965	16.5
1966	44.2
1967	20.8
1968	19.1
1969	46.5
1971	17.0
1972	32.8
1973	20.8
1974	31.2
1975	72.6
1976	27.7
1977	28.2
1978	36.3
1979	27.9
1980	22.9
1981	25.4
1982	18.0
1983	32.0
1984	22.4
1985	40.6
1986	33.0
1987	27.4
1988	30.0
1989	21.3
1990	46.2
1991	25.4
1992	37.6
1993	46.7
1994	40.6
1995	33.0
1996	29.2
1997	47.8
1998	45.2
1999	22.1
2000	35.6
2001	33.5
2002	38.1
2003	31.8
2004	44.5
2005	32.8
2006	43.7
2008	19.1
2009	11.4

1971	8/6/1971	17.0
1972	10/31/1972	32.8
1973	5/14/1973	20.8
1974	10/11/1974	31.2
1975	7/11/1975	72.6
1976	8/19/1976	27.7
1977	5/13/1977	28.2
1978	5/2/1978	36.3
1979	9/15/1979	27.9
1980	8/15/1980	22.9
1981	7/12/1981	25.4
1982	8/25/1982	18.0
1983	1/21/1983	32.0
1984	10/3/1984	22.4
1985	7/16/1985	42.4
1986	10/12/1986	30.7
1987	1/16/1987	27.4
1988	7/29/1988	30.0
1989	7/26/1989	21.3
1990	7/13/1990	46.2
1991	6/30/1991	25.4
1992	5/22/1992	37.6
1993	8/30/1993	46.7
1994	8/16/1994	40.6
1995	8/24/1995	33.0
1996	10/28/1996	29.2
1997	7/10/1997	47.8
1998	3/16/1998	45.2
1999		

Monthly	Inches	Incomplete Data																				
Month	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926
Jan	0	0.03	0.87	0	0.13	0	0.12	0	0.6	0	0.66	0	0	0.42	0	2.25	0.48	0	0	0	0	
Feb	0	0.37	0	0.6	0	0.49	1.7	0.36	1.09	0.2	0.25	0	0	0	0	0.47	0.2	0	0	0	0	
March	0	0	0	0.4	3.1	0.09	1.53	0.36	0.25	0.32	0	0	0	0	0.75	1	0.6	0	0	0	0	
April	2.62	0.45	3	1.6	0	1.21	0.82	0	0	1.35	4.3	0	0	0	0.6	0.78	0	0	0	0	0	
May	0.6	0.37	0.25	0	0	0.5	0.15	0	0.5	1.25	0	0	0	0	1.25	1.01	1.05	0	0	0	0	
June	1.3	0	1.7	0.15	0.1	0.2	0	0.8	1.35	0	0	0	0	0	0.23	1.62	0.9	0	0	0	0	
July	0.73	2.75	1.4	3.55	1.45	0.87	6.26	3.3	0	4.75	0	0	0	0	5.2	1.11	4.35	0	0	0	0	
August	0.25	1.26	0	0.7	3.25	1.63	0.7	1.5	0.35	2.79	0	0	0	0	1.75	3.94	0	0	0	0	0	
Sep	1.25	2.96	0	0.25	1.4	1.95	1.2	0	2.15	1.05	0	1.63	0	0	1.3	0.89	0	0	0	0	0	
Oct	0.5	1.33	0	0	0	1.04	0.08	1.25	0.85	0	0	0	0	0	0.25	0.7	0	0	0	0	0	
Nov	3.4	1.03	0.2	1.1	0.45	0.98	0.16	0	0.28	0	0	0	0	0	1.3	0	0	0	0	0	0	
Dec	5.4	2.5	0	0	0.72	0.12	0.18	0.5	1.26	1	0	0	0	0	0.88	0.04	0	0	0	0	0	

1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955
0	0	0	0.22	0.17	0.17	0.2	0	1.33	0	0.23	0.46	1.18	0.27	0.86	0.79	0.15	0.11	0.44	0.31	0	0	0.59	0	0.38	0.31	0.07	0.31	0.18
0.51	0.75	0.13	0.06	0.98	0.38	0.21	0	1.15	0.23	0.45	0.35	0.29	1.19	0.68	0.14	0.06	0.05	0.05	0.09	0	0	0.36	0.28	0.21	0.28	0.62	0	0.09
0.11	0.37	0.07	0.37	0.37	0.49	0.08	0.13	0	0	0.61	0.11	1.04	0.58	1.78	0	0.08	0	0.2	0.22	0	0	0.26	0.12	0	0.14	0.63	0.39	0
0.1	0.35	0	0.38	2.88	0	0.42	0.04	0	0.2	0	0	1.6	0.16	1.41	0.57	0	0	0.14	0.05	0	0	0.6	0.62	0.33	0.81	0.35	0	0.11
0	2.07	1.74	0.03	0.88	0.69	0.11	0	0	0.32	1.3	0.07	0	1.14	2.34	0	1.03	1.17	0	0.14	0	0	1.76	0	0.09	0.5	0	0.64	0.32
1.72	0	0.05	0.1	1.27	0.47	5.06	1	0	1.09	1	2.24	0	1.2	0.09	0.1	2.17	0.99	0	0.03	0	0	0.47	0.14	0.64	0.86	0.79	0.24	0.34
1.09	1.67	2.32	4.08	0.77	2.47	3.16	0.6	0	1.37	1.89	1.05	1.12	1.52	2.27	0.74	1.32	3.25	1.26	1.08	0	0	2	1.65	0.88	0.86	0.36	3.01	1.77
2.3	2.48	3.34	0.75	2.14	3.77	2.22	2.19	0	0.8	0.6	0.73	0.86	2.06	1.61	1.34	1.63	3.53	1.27	1.6	0	0	0.55	0.18	1.27	1.18	0.37	1.99	3.7
2.66	0.08	3.64	0.79	2.48	1.17	2.28	1.65	0	2.6	1.71	2.12	1.78	2.55	2.81	0.46	0.27	0.72	0.45	0	0	0	1.46	1.01	0.04	0.69	0	1	0.36
0	0.56	1.35	0.22	0	0.38	0.4	0.15	0	0.6	0.43	0	0.7	0.33	3.65	0.93	0.16	0.7	0.4	0	0	1.09	0.09	0.03	0.1	0	0.24	0.52	0.18
0.02	0.52	0.17	0.14	0.67	0	0.5	0.55	0	0	0	0.1	0.54	1.28	0.35	0	0.41	0.36	0	0	0	0.12	0	0	0.14	0.65	0.1	0	0.04
0.12	0	0.08	0	0.03	0.71	0	1	0	0.08	0.05	0.32	0.26	1.26	0.57	0.93	1.15	0.22	0.22	0	0	0.14	0	0	0.67	0.18	0.2	0.11	0.16

1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	
0.0	0.0	0.0	5.6	4.3	4.3	5.1	0.0	33.8	0.0	5.8	11.7	30.0	6.9	21.8	20.1	3.8	2.8	11.2	7.9	0.0	0.0	15.0	0.0	0.0	9.7	7.9	1.8	7.9	4.6
13.0	19.1	3.3	1.5	24.9	9.7	5.3	0.0	29.2	5.8	11.4	8.9	7.4	30.2	17.3	3.6	1.5	1.3	1.3	2.3	0.0	0.0	9.1	7.1	5.3	7.1	15.7	0.0	2.3	
2.8	9.4	1.8	9.4	9.4	12.4	2.0	3.3	0.0	0.0	15.5	2.8	26.4	14.7	45.2	0.0	2.0	0.0	5.1	5.6	0.0	0.0	6.6	3.0	0.0	3.6	16.0	9.9	0.0	
2.5	8.9	0.0	9.7	73.2	0.0	10.7	1.0	0.0	5.1	0.0	0.0	40.6	4.1	35.8	14.5	0.0	0.0	3.6	1.3	0.0	0.0	15.2	15.7	8.4	20.6	8.9	0.0	2.8	
0.0	52.6	44.2	0.8	22.4	17.5	2.8	0.0	0.0	8.1	33.0	1.8	0.0	29.0	59.4	0.0	26.2	29.7	0.0	3.6	0.0	0.0	44.7	0.0	2.3	12.7	0.0	16.3	8.1	
43.7	0.0	1.3	2.5	32.3	11.9	128.5	25.4	0.0	27.7	25.4	56.9	0.0	30.5	2.3	2.5	55.1	25.1	0.0	0.8	0.0	0.0	11.9	3.6	16.3	21.8	20.1	6.1	8.6	
27.7	42.4	58.9	103.6	19.6	62.7	80.3	15.2	0.0	34.8	48.0	26.7	28.4	38.6	57.7	18.8	33.5	82.6	32.0	27.4	0.0	0.0	50.8	41.9	22.4	21.8	9.1	76.5	45.0	
58.4	63.0	84.8	19.1	54.4	95.8	56.4	55.6	0.0	20.3	15.2	18.5	21.8	52.3	40.9	34.0	41.4	89.7	32.3	40.6	0.0	0.0	14.0	4.6	32.3	30.0	9.4	50.5	94.0	
67.6	2.0	92.5	20.1	63.0	29.7	57.9	41.9	0.0	66.0	43.4	53.8	45.2	64.8	71.4	11.7	6.9	18.3	11.4	0.0	0.0	0.0	37.1	25.7	1.0	17.5	0.0	25.4	9.1	
0.0	14.2	34.3	5.6	0.0	9.7	10.2	3.8	0.0	15.2	10.9	0.0	17.8	8.4	92.7	23.6	4.1	17.8	10.2	0.0	0.0	27.7	2.3	0.8	2.5	0.0	6.1	13.2	4.6	
0.5	13.2	4.3	3.6	17.0	0.0	12.7	14.0	0.0	0.0	0.0	2.5	13.7	32.5	8.9	0.0	10.4	9.1	0.0	0.0	0.0	3.0	0.0	0.0	3.6	16.5	2.5	0.0	1.0	
3.0	0.0	2.0	0.0	0.8	18.0	0.0	25.4	0.0	2.0	1.3	8.1	6.6	32.0	14.5	23.6	29.2	5.6	5.6	0.0	0.0	3.6	0.0	0.0	17.0	4.6	5.1	2.8	4.1	

1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
0.13	0.23	0.41	0	0.24	0	0.99	0.26	0.09	0.2	0.38	0.02	0.01	0.25	0	0.14	0.24	0.3	0.82	0.59	0	0.53	1.12	0.84	0.86	0.14	0.37	2.12	0.37
0.19	0.61	0.16	0.16	0.34	0.1	0	1.2	1.04	0.26	0.36	0.03	0.77	0.1	0	0.49	0.23	1.08	0.02	0.82	0.7	0.54	0.55	0.26	0.89	0.02	1.05	1.17	0
0	1.93	1.3	0.1	0.26	0.44	0.08	0.08	0.31	0.51	0.3	0.01	1.16	1.04	0	0.26	0	0.43	0.06	0.52	0.06	0.48	0.16	0.18	0.13	1.5	0.64	0.31	0.44
0	0.74	1.07	0.46	0	0.24	0	0.06	0.34	1.01	0.1	0.01	0.53	0.59	0	0.25	0	0.52	0.04	0.44	0.02	0.22	0.02	0.1	0.48	1.02	0.33	0.48	0.17
0	0.57	0	1.31	0.48	0.13	0.07	0.05	0.28	0.66	0	0.21	0.7	2.44	0	0.6	0.28	0.96	0.15	0.19	1.04	1.11	2.01	1.44	0.61	0.51	1.08	0.46	0.09
0.49	0.32	0.08	0.56	0.12	0.04	0.05	0.07	0.03	1.33	0.99	1.3	0.13	0.89	0	0	0.44	0	0.06	0	0.01	0.13	0.9	1.13	0.1	0.43	0.09	0.23	0.25
0.37	2.08	0.67	2.61	0.32	0.72	1.69	0.86	3.45	1.9	3.62	2.07	1.83	1.22	0	0.86	1.64	1.53	0.85	4.89	1	3.1	0.23	1.11	1.31	2.97	0.59	1.38	1.11
0.26	3.43	1.13	2.16	0.35	2.16	0.57	2.47	2.31	2.65	1.3	1.85	1.53	3.27	0	1.97	3.12	1.21	1.55	2.01	3.42	2.43	1.55	1.86	1.73	2.07	2.64	0.94	1.79
0	0.12	1.68	0	0.36	1.93	2.12	1.47	1.45	1.08	1.31	1.63	0.04	0.79	0.85	1.4	2.25	0.96	1.53	1.92	0.87	2.53	0.86	1.43	0.46	1.38	2.19	1.85	2.8
0.52	2.05	1.67	2	2.55	1.68	2.17	0.67	0.03	0.14	0.11	0.6	0.66	3.91	0.67	1.09	4.71	0.36	4.63	0	0.33	0.15	1.5	0.22	0.3	1.4	0	1.07	3.02
0	0.87	0.21	0.13	0.03	0.68	0.53	0.44	0.16	0.05	0.04	0.23	0.17	0.08	0.38	0.19	0.37	0.09	0.17	0.06	0.5	0.15	1.34	0.9	0.33	0.02	0.7	0.14	0.34
0	0.17	0.34	1.25	1.23	0.41	0.92	0	0.81	1.13	0.16	0.9	0.3	0.86	0.15	1.44	0.46	0	0.49	0.48	0	0.2	0.41	0.89	0.19	0.02	1.21	0.28	1.5

1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
3.3	5.8	10.4	0.0	6.1	0.0	25.1	6.6	2.3	5.1	9.7	0.5	0.3	6.4	0.0	3.6	6.1	7.6	20.8	15.0	0.0	13.5	28.4	21.3	21.8	3.6	9.4	53.8	9.4
4.8	15.5	4.1	4.1	8.6	2.5	0.0	30.5	26.4	6.6	9.1	0.8	19.6	2.5	0.0	12.4	5.8	27.4	0.5	20.8	17.8	13.7	14.0	6.6	22.6	0.5	26.7	29.7	0.0
0.0	49.0	33.0	2.5	6.6	11.2	2.0	2.0	7.9	13.0	7.6	0.3	29.5	26.4	0.0	6.6	0.0	10.9	1.5	13.2	1.5	12.2	4.1	4.6	3.3	38.1	16.3	7.9	11.2
0.0	18.8	27.2	11.7	0.0	6.1	0.0	1.5	8.6	25.7	2.5	0.3	13.5	15.0	0.0	6.4	0.0	13.2	1.0	11.2	0.5	5.6	0.5	2.5	12.2	25.9	8.4	12.2	4.3
0.0	14.5	0.0	33.3	12.2	3.3	1.8	1.3	7.1	16.8	0.0	5.3	17.8	62.0	0.0	15.2	7.1	24.4	3.8	4.8	26.4	28.2	51.1	36.6	15.5	13.0	27.4	11.7	2.3
12.4	8.1	2.0	14.2	3.0	1.0	1.3	1.8	0.8	33.8	25.1	33.0	3.3	22.6	0.0	0.0	11.2	0.0	1.5	0.0	0.3	3.3	22.9	28.7	2.5	10.9	2.3	5.8	6.4
9.4	52.8	17.0	66.3	8.1	18.3	42.9	21.8	87.6	48.3	91.9	52.6	46.5	31.0	0.0	21.8	41.7	38.9	21.6	124.2	25.4	78.7	5.8	28.2	33.3	75.4	15.0	35.1	28.2
6.6	87.1	28.7	54.9	8.9	54.9	14.5	62.7	58.7	67.3	33.0	47.0	38.9	83.1	0.0	50.0	79.2	30.7	39.4	51.1	86.9	61.7	39.4	47.2	43.9	52.6	67.1	23.9	45.5
0.0	3.0	42.7	0.0	9.1	49.0	53.8	37.3	36.8	27.4	33.3	41.4	1.0	20.1	21.6	35.6	57.2	24.4	38.9	48.8	22.1	64.3	21.8	36.3	11.7	35.1	55.6	47.0	71.1
13.2	52.1	42.4	50.8	64.8	42.7	55.1	17.0	0.8	3.6	2.8	15.2	16.8	99.3	17.0	27.7	119.6	9.1	117.6	0.0	8.4	3.8	38.1	5.6	7.6	35.6	0.0	27.2	76.7
0.0	22.1	5.3	3.3	0.8	17.3	13.5	11.2	4.1	1.3	1.0	5.8	4.3	2.0	9.7	4.8	9.4	2.3	4.3	1.5	12.7	3.8	34.0	22.9	8.4	0.5	17.8	3.6	8.6
0.0	4.3	8.6	31.8	31.2	10.4	23.4	0.0	20.6	28.7	4.1	22.9	7.6	21.8	3.8	36.6	11.7	0.0	12.4	12.2	0.0	5.1	10.4	22.6	4.8	0.5	30.7	7.1	38.1

1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
0.69	0.09	1.21	0.22	0.79	0.75	0.2	0.58	0.89	0.55	0.53	0.51	0.65	0.01	0.27	0	1.04	0.65	0.02	0.43	1.04	0.1
0.17	0.47	1.37	0.04	0.33	0.18	0	0.53	0.47	0	0.02	0.01	0.52	0.26	0	0	0.67	0	1.06	0.65	1.76	0
0.93	0	0.32	0.29	0.47	0.54	0.18	0.08	0.57	0.47	0.33	0	0.06	1.86	0.4	1.83	0.24	0	0.16	0.57	1.28	0.36
1.42	0	0.37	1.73	0	1.6	0	0.06	0.01	0	0.17	0	1.45	0.16	0.24	1.31	0.12	0	0	3.32	0.41	0
0.69	1.06	0.46	0.49	0.05	0.95	0	4.24	0.54	1.83	0.2	0	0.37	0.03	0.86	0	0.76	0	0.08	0.03	0	0
0.32	1.37	0.47	1.21	0.01	0.53	1.21	0.34	1.12	0.12	0.16	1.1	1.6	0.31	0.85	0.07	0.05	0.03	0.03	0.58	0	0
2.47	2.48	0.79	2.08	2.12	3.6	1.11	1.96	0.83	0.38	0.37	1.07	4.54	3.14	2.31	1.51	0.85	1.43	0.2	2.47	0	0
2.6	0.95	1.68	3.42	0.55	2.62	2.45	1.77	3.16	3.72	2.49	1.95	1.56	1.13	2.95	0.95	2.18	1.59	0.63	0.36	0.82	0
2.08	0.79	0.18	2.33	0.6	3.9	1.15	1.09	0.32	2.81	0.86	2.39	2.05	0.1	1.51	0.35	0.99	2.68	1.02	0.87	3.9	0
2.06	3.38	0.45	0.57	1.19	0.26	0.55	0.26	0.71	1.33	0	1.62	0.27	2.47	0.29	2.44	0.08	0.69	1.04	0.55	0	0
0.19	2.51	0.6	0.15	0	1.13	0.55	0	0.35	0.85	0.05	0	0.86	0.55	0	0.99	0.39	0.94	1.48	1.91	0.03	0
0.26	0.9	1	0.39	0.21	0.21	1.66	1.25	0.09	0.58	0.15	0.08	0.78	0.08	0.35	0.6	0.11	1.05	0.1	0.39	0	0

1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
17.5	2.3	30.7	5.6	20.1	19.1	5.1	14.7	22.6	14.0	13.5	13.0	16.5	0.3	6.9	0.0	26.4	16.5	0.5	10.9	26.4	2.5
4.3	11.9	34.8	1.0	8.4	4.6	0.0	13.5	11.9	0.0	0.5	0.3	13.2	6.6	0.0	0.0	17.0	0.0	26.9	16.5	44.7	0.0
23.6	0.0	8.1	7.4	11.9	13.7	4.6	2.0	14.5	11.9	8.4	0.0	1.5	47.2	10.2	46.5	6.1	0.0	4.1	14.5	32.5	9.1
36.1	0.0	9.4	43.9	0.0	40.6	0.0	1.5	0.3	0.0	4.3	0.0	36.8	4.1	6.1	33.3	3.0	0.0	0.0	84.3	10.4	0.0
17.5	26.9	11.7	12.4	1.3	24.1	0.0	107.7	13.7	46.5	5.1	0.0	9.4	0.8	21.8	0.0	19.3	0.0	2.0	0.8	0.0	0.0
8.1	34.8	11.9	30.7	0.3	13.5	30.7	8.6	28.4	3.0	4.1	27.9	40.6	7.9	21.6	1.8	1.3	0.8	0.8	14.7	0.0	0.0
62.7	63.0	20.1	52.8	53.8	91.4	28.2	49.8	21.1	9.7	9.4	27.2	115.3	79.8	58.7	38.4	21.6	36.3	5.1	62.7	0.0	0.0
66.0	24.1	42.7	86.9	14.0	66.5	62.2	45.0	80.3	94.5	63.2	49.5	39.6	28.7	74.9	24.1	55.4	40.4	16.0	9.1	20.8	0.0
52.8	20.1	4.6	59.2	15.2	99.1	29.2	27.7	8.1	71.4	21.8	60.7	52.1	2.5	38.4	8.9	25.1	68.1	25.9	22.1	99.1	0.0
52.3	85.9	11.4	14.5	30.2	6.6	14.0	6.6	18.0	33.8	0.0	41.1	6.9	62.7	7.4	62.0	2.0	17.5	26.4	14.0	0.0	0.0
4.8	63.8	15.2	3.8	0.0	28.7	14.0	0.0	8.9	21.6	1.3	0.0	21.8	14.0	0.0	25.1	9.9	23.9	37.6	48.5	0.8	0.0
6.6	22.9	25.4	9.9	5.3	5.3	42.2	31.8	2.3	14.7	3.8	2.0	19.8	2.0	8.9	15.2	2.8	26.7	2.5	9.9	0.0	0.0

STATION: CUBERO
 STATE: NEW MEXICO
 COOP NUMBER: 292250

BEGIN DATE: Jan 01 1977
 END DATE: Dec 31 2009

1 inch =

25.4 mm

Annul Totals

Year	Annual Total
1977	8.26
1978	12.63
1979	9.06
1980	6.95
1981	0
1982	5.61
1983	8.6
1984	11.78
1985	14.83
1986	11.37
1987	8.89
1988	14.91
1989	11.07
1990	15.93
1991	10.56
1992	11.46
1993	9.53
1994	13.53
1995	5.07
1996	10.25
1997	15.87
1998	11.64
1999	11.01
2000	11.11
2001	7.82
2002	7.28
2003	5.91
2004	12.06
2005	10.61
2006	13.22
2007	13.21
2008	9.35
2009	7.64

Max Precip

Year	Max (in)	Max (mm)
1977	0.75	19.1
1978	1.44	36.6
1979	1.1	27.9
1980	2.0	50.8
1981	0.0	0.0
1982	1.1	27.9
1983	0.8	20.3
1984	1.0	25.9
1985	1.2	29.2
1986	1.4	36.3
1987	1.1	28.7
1988	1.9	48.3
1989	2.0	49.5
1990	1.0	24.9
1991	1.0	25.1
1992	0.9	22.4
1993	0.9	21.6
1994	1.5	36.8
1995	0.6	14.0
1996	0.9	21.6
1997	1.5	36.8
1998	1.6	40.1
1999	1.5	38.6
2000	1.7	42.4
2001	0.8	20.1
2002	0.7	18.5
2003	1.3	31.8
2004	1.3	33.0
2005	1.2	30.2
2006	2.4	61.0
2007	1.1	27.2
2008	0.7	17.8
2009	0.7	17.0

Max Precip - Only Years with Complete Data

Year	Max (mm)
1977	19.1
1978	36.6
1979	27.9
1980	50.8
1982	27.9
1984	25.9
1985	29.2
1986	36.3
1987	28.7
1988	48.3
1989	49.5
1990	24.9
1991	25.1
1992	22.4
1993	21.6
1994	36.8
1995	14.0
1996	21.6
1997	36.8
1998	40.1
1999	38.6
2000	42.4
2001	20.1
2002	18.5
2003	31.8
2004	33.0
2005	30.2
2006	61.0
2007	27.2
2008	17.8
2009	17.0

Max Precip - Only Years with Complete Data

Year	Max (mm)
1977	19.1
1978	36.6
1979	27.9
1980	50.8
1982	27.9
1984	25.9
1985	29.2
1986	36.3
1987	28.7
1988	48.3
1989	49.5
1990	24.9
1991	25.1
1992	22.4
1993	21.6
1994	36.8
1995	14.0
1996	21.6
1997	36.8
1998	40.1
1999	38.6
2000	42.4
2001	20.1
2002	18.5
2003	31.8
2004	33.0
2005	30.2
2006	61.0
2007	27.2
2008	17.8
2009	17.0

Sorted - Largest Rain Events to Smallest

Max (mm)	Year
61.0	2006
50.8	1980
49.5	1989
48.3	1988
42.4	2000
40.1	1998
38.6	1999
36.8	1994
36.8	1997
36.6	1978
36.3	1986
33.0	2004
31.8	2003
30.2	2005
29.2	1985
28.7	1987
27.9	1979
27.9	1982
27.2	2007
25.9	1984
25.1	1991
24.9	1990
22.4	1992
21.6	1993
21.6	1996
20.1	2001
18.5	2002
21.6	1996
20.1	2001
19.1	1977
18.5	2002
17.8	2008
17.0	2009
14.0	1995

Mean	10.21
Max	15.93
Min	0

Cubero

Incomplete Data

Monthly Inches

Month	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Jan	0.43	1.57	0.75	0	0	0	0.99	0.39	1.03	0.11	1.8	0.35	0.69	1.11	0.4	0.8	0.95	0.35
Feb	0.23	0.83	0.37	0	0	0	0.75	0	0.32	0	1.41	0.02	0.6	0.32	0	0.14	0.81	0.05
March	0.45	0.33	0	0	0	0	0	0.66	0.97	0	0.2	0.1	0.6	0.94	0.49	0.1	1.01	0.73
April	0.32	0.02	0.02	0	0	0	0.72	0.1	2.03	0.35	0	2.94	0	1.47	0	0.19	0.13	0.33
May	0.77	1.95	1.51	0	0	0	0	0.5	0.58	0.54	0.7	0.2	0.07	0.97	1.42	2.65	0.79	1.74
June	0.34	0.61	0.75	0.02	0	0	0	0.7	0.47	1.22	0.36	1.57	0	0.77	1.18	0.5	0.74	0.12
July	1.48	0.4	1.14	2.11	0	0.5	0	0.52	3.61	2.11	0.54	3.87	5	3.04	1.59	1.63	0.5	2.11
August	1.69	1.75	2.07	1.3	0	3.64	1.18	2.56	0.97	1.06	1.22	3.73	1.02	2.32	0.41	2.41	3.19	3.07
Sep	1.93	1.31	1.1	3.02	0	1.47	3	2.49	2.4	0.21	0	1.42	0.52	1.89	1.71	0.75	0.15	1.67
Oct	0.19	1.72	0.25	0	0	0	1.72	2.46	2.13	2.79	0.76	0.33	2.34	0.32	0.57	0.51	0.87	1.88
Nov	0.28	1.84	1.1	0.5	0	0	0.24	0.85	0.07	2.27	0.41	0.09	0	1.6	1.46	0.56	0.26	0.91
Dec	0.15	0.3	0	0	0	0	0	0.55	0.25	0.71	1.49	0.29	0.23	1.18	1.33	1.22	0.13	0.57

Monthly Milimeters

Month	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Jan	10.9	39.9	19.1	0.0	0.0	0.0	25.1	9.9	26.2	2.8	45.7	8.9	17.5	28.2	10.2	20.3	24.1	8.9
Feb	5.8	21.1	9.4	0.0	0.0	0.0	19.1	0.0	8.1	0.0	35.8	0.5	15.2	8.1	0.0	3.6	20.6	1.3
March	11.4	8.4	0.0	0.0	0.0	0.0	0.0	16.8	24.6	0.0	5.1	2.5	15.2	23.9	12.4	2.5	25.7	18.5
April	8.1	0.5	0.5	0.0	0.0	0.0	18.3	2.5	51.6	8.9	0.0	74.7	0.0	37.3	0.0	4.8	3.3	8.4
May	19.6	49.5	38.4	0.0	0.0	0.0	0.0	12.7	14.7	13.7	17.8	5.1	1.8	24.6	36.1	67.3	20.1	44.2
June	8.6	15.5	19.1	0.5	0.0	0.0	0.0	17.8	11.9	31.0	9.1	39.9	0.0	19.6	30.0	12.7	18.8	3.0
July	37.6	10.2	29.0	53.6	0.0	12.7	0.0	13.2	91.7	53.6	13.7	98.3	127.0	77.2	40.4	41.4	12.7	53.6
August	42.9	44.5	52.6	33.0	0.0	92.5	30.0	65.0	24.6	26.9	31.0	94.7	25.9	58.9	10.4	61.2	81.0	78.0
Sep	49.0	33.3	27.9	76.7	0.0	37.3	76.2	63.2	61.0	5.3	0.0	36.1	13.2	48.0	43.4	19.1	3.8	42.4
Oct	4.8	43.7	6.4	0.0	0.0	0.0	43.7	62.5	54.1	70.9	19.3	8.4	59.4	8.1	14.5	13.0	22.1	47.8
Nov	7.1	46.7	27.9	12.7	0.0	0.0	6.1	21.6	1.8	57.7	10.4	2.3	0.0	40.6	37.1	14.2	6.6	23.1
Dec	3.8	7.6	0.0	0.0	0.0	0.0	0.0	14.0	6.4	18.0	37.8	7.4	5.8	30.0	33.8	31.0	3.3	14.5

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	AVERAGE
0.7	0.63	0.58	0.15	0	0.28	1.3	0.63	0.14	0.38	1.34	0.1	0.58	0.5	0.05	0.60
0.33	0.21	0.17	0.41	0	0.01	0.57	0	1.18	0.79	2.01	0	0.9	0.62	0.01	0.44
0.29	0.06	0.04	1.95	0.7	3.32	0.2	0	0.09	0.48	1.13	0.39	0.44	0.04	1.01	0.56
0.25	0	2.25	0.24	0.88	0.85	0.24	0.1	0	3.19	0.43	0.02	1.15	0	0.16	0.59
0.31	0	0.93	0	0.93	0.03	1.17	0.03	0	0	0.62	0	1.21	0.8	0.98	0.71
0.27	1.11	1.52	0.1	0.3	0.31	0.1	0.19	0.09	0.65	0.03	0.63	0.27	0.76	1.17	0.54
0.12	1.48	3.11	3.75	3.26	1.2	1.02	0.54	0.24	1.84	0.49	2.64	1.56	2.98	0.75	1.78
1.03	2.35	1.75	1.25	3.28	0.78	1.56	1.22	1.32	1.37	1.51	6.4	3.18	1.23	1.52	2.01
1.39	2.11	2.62	0.35	0.96	0.53	0.66	1.57	0.65	1.01	2.07	0.66	1.47	0.12	1.51	1.28
0	1.97	0.23	2.93	0.23	2.42	0.04	1.19	0.83	0.34	0.96	0.91	0.82	0.42	0.28	0.99
0.02	0.33	1.28	0.45	0	0.98	0.5	0.6	1.27	1.73	0.02	0.2	0.51	0.53	0	0.67
0.36	0	1.39	0.06	0.47	0.4	0.46	1.21	0.1	0.28	0	1.27	1.12	1.35	0.2	0.57

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	AVERAGE
17.8	16.0	14.7	3.8	0.0	7.1	33.0	16.0	3.6	9.7	34.0	2.5	14.7	12.7	1.3	15.3
8.4	5.3	4.3	10.4	0.0	0.3	14.5	0.0	30.0	20.1	51.1	0.0	22.9	15.7	0.3	11.2
7.4	1.5	1.0	49.5	17.8	84.3	5.1	0.0	2.3	12.2	28.7	9.9	11.2	1.0	25.7	14.2
6.4	0.0	57.2	6.1	22.4	21.6	6.1	2.5	0.0	81.0	10.9	0.5	29.2	0.0	4.1	15.0
7.9	0.0	23.6	0.0	23.6	0.8	29.7	0.8	0.0	0.0	15.7	0.0	30.7	20.3	24.9	18.1
6.9	28.2	38.6	2.5	7.6	7.9	2.5	4.8	2.3	16.5	0.8	16.0	6.9	19.3	29.7	13.8
3.0	37.6	79.0	95.3	82.8	30.5	25.9	13.7	6.1	46.7	12.4	67.1	39.6	75.7	19.1	45.2
26.2	59.7	44.5	31.8	83.3	19.8	39.6	31.0	33.5	34.8	38.4	162.6	80.8	31.2	38.6	50.9
35.3	53.6	66.5	8.9	24.4	13.5	16.8	39.9	16.5	25.7	52.6	16.8	37.3	3.0	38.4	32.5
0.0	50.0	5.8	74.4	5.8	61.5	1.0	30.2	21.1	8.6	24.4	23.1	20.8	10.7	7.1	25.1
0.5	8.4	32.5	11.4	0.0	24.9	12.7	15.2	32.3	43.9	0.5	5.1	13.0	13.5	0.0	16.9
9.1	0.0	35.3	1.5	11.9	10.2	11.7	30.7	2.5	7.1	0.0	32.3	28.4	34.3	5.1	14.5

STATION: MARQUEZ
STATE: NEW MEXICO
COOP NUMBER: 295467

BEGIN DATE: Jan 01 1942
 END DATE: Oct 31 1975

1 inch =	25.4 mm
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Annual Totals

Year	Annual Total (in)	Annual Total (mm)
1942	10.4	263.7
1943	15.5	394.0
1944	14.5	369.1
1945	9.7	245.4
1946	11.0	279.1
1947	13.5	342.6
1948	14.1	358.4
1949	13.1	333.2
1950	5.2	132.6
1951	9.0	227.3
1952	12.3	312.9
1953	9.6	244.9
1954	11.0	278.1
1955	9.1	231.6
1956	5.2	132.3
1957	19.6	496.8
1958	16.1	407.7
1959	12.7	322.6
1960	12.3	311.7
1961	13.1	332.2
1962	11.7	297.9
1963	9.1	231.6
1964	9.5	240.0
1965	13.1	333.8
1966	7.9	200.7
1967	13.4	339.6
1968	7.0	177.8
1969	10.7	270.8
1970	6.6	166.6
1971	7.2	182.4
1972	11.4	290.6
1973	8.6	218.2
1974	7.2	181.9
1975	9.9	251.2

Mean	10.9	276.4
Max	19.6	496.8
Min	5.2	132.3

Max Precip

Year	Max (in)	Max (mm)
1942	1.3	33.0
1943	1.0	25.7
1944	1.4	35.6
1945	1.0	25.4
1946	0.9	22.9
1947	1.4	35.6
1948	1.2	29.2
1949	1.3	32.8
1950	0.7	18.3
1951	2.3	58.4
1952	1.8	46.5
1953	1.4	35.1
1954	1.8	45.7
1955	1.2	31.0
1956	0.6	15.2
1957	1.8	44.7
1958	1.2	31.5
1959	1.5	39.1
1960	1.6	40.6
1961	1.5	38.1
1962	1.6	41.4
1963	1.3	31.8
1964	1.3	33.0
1965	1.4	35.6
1966	1.5	38.6
1967	1.3	32.3
1968	0.9	22.9
1969	1.6	40.1
1970	0.9	22.9
1971	1.0	25.1
1972	2.0	50.8
1973	0.7	17.8
1974	0.7	16.8
1975	1.0	24.1

Sorted - Largest Rain Events to Smallest Events

Max (mm)	Year
58.4	1951
50.8	1972
46.5	1952
45.7	1954
44.7	1957
41.4	1962
40.6	1960
40.1	1969
39.1	1959
38.6	1966
38.1	1961
35.6	1944
35.6	1947
35.6	1965
35.1	1953
33.0	1942
33.0	1964
32.8	1949
32.3	1967
31.8	1963
31.5	1958
31.0	1955
29.2	1948
25.7	1943
25.4	1945
25.1	1971
24.1	1975
22.9	1946
22.9	1968
22.9	1970
18.3	1950
17.8	1973
16.8	1974
15.2	1956

Marquez

Monthly Inches

Month	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
Jan	0.26	0.65	0.33	1.03	0.53	0.52	0.92	1.48	0	0.62	1.16	0	0.23	0.33	0.03	0.5	0.9	0
Feb	0.52	0.06	0.37	0.06	0.1	0	2.85	0.45	0.06	0.46	0.21	1.21	0	0.24	1.03	0.87	0.37	0.34
March	0.24	0.73	0.85	1.11	0.54	0	0.84	0.11	0.8	0	0.31	1.19	0.03	0	0	2.21	2.17	0
April	2.58	0.12	0.43	1.18	0	0.06	0.04	1.71	0.65	0.67	1.12	0.27	0	0.32	0	0.71	1.8	1.42
May	0.07	0.73	1.34	0	0.57	1.58	0.83	1.79	0	0.08	0.53	0.07	0.74	0.99	0	1.95	0.51	1.25
June	0.84	2.05	0.22	0	0	0.48	1.95	0.99	0.7	0	1.12	0.92	2.19	0.19	0.37	0.96	0.04	0.53
July	0.82	0.84	3.61	0.58	1.67	1.61	1.49	1.79	0.9	0.42	2	2.04	2.41	2.14	2.65	2.41	0.94	1.89
August	1.33	4.52	1.82	4.02	4.08	4.5	2.62	2.72	0.61	4.85	2.06	1.61	3.39	4.2	0.35	5.81	5.85	2.79
Sep	1.43	1.09	1.36	0.5	1.09	3.28	0.52	1.41	1.5	0	2.07	0	0.88	0.25	0	0	1.25	0
Oct	1.21	1.4	2.41	0.76	1.12	0.1	1.35	0.67	0	0.33	0	0.86	0.87	0.11	0.78	2.51	1.43	1.9
Nov	0	0.64	1.16	0	1.25	0.35	0.4	0	0	0.55	1.19	1.31	0	0.28	0	1.36	0.64	1.54
Dec	1.08	2.68	0.63	0.42	0.04	1.01	0.3	0	0	0.97	0.55	0.16	0.21	0.07	0	0.27	0.15	1.04

Monthly Milimeters

Month	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
Jan	6.6	16.5	8.4	26.2	13.5	13.2	23.4	37.6	0.0	15.7	29.5	0.0	5.8	8.4	0.8	12.7	22.9	0.0
Feb	13.2	1.5	9.4	1.5	2.5	0.0	72.4	11.4	1.5	11.7	5.3	30.7	0.0	6.1	26.2	22.1	9.4	8.6
March	6.1	18.5	21.6	28.2	13.7	0.0	21.3	2.8	20.3	0.0	7.9	30.2	0.8	0.0	0.0	56.1	55.1	0.0
April	65.5	3.0	10.9	30.0	0.0	1.5	1.0	43.4	16.5	17.0	28.4	6.9	0.0	8.1	0.0	18.0	45.7	36.1
May	1.8	18.5	34.0	0.0	14.5	40.1	21.1	45.5	0.0	2.0	13.5	1.8	18.8	25.1	0.0	49.5	13.0	31.8
June	21.3	52.1	5.6	0.0	0.0	12.2	49.5	25.1	17.8	0.0	28.4	23.4	55.6	4.8	9.4	24.4	1.0	13.5
July	20.8	21.3	91.7	14.7	42.4	40.9	37.8	45.5	22.9	10.7	50.8	51.8	61.2	54.4	67.3	61.2	23.9	48.0
August	33.8	114.8	46.2	102.1	103.6	114.3	66.5	69.1	15.5	123.2	52.3	40.9	86.1	106.7	8.9	147.6	148.6	70.9
Sep	36.3	27.7	34.5	12.7	27.7	83.3	13.2	35.8	38.1	0.0	52.6	0.0	22.4	6.4	0.0	0.0	31.8	0.0
Oct	30.7	35.6	61.2	19.3	28.4	2.5	34.3	17.0	0.0	8.4	0.0	21.8	22.1	2.8	19.8	63.8	36.3	48.3
Nov	0.0	16.3	29.5	0.0	31.8	8.9	10.2	0.0	0.0	14.0	30.2	33.3	0.0	7.1	0.0	34.5	16.3	39.1
Dec	27.4	68.1	16.0	10.7	1.0	25.7	7.6	0.0	0.0	24.6	14.0	4.1	5.3	1.8	0.0	6.9	3.8	26.4

1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	AVERAGE
0.53	0	0.4	0.53	0	0.4	0.99	0.02	0	0	0	0.68	0.2	1.5	1.36	0.65	0.49
1.26	0.32	0	0.67	0.16	0.11	0.3	0.03	1.92	0.21	0	0.6	0	1.45	0.2	1.31	0.52
0	1.17	0.36	0.38	0.08	0.14	0	0	0.34	0.65	0.7	0	0	1.35	0.3	0.6	0.51
0	1.51	0	0.17	1.34	1.45	0	0	0.5	0.15	0	0.37	0	0.36	0.1	0.55	0.58
0.85	0	0.11	0	1.12	0.21	0	0.12	0	0	0.08	0	0	0.95	0	1.92	0.56
0.12	0.38	0.52	0.42	0.13	1.8	1.48	1.81	0	0	0	0	0	0.5	0	0	0.61
2.3	1.18	2.63	0.63	2.8	4.12	1.55	1.48	2.1	1.6	1.71	0.84	0.55	1.45	1.21	1.34	1.70
0.52	2.59	0.22	3.33	1.5	1.04	1.1	5.07	1.8	2.7	1.97	0.7	1.49	0.5	1.24	1.54	2.48
0.99	0.85	3.61	0.96	1.58	1.5	1.75	3.39	0	1.15	0	1.15	0.8	0.45	0.95	1.98	1.11
4.47	3.05	2.05	1.7	0	0.5	0.2	0.1	0	4.2	1.97	0.6	7.3	0.08	1.4	0	1.34
0.2	1.03	1.24	0.33	0.72	0.4	0.12	0.02	0.34	0	0.13	0.35	0.8	0	0	0	0.50
1.03	1	0.59	0	0.02	1.47	0.41	1.33	0	0	0	1.89	0.3	0	0.4	0	0.55

1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	AVERAGE
13.5	0.0	10.2	13.5	0.0	10.2	25.1	0.5	0.0	0.0	0.0	17.3	5.1	38.1	34.5	16.5	12.5
32.0	8.1	0.0	17.0	4.1	2.8	7.6	0.8	48.8	5.3	0.0	15.2	0.0	36.8	5.1	33.3	13.3
0.0	29.7	9.1	9.7	2.0	3.6	0.0	0.0	8.6	16.5	17.8	0.0	0.0	34.3	7.6	15.2	12.8
0.0	38.4	0.0	4.3	34.0	36.8	0.0	0.0	12.7	3.8	0.0	9.4	0.0	9.1	2.5	14.0	14.6
21.6	0.0	2.8	0.0	28.4	5.3	0.0	3.0	0.0	0.0	2.0	0.0	0.0	24.1	0.0	48.8	14.2
3.0	9.7	13.2	10.7	3.3	45.7	37.6	46.0	0.0	0.0	0.0	0.0	0.0	12.7	0.0	0.0	15.5
58.4	30.0	66.8	16.0	71.1	104.6	39.4	37.6	53.3	40.6	43.4	21.3	14.0	36.8	30.7	34.0	43.1
13.2	65.8	5.6	84.6	38.1	26.4	27.9	128.8	45.7	68.6	50.0	17.8	37.8	12.7	31.5	39.1	63.1
25.1	21.6	91.7	24.4	40.1	38.1	44.5	86.1	0.0	29.2	0.0	29.2	20.3	11.4	24.1	50.3	28.2
113.5	77.5	52.1	43.2	0.0	12.7	5.1	2.5	0.0	106.7	50.0	15.2	185.4	2.0	35.6	0.0	33.9
5.1	26.2	31.5	8.4	18.3	10.2	3.0	0.5	8.6	0.0	3.3	8.9	20.3	0.0	0.0	0.0	12.6
26.2	25.4	15.0	0.0	0.5	37.3	10.4	33.8	0.0	0.0	0.0	48.0	7.6	0.0	10.2	0.0	13.9

Laguna2 New Mexico

1 inch =	25.4 mm
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Top Storms

	Total Precip (in)	Date
1	1.72	7/31/2006
2	1.29	9/6/2005
3	1	8/6/2006
4	0.9	9/29/2005
5	0.86	8/4/2006
6	0.86	4/13/2007
7	0.83	7/8/2006
8	0.8	9/7/2005
9	0.75	7/20/2008
10	0.74	10/9/2006
11	0.73	8/9/2006

Annual Totals

Year	Annual Total (in)	Annual Total (mm)
2005	10.3	260.6
2006	12.9	328.4
2007	3.7	94.2
2008	7.0	178.3
2009	6.3	160.3

Mean	8.0	204.4
Max	12.9	328.4
Min	3.7	94.2

Max Precip

Year	Max Precip (in)	Max Precip (mm)
2005	1.29	32.8
2006	1.72	43.7
2007	0.86	21.8
2008	0.75	19.1
2009	0.45	11.4

Laguna2**Monthly Inches**

Month	2004	2005	2006	2007	2008	2009	2010
Jan	0	0.96	0.16	0.31	0.16	0.01	1.04
Feb	0	1.6	0	0.51	0.67	0	0.53
March	0	1.3	0.37	0.52	0.02	0.75	0.17
April	0	0.37	0.04	1.16	0.01	0.13	0
May	0	0.42	0	0	1.01	0.45	0
June	0	0.02	0.63	0	0.08	0.84	0
July	0	0.15	3.36	0	2.7	1.3	0
August	0	0.79	5.73	0	0.47	0.78	0
Sep	0	3.82	0.75	0	0.23	1.53	0
Oct	0	0.76	0.9	0.15	0.37	0.26	0
Nov	0	0.04	0.06	0.43	0.24	0.09	0
Dec	0.24	0.03	0.93	0.63	1.06	0.17	0

Monthly Milimeters

Month	2004	2005	2006	2007	2008	2009	2010
Jan	0	24.4	4.1	7.9	4.1	0.3	26.4
Feb	0	40.6	0.0	13.0	17.0	0.0	13.5
March	0	33.0	9.4	13.2	0.5	19.1	4.318
April	0	9.4	1.0	29.5	0.3	3.3	0
May	0	10.7	0.0	0.0	25.7	11.4	0
June	0	0.5	16.0	0.0	2.0	21.3	0
July	0	3.8	85.3	0.0	68.6	33.0	0
August	0	20.1	145.5	0.0	11.9	19.8	0
Sep	0	97.0	19.1	0.0	5.8	38.9	0
Oct	0	19.3	22.9	3.8	9.4	6.6	0
Nov	0	1.0	1.5	10.9	6.1	2.3	0
Dec	6.096	0.8	23.6	16.0	26.9	4.3	0

By: A. Duran
 Checked by:
 Date: 3-24-10

St. Anthony
Rainfall Frequency Analysis
Type I Extremal Distribution by Fisher & Tippett (Gumbel Distribution)

(Using Laguna Climatological Station Data)

n	Year	Max Daily Rainfall (mm)	Sorted
1	1905	67.3	78.7
2	1906	31.8	72.6
3	1907	40.6	67.3
4	1908	34.3	58.7
5	1909	78.7	50.8
6	1910	45.7	48.3
7	1911	40.6	47.8
8	1912	50.8	46.7
9	1913	34.3	46.5
10	1914	25.4	46.2
11	1919	35.6	45.7
12	1920	48.3	45.7
13	1921	45.7	45.7
14	1927	22.9	45.2
15	1928	19.6	44.5
16	1929	33.3	44.2
17	1930	38.1	43.7
18	1931	30.5	42.9
19	1932	38.4	42.4
20	1933	38.1	40.6
21	1934	21.6	40.6
22	1936	26.9	40.6
23	1937	24.1	38.4
24	1938	31.8	38.1
25	1939	36.8	38.1
26	1940	26.2	38.1
27	1941	30.0	37.6
28	1942	17.3	36.8
29	1943	30.0	36.3
30	1944	45.7	35.6
31	1945	16.8	35.6
32	1949	26.9	35.6
33	1950	18.5	34.3
34	1951	16.3	34.3
35	1952	14.5	33.8
36	1953	13.0	33.5
37	1954	35.6	33.3
38	1955	42.9	33.0
39	1956	12.7	32.8
40	1957	33.8	32.8
41	1958	28.7	32.0
42	1959	26.7	31.8
43	1960	31.5	31.8
44	1961	28.2	31.8
45	1962	26.2	31.5

i	1/(n+1)	Rainfall (mm)	x	y	Return Period
			1	1/(1-(1-(1/(n+1))))	
1	1.1%	78.7	91.0		
2	2.2%	72.6	45.5		
3	3.3%	67.3	30.3		
4	4.4%	58.7	22.8		
5	5.5%	50.8	18.2		
6	6.6%	48.3	15.2		
7	7.7%	47.8	13.0		
8	8.8%	46.7	11.4		
9	9.9%	46.5	10.1		
10	11.0%	46.2	9.1		
11	12.1%	45.7	8.3		
12	13.2%	45.7	7.6		
13	14.3%	45.7	7.0		
14	15.4%	45.2	6.5		
15	16.5%	44.5	6.1		
16	17.6%	44.2	5.7		
17	18.7%	43.7	5.4		
18	19.8%	42.9	5.1		
19	20.9%	42.4	4.8		
20	22.0%	40.6	4.6		
21	23.1%	40.6	4.3		
22	24.2%	40.6	4.1		
23	25.3%	38.4	4.0		
24	26.4%	38.1	3.8		
25	27.5%	38.1	3.6		
26	28.6%	38.1	3.5		
27	29.7%	37.6	3.4		
28	30.8%	36.8	3.3		
29	31.9%	36.3	3.1		
30	33.0%	35.6	3.0		
31	34.1%	35.6	2.9		
32	35.2%	35.6	2.8		
33	36.3%	34.3	2.8		
34	37.4%	34.3	2.7		
35	38.5%	33.8	2.6		
36	39.6%	33.5	2.5		
37	40.7%	33.3	2.5		
38	41.8%	33.0	2.4		
39	42.9%	32.8	2.3		
40	44.0%	32.8	2.3		
41	45.1%	32.0	2.2		
42	46.2%	31.8	2.2		
43	47.3%	31.8	2.1		
44	48.4%	31.8	2.1		
45	49.5%	31.5	2.0		

46	1963	24.6	31.2
47	1964	58.7	30.7
48	1965	16.5	30.5
49	1966	44.2	30.0
50	1967	20.8	30.0
51	1968	19.1	30.0
52	1969	46.5	29.2
53	1971	17.0	28.7
54	1972	32.8	28.2
55	1973	20.8	28.2
56	1974	31.2	27.9
57	1975	72.6	27.7
58	1976	27.7	27.4
59	1977	28.2	26.9
60	1978	36.3	26.9
61	1979	27.9	26.7
62	1980	22.9	26.2
63	1981	25.4	26.2
64	1982	18.0	25.4
65	1983	32.0	25.4
66	1984	22.4	25.4
67	1985	42.4	24.6
68	1986	30.7	24.1
69	1987	27.4	22.9
70	1988	30.0	22.9
71	1989	21.3	22.4
72	1990	46.2	22.1
73	1991	25.4	21.6
74	1992	37.6	21.3
75	1993	46.7	20.8
76	1994	40.6	20.8
77	1995	33.0	19.6
78	1996	29.2	19.1
79	1997	47.8	19.1
80	1998	45.2	18.5
81	1999	22.1	18.0
82	2000	35.6	17.3
83	2001	33.5	17.0
84	2002	38.1	16.8
85	2003	31.8	16.5
86	2004	44.5	16.3
87	2005	32.8	14.5
88	2006	43.7	13.0
89	2008	19.1	12.7
90	2009	11.4	11.4

N 90
Mean ($x_{\bar{n}}$) 32.49 mm

46	50.5%	31.2	2.0
47	51.6%	30.7	1.9
48	52.7%	30.5	1.9
49	53.8%	30.0	1.9
50	54.9%	30.0	1.8
51	56.0%	30.0	1.8
52	57.1%	29.2	1.8
53	58.2%	28.7	1.7
54	59.3%	28.2	1.7
55	60.4%	28.2	1.7
56	61.5%	27.9	1.6
57	62.6%	27.7	1.6
58	63.7%	27.4	1.6
59	64.8%	26.9	1.5
60	65.9%	26.9	1.5
61	67.0%	26.7	1.5
62	68.1%	26.2	1.5
63	69.2%	26.2	1.4
64	70.3%	25.4	1.4
65	71.4%	25.4	1.4
66	72.5%	25.4	1.4
67	73.6%	24.6	1.4
68	74.7%	24.1	1.3
69	75.8%	22.9	1.3
70	76.9%	22.9	1.3
71	78.0%	22.4	1.3
72	79.1%	22.1	1.3
73	80.2%	21.6	1.2
74	81.3%	21.3	1.2
75	82.4%	20.8	1.2
76	83.5%	20.8	1.2
77	84.6%	19.6	1.2
78	85.7%	19.1	1.2
79	86.8%	19.1	1.2
80	87.9%	18.5	1.1
81	89.0%	18.0	1.1
82	90.1%	17.3	1.1
83	91.2%	17.0	1.1
84	92.3%	16.8	1.1
85	93.4%	16.5	1.1
86	94.5%	16.3	1.1
87	95.6%	14.5	1.0
88	96.7%	13.0	1.0
89	97.8%	12.7	1.0
90	98.9%	11.4	1.0

Standard Deviation (s_n) = 12.55

α = 9.79

$$\alpha = 6^{0.5} * s_n / 3.1416$$

μ = 26.84

$$\mu = x_n - 0.5772 * \alpha$$

T (years)	P	y_T	x_T (mm)	x_T (in)
1.01	0.010	-1.5	11.9	0.5
2	0.500	0.4	30.4	1.2
3	0.667	0.9	35.7	1.4
4	0.750	1.2	39.0	1.5
5	0.800	1.5	41.5	1.6
10	0.900	2.3	48.9	1.9
20	0.950	3.0	55.9	2.2
25	0.960	3.2	58.1	2.3
50	0.980	3.9	65.0	2.6
100	0.990	4.6	71.9	2.8
200	0.995	5.3	78.7	3.1
500	0.998	6.2	87.7	3.5
1000	0.999	6.9	94.4	3.7

1 inch = 25.4 mm

$$y_T = -\ln(\ln(T/(T-1)))$$

$$x_T = \mu + \alpha * y_T$$

113.226

Reference:

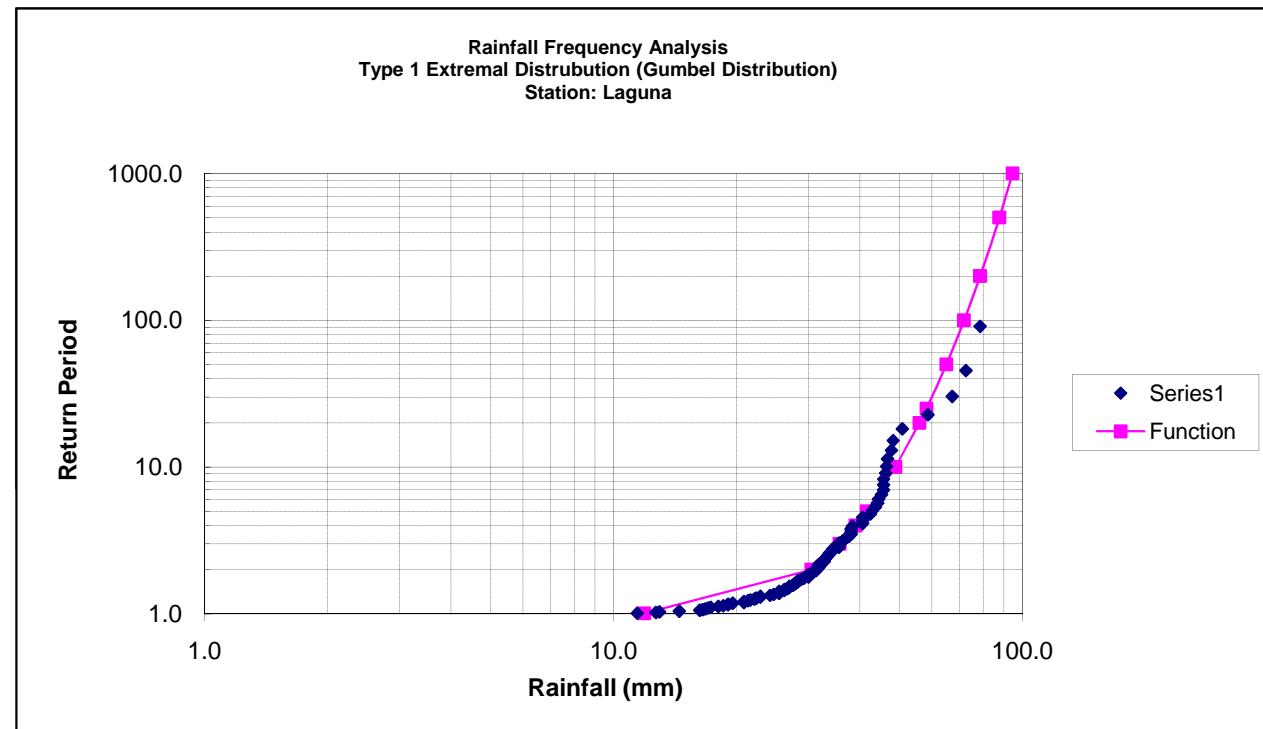
National Engineering Handbook: Part 630 Hydrology, NRCS 2000.

Notes:

Notes:

1. 1905 missing data from Jan through March (9/12)
2. 1915 missing data from May through December (4/12)
3. 1916 only has data for September (1/12)
4. 1917 missing data from May through November (5/12)
5. 1918 only has data for Jan and April (2/12)
6. 1919 missing data for January (11/12)
7. 1921 missing data from August through November (8/12)
8. 1924 only has data for January (1/12)
9. 1927 missing data from January (11/12)
10. 1935 only has data for January and February (2/12)
11. 1946 missing data from Sep to Dec (8/12)
12. 1947 missing whole year
13. 1948 only has data from Oct to Dec (3/12)
14. 1970 only has data for Jan, Feb, Sep through Dec (6/12)
15. 2005 missing data from May, June, July, Oct, Dec (7/12) - Laguna (THEREFORE LAGUNA2 IS USED)
16. 2006 only has data from Jan through March (3/12) - Laguna (THEREFORE LAGUNA2 IS USED)
17. Laguna2 data is used for 2005, 2006, 2008, 2009

T	x_T
2	30.4
5	41.5
10	48.9
20	55.9
25	58.1
100	71.9
200	78.7



By: A. Duran
Checked by:
Date: 3-24-10

St. Anthony
Rainfall Frequency Analysis

Type I Extremal Distribution by Fisher & Tippett (Gumbel Distribution)
(Using Cubero Climatological Station Data)

n	Year	Max Daily Rainfall (mm)	Sorted
1	1977	19.1	61.0
2	1978	36.6	50.8
3	1979	27.9	49.5
4	1980	50.8	48.3
5	1982	27.9	42.4
6	1984	25.9	40.1
7	1985	29.2	38.6
8	1986	36.3	36.8
9	1987	28.7	36.8
10	1988	48.3	36.6
11	1989	49.5	36.3
12	1990	24.9	33.0
13	1991	25.1	31.8
14	1992	22.4	30.2
15	1993	21.6	29.2
16	1994	36.8	28.7
17	1995	14.0	27.9
18	1996	21.6	27.9
19	1997	36.8	27.2
20	1998	40.1	25.9
21	1999	38.6	25.1
22	2000	42.4	24.9
23	2001	20.1	22.4
24	2002	18.5	21.6
25	2003	31.8	21.6
26	2004	33.0	20.1
27	2005	30.2	19.1
28	2006	61.0	18.5
29	2007	27.2	17.8
30	2008	17.8	17.0
31	2009	17.0	14.0

x	y	Return Period	
i	1/(n+1)	Rainfall (mm)	1/(1-(1/(n+1)))
1	3.1%	61.0	32.0
2	6.3%	50.8	16.0
3	9.4%	49.5	10.7
4	12.5%	48.3	8.0
5	15.6%	42.4	6.4
6	18.8%	40.1	5.3
7	21.9%	38.6	4.6
8	25.0%	36.8	4.0
9	28.1%	36.8	3.6
10	31.3%	36.6	3.2
11	34.4%	36.3	2.9
12	37.5%	33.0	2.7
13	40.6%	31.8	2.5
14	43.8%	30.2	2.3
15	46.9%	29.2	2.1
16	50.0%	28.7	2.0
17	53.1%	27.9	1.9
18	56.3%	27.9	1.8
19	59.4%	27.2	1.7
20	62.5%	25.9	1.6
21	65.6%	25.1	1.5
22	68.8%	24.9	1.5
23	71.9%	22.4	1.4
24	75.0%	21.6	1.3
25	78.1%	21.6	1.3
26	81.3%	20.1	1.2
27	84.4%	19.1	1.2
28	87.5%	18.5	1.1
29	90.6%	17.8	1.1
30	93.8%	17.0	1.1
31	96.9%	14.0	1.0

N 31

Mean (x_n) 31.00 mm

Standard Deviation 11.26

$$\alpha = 6^{0.5} * s_n / 3.1416$$

$$\mu = x_n - 0.5772 * \alpha$$

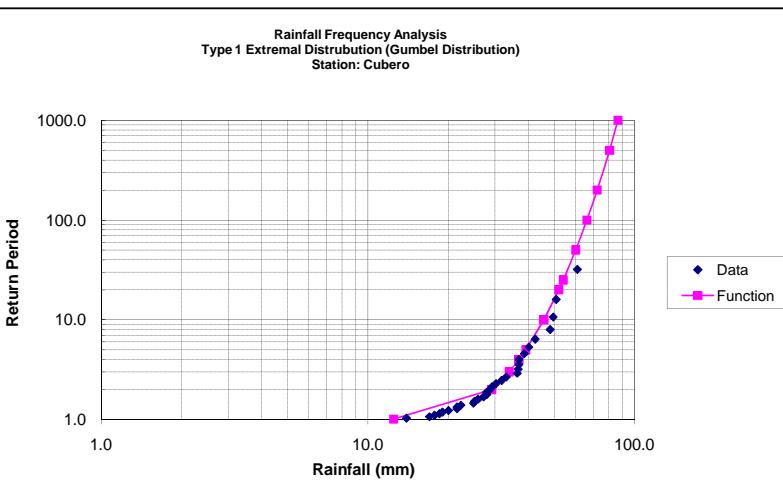
T (years)	P	y_T	x_T (mm)	x_T (in)
1.01	0.010	-1.5	12.5	0.5
2	0.500	0.4	29.2	1.1
3	0.667	0.9	33.9	1.3
4	0.750	1.2	36.9	1.5
5	0.800	1.5	39.1	1.5
10	0.900	2.3	45.7	1.8
20	0.950	3.0	52.0	2.0
25	0.960	3.2	54.0	2.1
50	0.980	3.9	60.2	2.4
100	0.990	4.6	66.3	2.6
200	0.995	5.3	72.4	2.9
500	0.998	6.2	80.5	3.2
1000	0.999	6.9	86.6	3.4

1 inch = 25.4 mm

60.5

$$y_T = -\ln(\ln(T/(T-1)))$$

$$x_T = \mu + \alpha * y_T$$



Reference:
National Engineering Handbook: Part 630 Hydrology, NRCS 2000

Notes:

1. 1980 only has data from June to December (7/12)
2. 1981 only has data from February to June (5/12)
3. 1982 missing data from February and December (10/12)
4. 1983 missing data from March, May, June, and July (8/12)
5. 1986 missing data from February (11/12)

T	x_T
2	29.2
5	39.1
10	45.7
20	52.0
25	54.0
100	66.3
200	72.4

113.226

By: A. Duran
Checked by:
Date: 3-24-10

St. Anthony

Rainfall Frequency Analysis

Type I Extremal Distribution by Fisher & Tippett (Gumbel Distribution) (Using Marquez Climatological Station Data)

n	Year	MAX Daily Rainfall (mm)	Sorted
1	1942	33.0	58.4
2	1943	25.7	50.8
3	1944	35.6	46.5
4	1945	25.4	45.7
5	1946	22.9	44.7
6	1947	35.6	41.4
7	1948	29.2	40.6
8	1949	32.8	40.1
9	1950	18.3	39.1
10	1951	58.4	38.6
11	1952	46.5	38.1
12	1953	35.1	35.6
13	1954	45.7	35.6
14	1955	31.0	35.6
15	1956	15.2	35.1
16	1957	44.7	33.0
17	1958	31.5	33.0
18	1959	39.1	32.8
19	1960	40.6	32.3
20	1961	38.1	31.8
21	1962	41.4	31.5
22	1963	31.8	31.0
23	1964	33.0	29.2
24	1965	35.6	25.7
25	1966	38.6	25.4
26	1967	32.3	25.1
27	1968	22.9	24.1
28	1969	40.1	22.9
29	1970	22.9	22.9
30	1971	25.1	22.9
31	1972	50.8	18.3
32	1973	17.8	17.8
33	1974	16.8	16.8
34	1975	24.1	15.2

x	y	Return Period	
i	1/(n+1)	Rainfall (mm)	
1	2.9%	58.4	35.0
2	5.7%	50.8	17.5
3	8.6%	46.5	11.7
4	11.4%	45.7	8.8
5	14.3%	44.7	7.0
6	17.1%	41.4	5.8
7	20.0%	40.6	5.0
8	22.9%	40.1	4.4
9	25.7%	39.1	3.9
10	28.6%	38.6	3.5
11	31.4%	38.1	3.2
12	34.3%	35.6	2.9
13	37.1%	35.6	2.7
14	40.0%	35.6	2.5
15	42.9%	35.1	2.3
16	45.7%	33.0	2.2
17	48.6%	33.0	2.1
18	51.4%	32.8	1.9
19	54.3%	32.3	1.8
20	57.1%	31.8	1.8
21	60.0%	31.5	1.7
22	62.9%	31.0	1.6
23	65.7%	29.2	1.5
24	68.6%	25.7	1.5
25	71.4%	25.4	1.4
26	74.3%	25.1	1.3
27	77.1%	24.1	1.3
28	80.0%	22.9	1.3
29	82.9%	22.9	1.2
30	85.7%	22.9	1.2
31	88.6%	18.3	1.1
32	91.4%	17.8	1.1
33	94.3%	16.8	1.1
34	97.1%	15.2	1.0

N **34**
Mean (x_n) 32.86 mm
Standard Deviation 10.08
 α 7.86 $\alpha = 6^{0.5} * s_n / 3.1416$
 μ 28.33 $\mu = x_n - 0.5772 * \alpha$

T (years)	P	y_T	x_T (mm)	x_T (in)
1.01	0.010	-1.5	16.3	0.6
2	0.500	0.4	31.2	1.2
3	0.667	0.9	35.4	1.4
4	0.750	1.2	38.1	1.5
5	0.800	1.5	40.1	1.6
10	0.900	2.3	46.0	1.8
20	0.950	3.0	51.7	2.0
25	0.960	3.2	53.5	2.1
50	0.980	3.9	59.0	2.3
100	0.990	4.6	64.5	2.5
200	0.995	5.3	69.9	2.8
500	0.998	6.2	77.2	3.0
1000	0.999	6.9	82.6	3.3

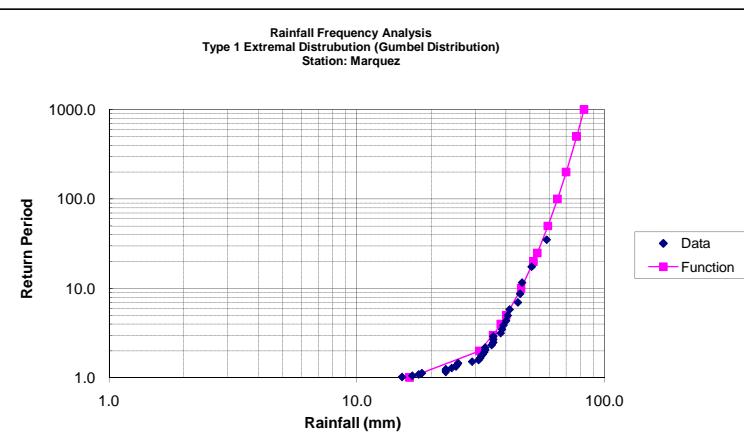
1 inch = 25.4 mm

Reference:
National Engineering Handbook: Part 630 Hydrology, NRCS 2000.

Notes:

1. 1969 missing data from May and Dec (10/12)
2. 1975 missing data from Nov through Dec (10/12)

T	x_T
2	31.2
5	40.1
10	46.0
20	51.7
25	53.5
100	64.5
200	69.9



Gumbel Rainfall Frequency Analysis

Station	Return Period	Rainfall (mm)
Laguna	25	62.3
	100	77.9
	500	95.8
Cubero	25	54.0
	100	66.3
	500	80.5
Marquez	25	53.5
	100	64.5
	500	77.2
NOAA Atlas 14	25	57.4
	100	71.9
	500	89.2

Maximum Rainfall

Station	Maximum Rainfall (mm)	Year
Laguna	78.7	1909
Laguna2	98.0	2007
Cubero	60.96	2006
Marquez	58.42	1951

POINT PRECIPITATION
FREQUENCY ESTIMATES
FROM NOAA ATLAS 14

New Mexico 35.1547 N 107.288 W 6079 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M. Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland, 2006

Extracted: Mon Mar 22 2010

NOAA Atlas 14 Precipitation frequency estimates (inches)

Point Estimates

Data series, Annual maxima

State, New Mexico

Station,

Lon (dd), -107.288

Lat (dd), 35.1547

Elev (feet), 6079

1. DATA DESCRIPTION:

Data type: Precipitation Depth
Units: English
Time series type: Annual Maximum

1 inch =	25.4 mm
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2. SELECT LOCATION:

Choose one of the following options:

2.2 Enter location:

Latitude (decimal degrees): 35.1547
Latitude (decimal degrees): -107.288

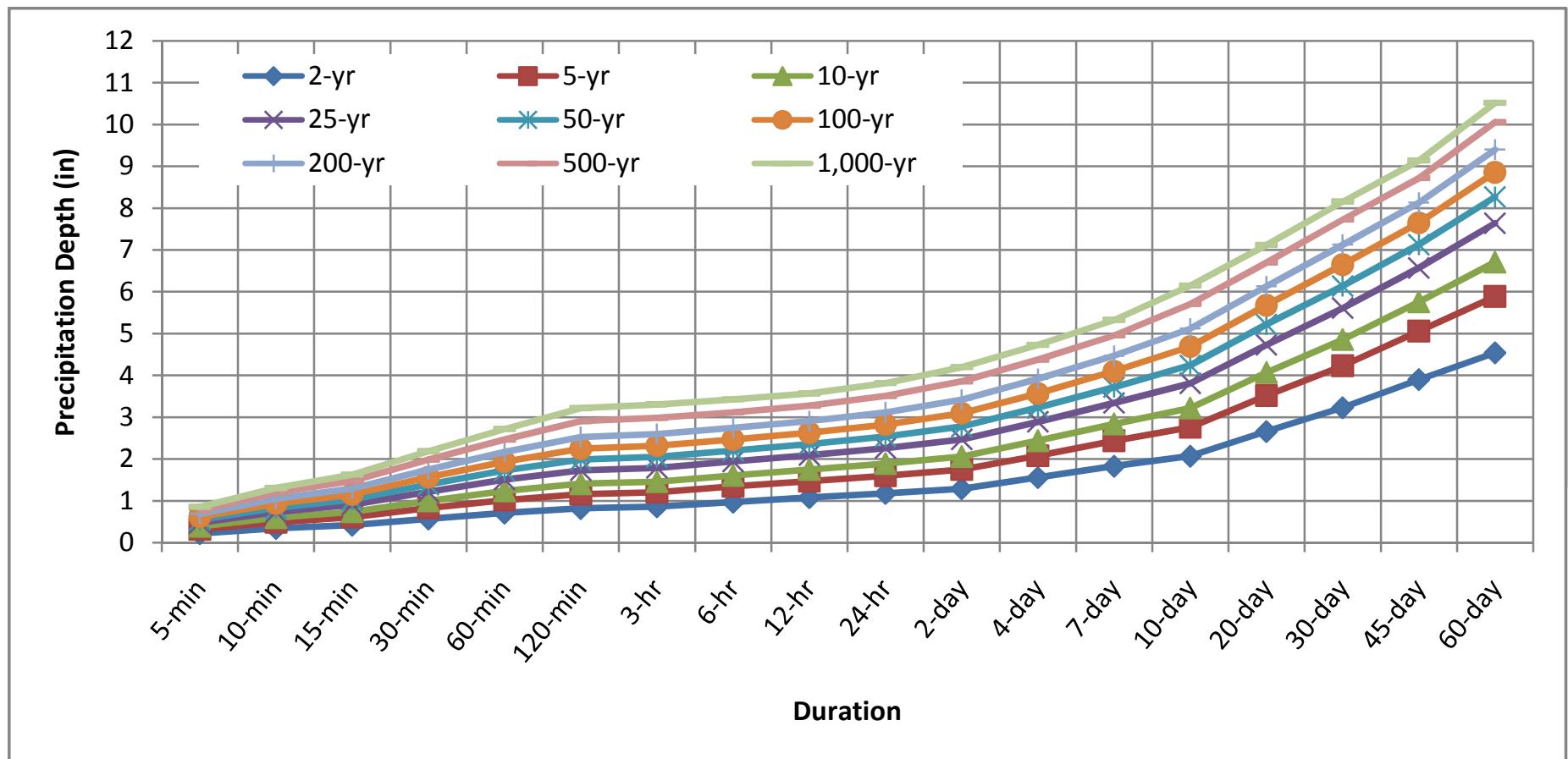
Return Period	15-min	30-min	60-min	3-hr	6-hr	12-hr	24-hr
25 - yr	23.1	31.0	38.4	45.5	49.3	53.1	57.4
100 - yr	29.5	39.9	49.3	58.9	62.7	66.8	71.9
500 - yr	95.8	96.8	97.8	75.9	79.2	83.3	89.2

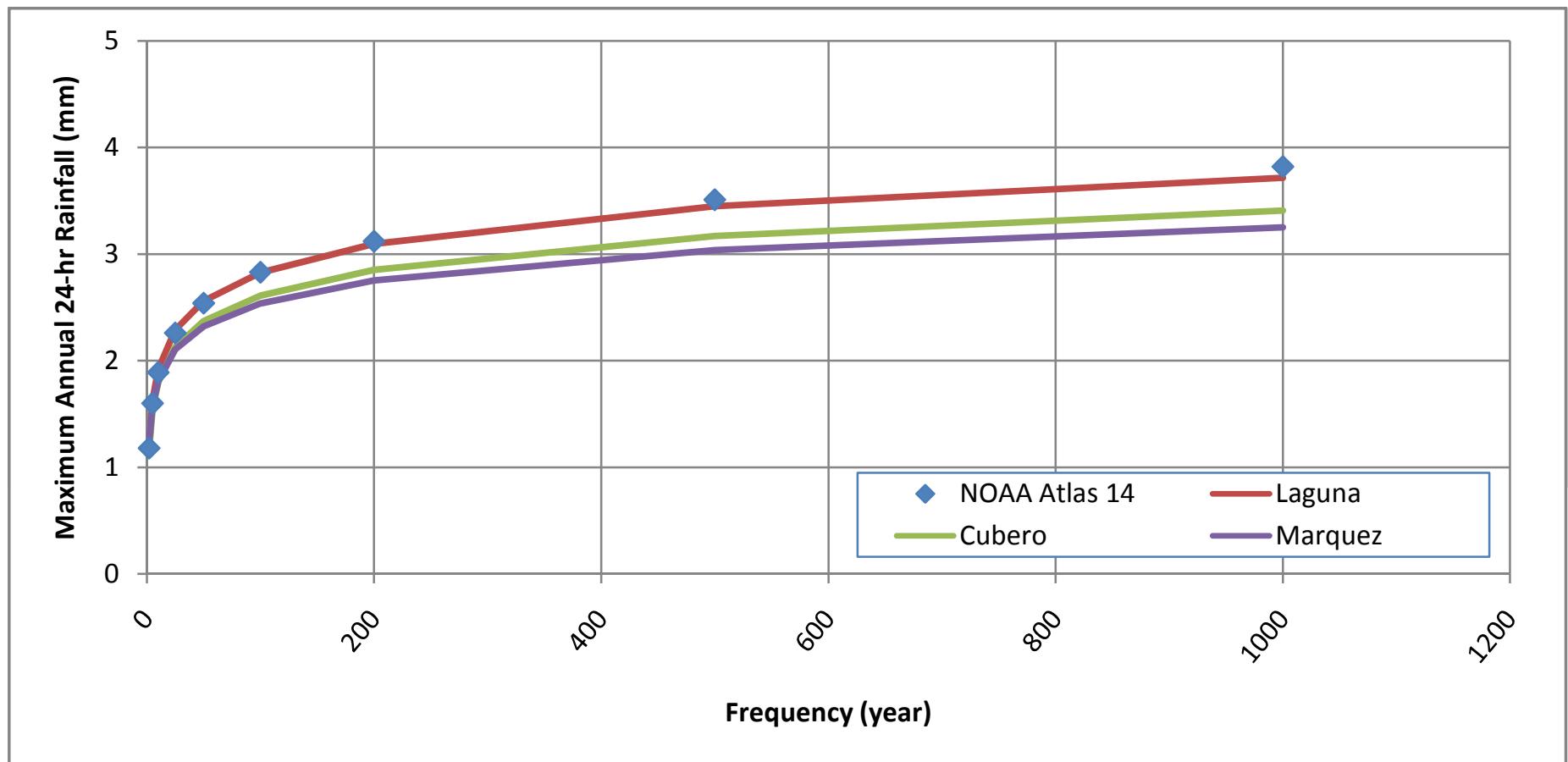
MEAN PRECIPITATION FREQUENCY ESTIMATES

Precipitation Frequency Estimates (inches)

Freq (yr)	5-min	10-min	15-min	30-min	60-min	120-min	3-hr	6-hr	12-hr	24-hr	2-day	4-day	7-day	10-day	20-day	30-day	45-day	60-day
2	0.22	0.34	0.42	0.57	0.71	0.82	0.86	0.97	1.08	1.18	1.29	1.56	1.83	2.07	2.66	3.23	3.9	4.54
5	0.32	0.49	0.61	0.83	1.02	1.16	1.21	1.35	1.47	1.6	1.75	2.08	2.44	2.76	3.52	4.23	5.06	5.89
10	0.39	0.6	0.74	1	1.24	1.41	1.46	1.61	1.75	1.89	2.06	2.44	2.84	3.22	4.07	4.86	5.76	6.71
25	0.48	0.73	0.91	1.22	1.51	1.73	1.79	1.94	2.09	2.26	2.47	2.89	3.34	3.81	4.73	5.61	6.57	7.64
50	0.55	0.83	1.03	1.39	1.73	1.99	2.05	2.2	2.36	2.54	2.78	3.23	3.72	4.24	5.22	6.14	7.13	8.27
100	0.62	0.94	1.16	1.57	1.94	2.25	2.32	2.47	2.63	2.83	3.1	3.57	4.1	4.69	5.68	6.65	7.65	8.86
200	0.69	1.05	1.3	1.75	2.17	2.53	2.6	2.75	2.91	3.12	3.42	3.92	4.47	5.12	6.13	7.13	8.13	9.4
500	0.78	1.2	1.48	1.99	2.47	2.91	2.99	3.12	3.28	3.51	3.86	4.38	4.96	5.71	6.7	7.73	8.72	10.06
1000	0.86	1.31	1.63	2.19	2.72	3.22	3.31	3.43	3.57	3.82	4.2	4.73	5.33	6.15	7.12	8.16	9.14	10.52

Laguna	Cubero	Marquez
24-hr	24-hr	24-hr
1.2	1.1	1.2
1.6	1.5	1.6
1.9	1.8	1.8
2.3	2.1	2.1
2.6	2.4	2.3
2.8	2.6	2.5
3.1	2.9	2.8
3.5	3.2	3.0
3.7	3.4	3.3





Laguna2 New Mexico

1 inch =	25.4 mm
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Top Storms

	Total Precip (in)	Date
1	1.72	7/31/2006
2	1.29	9/6/2005
3	1	8/6/2006
4	0.9	9/29/2005
5	0.86	8/4/2006
6	0.86	4/13/2007
7	0.83	7/8/2006
8	0.8	9/7/2005
9	0.75	7/20/2008
10	0.74	10/9/2006
11	0.73	8/9/2006

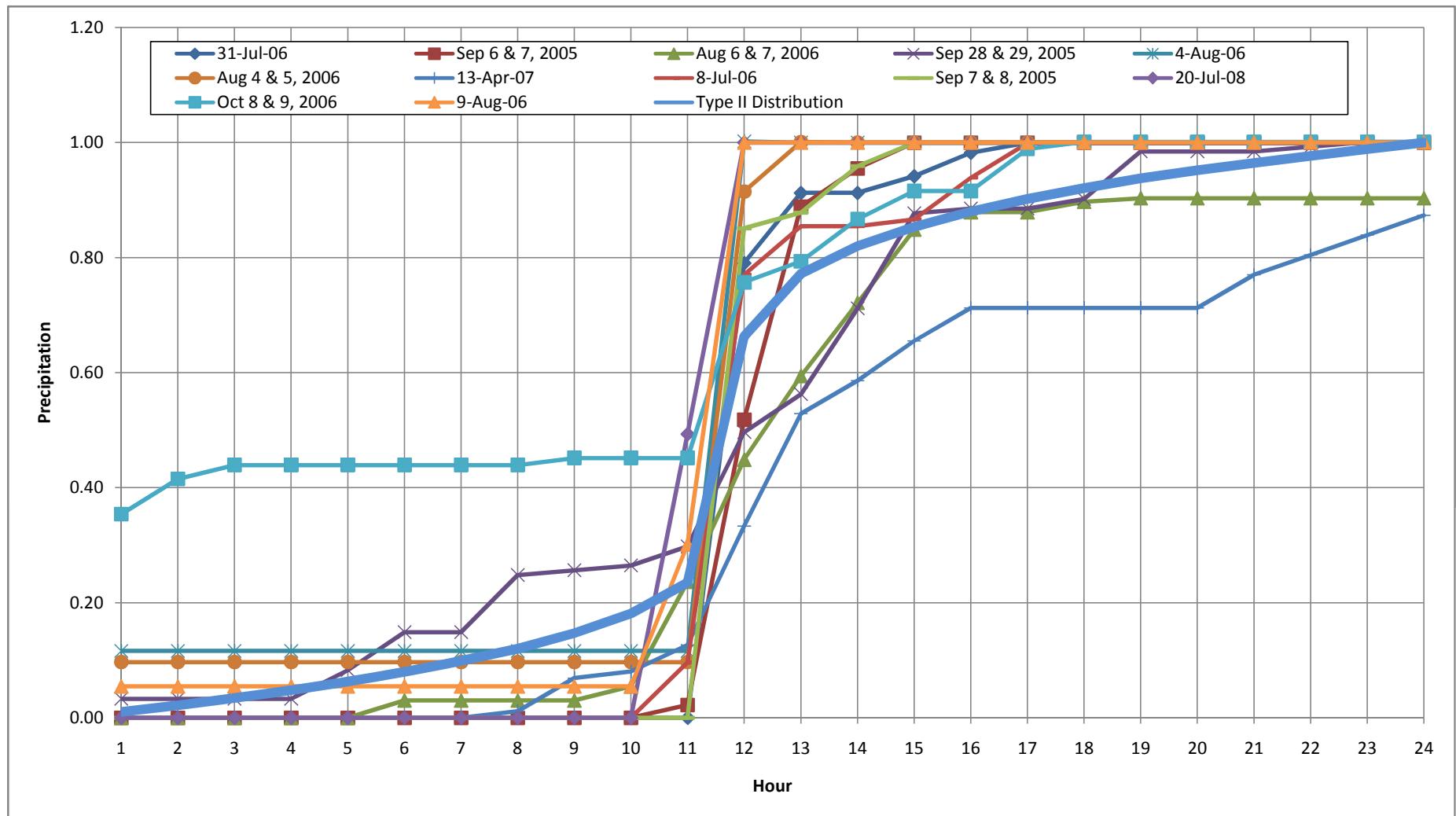
Annual Totals

Year	Annual Total (in)	Annual Total (mm)
2005	10.3	260.6
2006	12.9	328.4
2007	3.7	94.2
2008	7.0	178.3
2009	6.3	160.3

Mean	8.0	204.4
Max	12.9	328.4
Min	3.7	94.2

Max Precip

Year	Max Precip (in)	Max Precip (mm)
2005	1.29	32.8
2006	1.72	43.7
2007	0.86	21.8
2008	0.75	19.1
2009	0.45	11.4



Max Intensity in 2 hrs

Hour	Hour	31-Jul-06	Sep 6 & 7, 2005	Aug 6 & 7, 2006	Sep 28 & 29, 2005	4-Aug-06	Aug 4 & 5, 2006	13-Apr-07	8-Jul-06	Sep 7 & 8, 2005	20-Jul-08	Oct 8 & 9, 2006	9-Aug-06	Type 2
1&2	0:00 AM to 2:00 AM	0.00	0.00	0.03	0.03	0.07	0.06	0.01	0.00	0.00	0.00	0.01	0.00	0.02
2&3	1:00 AM to 3:00AM	0.00	0.00	0.00	0.03	0.07	0.01	0.07	0.00	0.00	0.00	0.10	0.00	0.02
3&4	2:00 AM to 4:00 AM	0.00	0.00	0.00	0.00	0.01	0.00	0.07	0.00	0.00	0.00	0.28	0.00	0.03
4&5	3:00 AM to 5:00 AM	0.00	0.00	0.02	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.22	0.05	0.03
5&6	4:00 AM to 6:00 AM	0.00	0.00	0.21	0.05	0.00	0.00	0.25	0.00	0.00	0.00	0.06	0.05	0.03
6&7	5:00 AM to 7:00 AM	0.00	0.00	0.39	0.12	0.00	0.00	0.40	0.00	0.00	0.00	0.10	0.00	0.04
7&8	6:00 AM to 8:00 AM	0.00	0.00	0.36	0.07	0.00	0.00	0.25	0.00	0.00	0.00	0.09	0.00	0.04
8&9	7:00 AM to 9:00 AM	0.00	0.00	0.27	0.10	0.00	0.03	0.13	0.00	0.00	0.00	0.02	0.00	0.05
9&10	8:00 AM to 10:00 AM	0.00	0.00	0.25	0.11	0.03	0.03	0.13	0.00	0.00	0.00	0.00	0.00	0.06
10&11	9:00 AM to 11:00 AM	0.00	0.00	0.16	0.02	0.03	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.09
11&12	10:00 AM to 12:00 AM	0.00	0.00	0.03	0.04	0.00	0.00	0.00	0.00	0.00	0.49	0.00	0.00	0.48
12&13	11:00 AM to 1:00 PM	0.00	0.00	0.02	0.23	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.54
13&14	12:00 PM to 2:00 PM	0.00	0.00	0.02	0.26	0.00	0.00	0.00	0.00	0.00	0.51	0.01	0.00	0.16
14&15	1:00 PM to 3:00 PM	0.00	0.00	0.01	0.22	0.00	0.00	0.06	0.10	0.00	0.00	0.01	0.25	0.08
15&16	2:00 PM to 4:00 PM	0.79	0.00	0.00	0.31	0.00	0.00	0.09	0.77	0.00	0.00	0.00	0.95	0.06
16&17	3:00 PM to 5:00 PM	0.91	0.00	0.00	0.17	0.00	0.00	0.07	0.76	0.00	0.00	0.31	0.70	0.05
17&18	4:00 PM to 6:00 PM	0.12	0.00	0.00	0.01	0.00	0.00	0.07	0.08	0.00	0.00	0.34	0.00	0.04
18&19	5:00 PM to 7:00 PM	0.03	0.00	0.00	0.02	0.00	0.00	0.08	0.01	0.85	0.00	0.11	0.00	0.04
19&20	6:00 PM to 8:00 PM	0.07	0.02	0.00	0.10	0.00	0.00	0.06	0.08	0.88	0.00	0.12	0.00	0.03
20&21	7:00 PM to 9:00 PM	0.06	0.52	0.00	0.08	0.00	0.00	0.03	0.13	0.11	0.00	0.05	0.00	0.03
21&22	8:00 PM to 10:00 PM	0.02	0.87	0.00	0.00	0.00	0.00	0.06	0.06	0.12	0.00	0.07	0.00	0.02
22&23	9:00 PM to 11:00 PM	0.00	0.44	0.07	0.01	0.00	0.82	0.05	0.00	0.04	0.00	0.09	0.00	0.02
23&24	10:00 PM to 12:00 AM	0.00	0.11	0.09	0.02	0.89	0.90	0.01	0.00	0.00	0.01	0.00	0.00	0.02

Cummulative

A.2 RAINFALL RUNOFF



By: LTF Date: 04/29/10 Client: UNC Sheet 1 of 9
Chkd By: BC Description: HMS Inputs Job No. 1008506
Rev By: CB 05/04/10

Goals:

Produce HEC-HMS inputs for the St. Anthony Mine drainage system.

Tasks:

1. Delineate sub-basins from the larger watershed basin that is upgradient of the St. Anthony Mine.
2. Using these sub-basins, determine inputs that will be needed to perform a HEC-HMS model for the basin.

Assumptions:

- Channel geometry can be approximated using typical cross-sections taken from selected points along existing points on the waterways.
- Baseflow and evapotranspiration have negligible contributions to loss.

Analysis:

Using Civil 3D, sub-basins were delineated for the larger watershed basin that is upgradient of the St. Anthony Mine. These delineations can be seen in Figure 1. Figure 2 shows the sub-basin delineations immediately surrounding the mine area that were created to more accurately depict the runoff from within the mine boundaries.

Figure 1: St. Anthony Area Basin

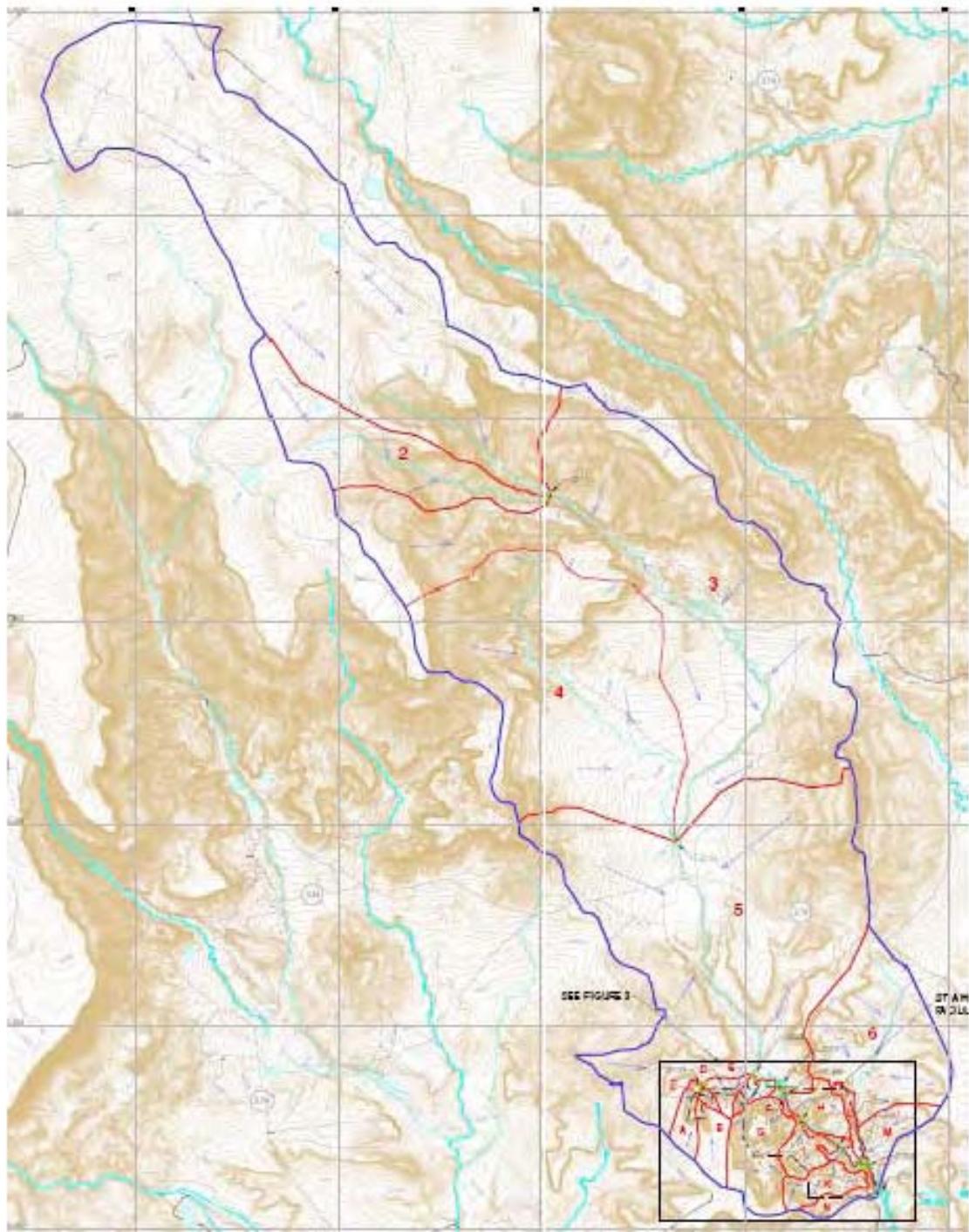


Figure 2: Subbasins within St. Anthony Mine

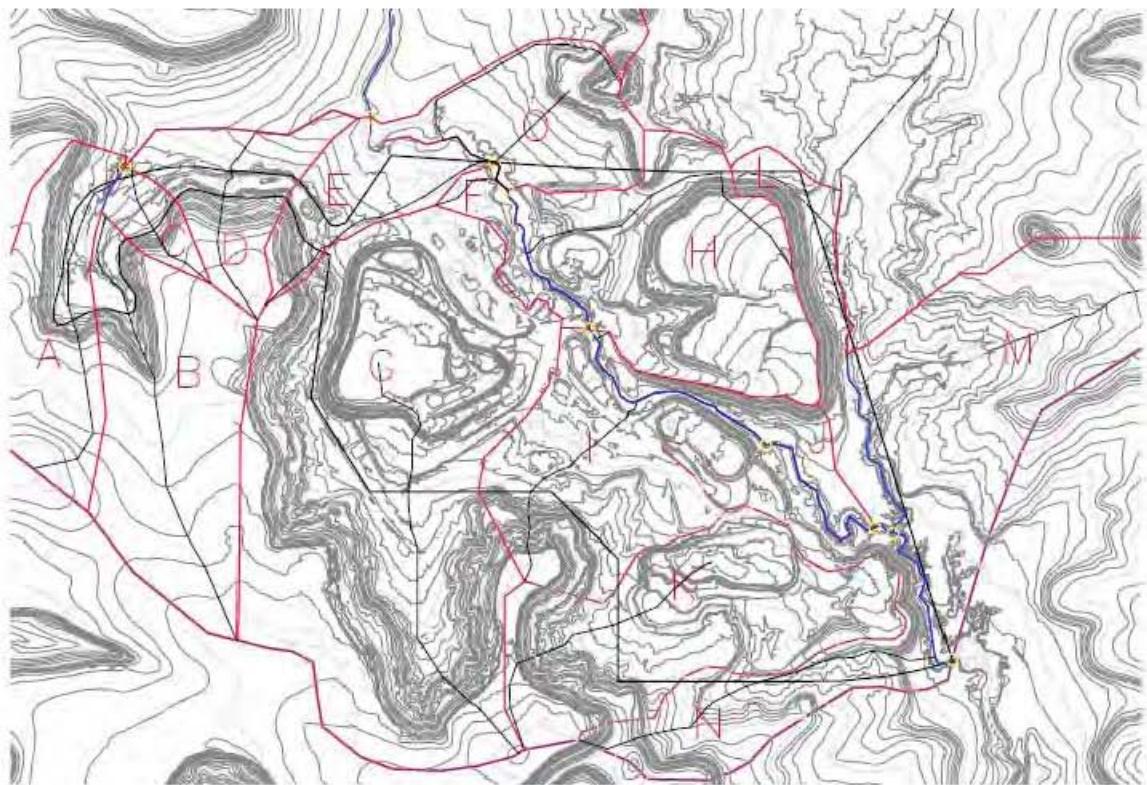


Figure 3: St. Anthony Area Basin (HEC-HMS)

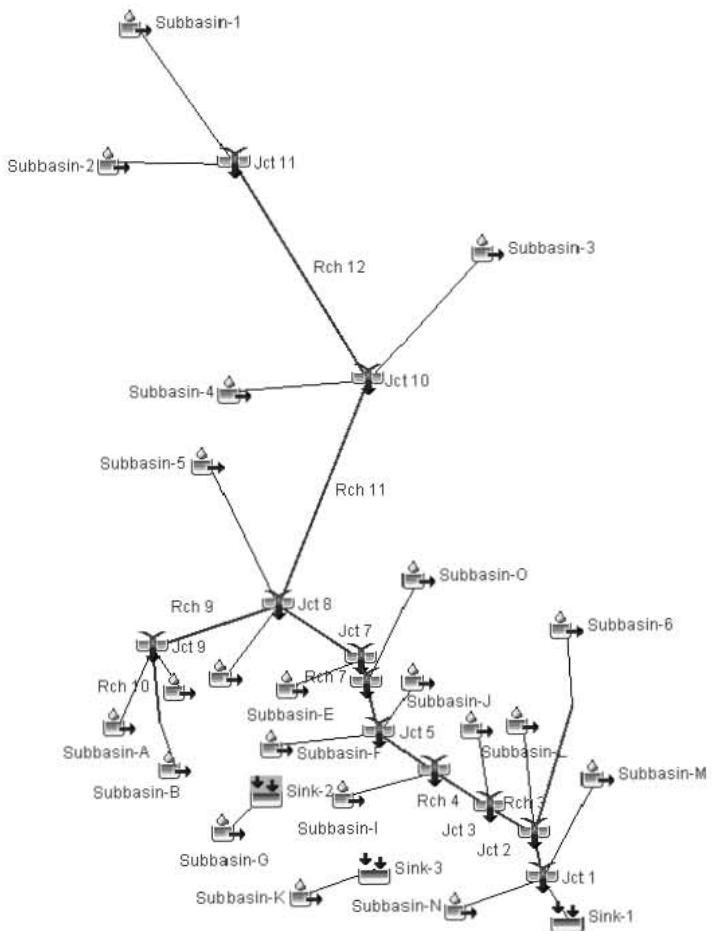
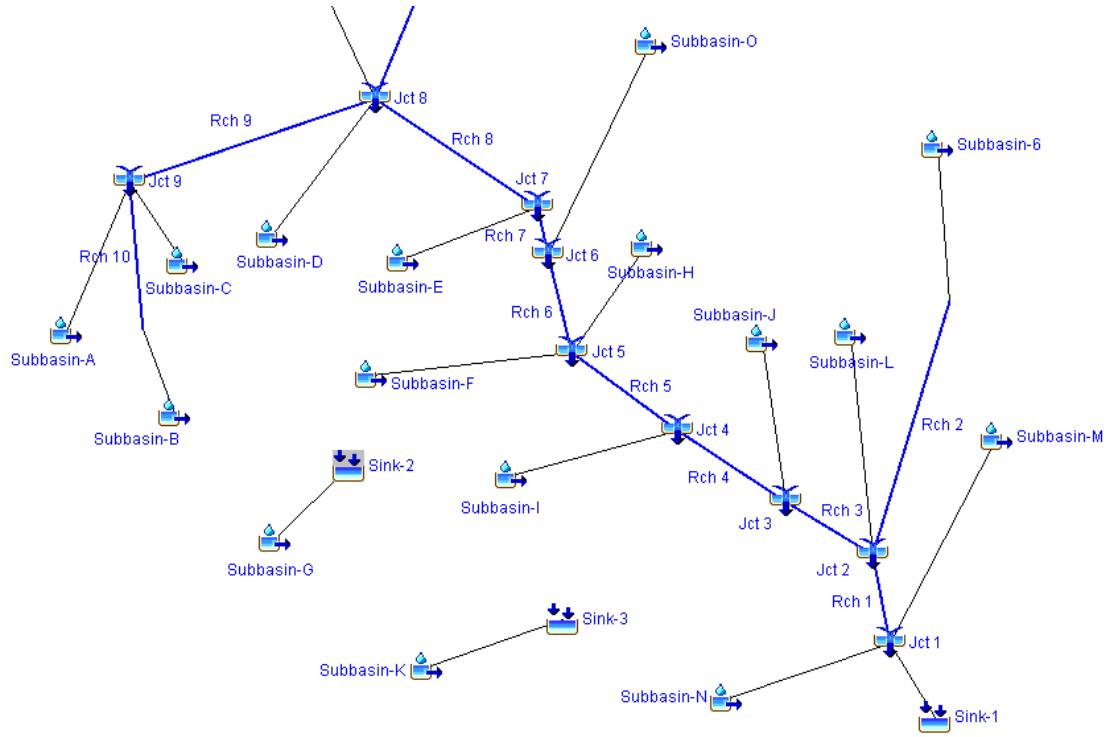


Figure 4: Subbasins within St. Anthony Mine (HEC-HMS)



Sub-basins: With the sub-basins established, the inputs to the mine began with the sub-basin areas and included other measurements taken in Civil 3D, such as the longest flow lengths, average sub-basin slopes, and lengths and slopes of reaches connecting sub-basins. Average slopes for the larger sub-basins were calculated by measuring a line from a central point of the sub-basin to the lowest elevation of the sub-basin and using this number to divide by the vertical distance of the line. Average slopes for the smaller sub-basins around the mine were generated automatically using Civil 3D®. Sub-basin related information is in the “subbasin” tab and information related to reaches is in the “reaches” tab.

Using information provided in the NRCS database, the hydrologic soil groups for each numbered sub-basin were calculated as a percentage of the sub-basin area. Percentages of each hydrologic soil group were estimated for the lettered sub-basins using a map generated using the NRCS data and ArcGIS with the sub-basin boundaries shown on the map. For each sub-basin, hydrologic soil group percentages were paired with the hydrologic condition of the sub-basin and a weighted curve number (corresponding with antecedent moisture condition II) was assigned. For areas within the mine site a CN = 85 was assigned to be appropriate for disturbed soils conditions.

From the measured lengths and curve numbers, the lag times for each sub-basin were estimated, calculated with the below equation:

$$L = (I^{0.8} * (S + 1)^{0.7}) / (1900 * Y^{0.5})$$

Where,

- L = lag time in hours
- I = hydraulic length of watershed in feet
- S = $(1000/CN) - 10$
- CN = soil group curve number
- Y = average watershed land slope in percent

Initial abstraction was calculated using the equation $I_a = 0.2S$. Subbasin input information is shown in Table 1.

Reaches: Reach data can be seen in the same spreadsheet as mentioned above. The cross-sectional geometry entered into HEC-HMS was taken from Civil 3D cross-sections that were plotted across eight different channel sections in the mine area and upgradient basin. Eight points (typically marking distinct changes in elevation) were recorded as coordinates, representing their distance across the channel and their elevation. Eight different tables were created as “paired data” in HEC-HMS and assigned to appropriate reaches to be used as the channel shape for the reach. See Table 2 below for reach input information.

Table 2: Reach Inputs for St. Anthony HEC-HMS							
	Length (ft)	High Elevation (ft)	Low Elevation (ft)	Slope (ft/ft)	Invert (ft)	Shape	Cross Section Table
Rch 1	1820	5960	5950	0.005	26	Eight Point	Table 1
Rch 10	544	6140	6110	0.055	7	Eight Point	Table 6
Rch 11	14279	6180	6040	0.010	31	Eight Point	Table 7
Rch 12	26485	6750	6180	0.022	22	Eight Point	Table 8
Rch 2	2215	5997	5960	0.017	32	Eight Point	Table 2
Rch 3	228	5961	5960	0.004	34	Eight Point	Table 3
Rch 4	2105	5980	5961	0.009	34	Eight Point	Table 3
Rch 5	2590	6012	5980	0.012	21	Eight Point	Table 4
Rch 6	1894	6027	6012	0.008	11	Eight Point	Table 5
Rch 7	382	6029	6027	0.005	11	Eight Point	Table 5
Rch 8	1984	6060	6029	0.016	11	Eight Point	Table 5
Rch 9	2725	6110	6060	0.018	7	Eight Point	Table 6

Project: United Nuclear Corp., St. Anthony Mine
Description: Basin Data
Calc By: LTF
Check and Updateb By: CB
Date: 4/23/2010 5/3/2010

Model Assumptions:

* Channel geometry can be approximated using typical cross-sections taken from selected points along existing points on the waterways.

* Baseflow and evapotranspiration have negligible contributions to loss.

Table 1. Lag Time Calculations

Subbasin #	Inputs for St. Anthony HEC-HMS																				
	1	2	3	4	5	6	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Area (ft ²)	197932898	40389031	194965416	122191536	171922193	40560368	3661859	5375877	699504	2198649	1888106	695469	14641543	5628947	4578093	1195615	5815246	1884328	7218461	3864310	2805203
Max Elevation (ft)	8600	8100	8050	7850	6400	7070	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6190
Min Elevation (ft)	6750	6750	6200	6200	6000	6030	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6027
Length for Slope % (ft)	35387	18788	38094	21595	23793	11365	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1484
*Avg Slope % (Method A)	5.228	7.185	4.856	7.641	1.681	9.151	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	10.984
*Avg Slope % (Method B)	n/a	n/a	n/a	n/a	n/a	n/a	19.19	10.81	24.82	18.46	18.08	16.93	42.05	21.9	27.72	36.69	33.76	35.94	16.86	27.37	n/a
Longest Length	35387	18788	38094	21595	21566	11365	3967	4821	1545	3096	2939	200	4000	5386	2250	500	3285	520	5651	550	1600
Area (mi ²)	7.100	1.449	6.993	4.383	6.167	1.455	0.131	0.193	0.025	0.079	0.068	0.025	0.525	0.202	0.164	0.043	0.209	0.068	0.259	0.139	0.101
Area (acres)	4543.7	927.2	4475.6	2805.0	3946.6	931.1	84.1	123.4	16.1	50.5	43.3	16.0	336.1	105.1	27.4	133.5	43.3	43.3	165.7	88.7	64.4
lag time (min)	139.8	69.1	138.0	63.3	152.4	42.3	11.1	19.6	4.6	9.3	9.0	1.1	7.6	13.3	5.9	1.5	7.2	1.6	14.9	2.8	8.4
time of concentration (hr) =																					
TL/0.6	3.88	1.92	3.83	1.76	4.23	1.18	0.31	0.54	0.13	0.26	0.25	0.03	0.21	0.37	0.16	0.04	0.20	0.04	0.41	0.08	0.23
Time Step (min)	41.95	20.74	41.40	18.98	45.72	12.69	3.33	5.88	1.38	2.79	2.70	0.33	2.27	3.99	1.76	0.46	2.16	0.48	4.48	0.83	2.51
Hydrologic Soil Group A, %	0	0	0	0	9	7	0	0	0	0	90	100	50	90	80	100	70	90	5	60	10
Hydrologic Soil Group B, %	6	7	0	0	9	40	0	50	0	0	10	0	10	0	0	0	0	10	0	0	40
Hydrologic Soil Group C, %	82	55	33	29	37	19	50	40	40	20	0	0	10	0	0	0	0	0	10	0	10
Hydrologic Soil Group D, %	12	38	67	71	45	34	50	10	60	80	0	0	30	10	20	0	30	0	85	40	40
Hydrologic Condition	Fair	Fair	Fair	Poor	Poor	Poor	Disturbed	Poor	Disturbed	Poor	Poor	Poor									
Curve Number, AMC II	81.1	82.3	84.4	87.1	83.7	81.3	85.0	81.3	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	86.5	73.0	80.8	

S	2.34	2.16	1.86	1.48	1.95	2.30	1.76	2.30	1.76	1.76	1.76	1.76	1.76	1.76	1.76	1.76	1.76	1.57	3.70	2.38
Initial Abstraction	0.47	0.43	0.37	0.30	0.39	0.46	0.35	0.46	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.31	0.74	0.48

***Notes:**

Average slope determination using Method A was done on larger subbasins and completed using Civil 3D, tracing a central drainage path and calculating it using the maximum and minimum elevation.

Average slope determination using Method B was done on smaller, Site area subbasins and were calculated automatically with Civil 3D.

References:

AutoCAD Civil3D 2010. ESRI ArcView™ V9.2.

Hydrological Modeling System (HEC-HMS) (2008), *Computer Program*, U.S. Army Corps of Engineers, Version 3.3.

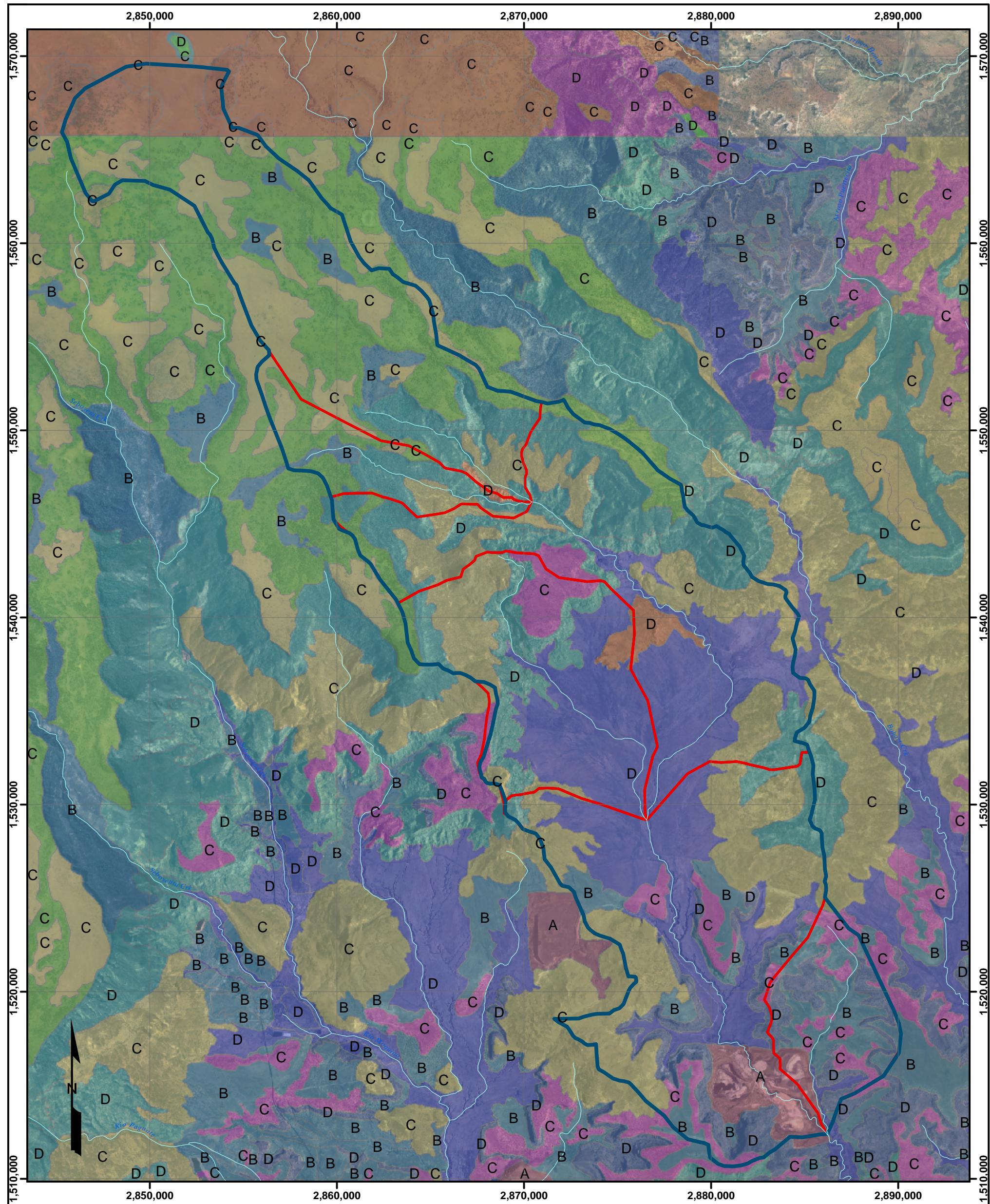
Maidment, D.R. (1993) "Handbook of Hydrology", McGraw Hill.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Official Soil Series Descriptions [Online WWW]. Available URL: "<http://soils.usda.gov/technical/classification/osd/index.html>" [Accessed 10 February 2008]. USDA-NRCS, Lincoln, NE.

Figure 1: Orthorectified image generated from the National Agriculture Imagery Program (NAIP), 1 meter resolution. Drainage and roads generated from U.S. Census Bureau 2007 Tiger Line data original file.

Figure 3: Topography generated from USGS DEM 10 meter data.

Figure 4: Topography generated from aerial photographs dated May 2007, by Cooper Aerial Surveys Co. USGS 10 meter DEM data.



Legend

Drainage	NRCS Soil Data McKinley County	NRCS Soil Data Cibola County	
Basin Boundary	Hydrologic Group, Particle Size	Hydrologic Group, Particle Size	
Subbasin Boundaries	B, fine-loamy	A,	D, clayey
	C, fine	B, fine-loamy	C, fine
	C, very-fine		D, fine
	D,		C, fine-loamy
	D, fine		D, loamy
			D,

DRAWING REFERENCE(S):
PROJECTION: STATE PLANE COORDINATES
ZONE: NEW MEXICO WEST
DATUM: NAD83
UNITS: FEET

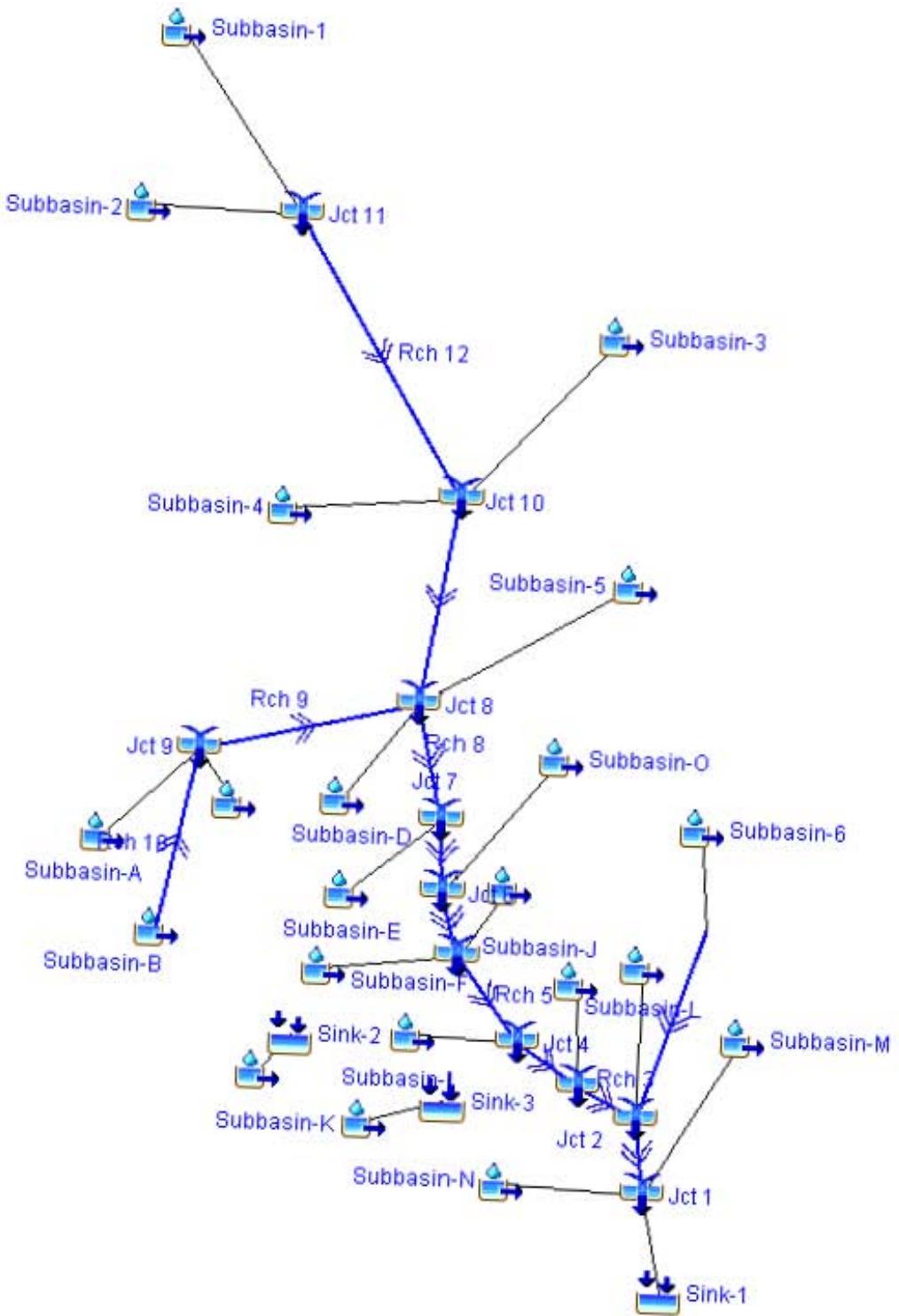
DESIGNED BY L. Fuhrig #####
DRAWN BY E. Marks #####
CHECKED BY C. Sanchez #####
APPROVED BY T. Leeson #####
PROJECT MANAGER T. Leeson #####
PROJECT NO. 1008506.011802
FILE NAME

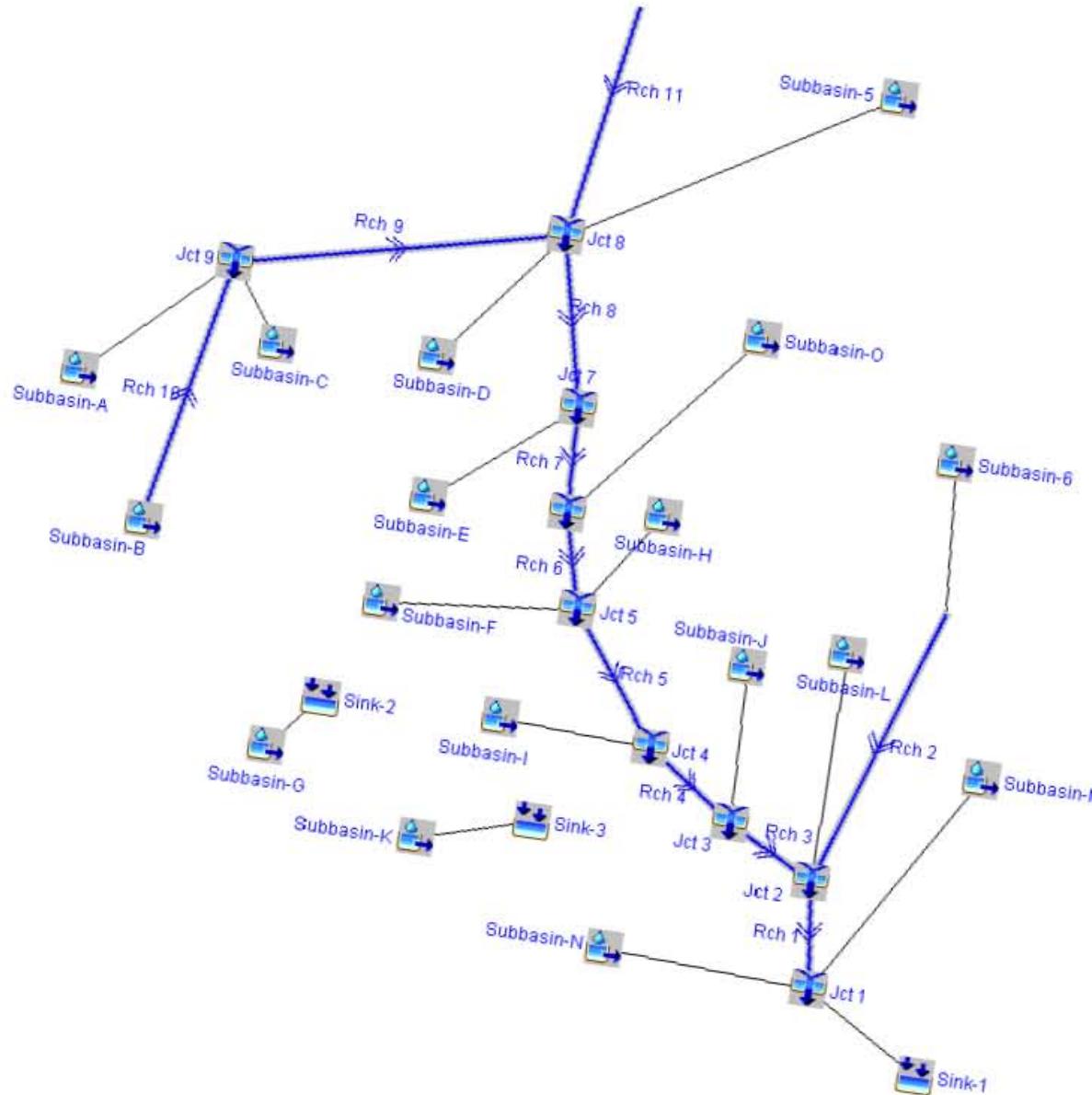
UNC P.O. BOX 3077
Gallup, New Mexico 87305-3077

PROJECT LOCATION ST. ANTHONY MINE
PROJECT ST. ANTHONY CLOSEOUT PLAN
TITLE SOILS MAP

MWH FIGURE 1

A.3 HEC-HMS





 Subbasin Area [Final CB1]

Show Elements: All Elements

Subbasin	Area (MI2)
Subbasin-1	7.0999
Subbasin-2	1.4488
Subbasin-3	6.9934
Subbasin-4	4.3830
Subbasin-5	6.167
Subbasin-B	0.193
Subbasin-A	0.13135
Subbasin-C	0.0250913
Subbasin-D	0.0788657
Subbasin-E	0.0677265
Subbasin-O	0.101
Subbasin-H	0.202
Subbasin-F	0.0249465
Subbasin-I	0.164
Subbasin-J	0.043
Subbasin-6	1.4549
Subbasin-L	0.0675910
Subbasin-M	0.25893
Subbasin-N	0.13861
Subbasin-G	0.52519
Subbasin-K	0.209

Curve Number Loss [Final CB1]

Show Elements: All Elements 

Subbasin	Initial Abstraction (IN)	Curve Number	Impervious (%)
Subbasin-1		81.1	0.0
Subbasin-2		82.3	0.0
Subbasin-3		84.4	0.0
Subbasin-4		87.1	0.0
Subbasin-5		83.7	0.0
Subbasin-B		81.3	0.0
Subbasin-A		85	0.0
Subbasin-C		85	0.0
Subbasin-D		85	0.0
Subbasin-E		85	0.0
Subbasin-O		80.8	0.0
Subbasin-H		85	0.0
Subbasin-F		85	0.0
Subbasin-I		85	0.0
Subbasin-J		85	0.0
Subbasin-6		81.3	0.0
Subbasin-L		85	0.0
Subbasin-M		86.5	0.0
Subbasin-N		73.0	0.0
Subbasin-G		85	0.0
Subbasin-K		85	0.0

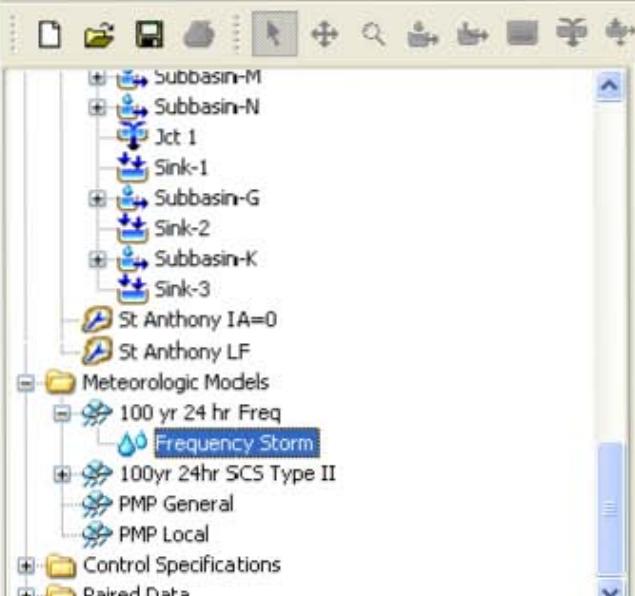
SCS Transform[Final CB1]

Show Elements: All Elements

Subbasin	Lag Time (MIN)
Subbasin-1	139.8
Subbasin-2	69.1
Subbasin-3	138
Subbasin-4	63.3
Subbasin-5	152.4
Subbasin-B	19.6
Subbasin-A	11.1
Subbasin-C	4.6
Subbasin-D	9.3
Subbasin-E	9
Subbasin-O	8.4
Subbasin-H	13.3
Subbasin-F	1.1
Subbasin-I	5.9
Subbasin-J	1.5
Subbasin-6	42.3
Subbasin-L	1.6
Subbasin-M	14.9
Subbasin-N	2.8
Subbasin-G	7.6
Subbasin-K	7.2

HEC-HMS 3.4 [D:\St. Anthony\St_Anthony_Final_Re]

File Edit View Components Parameters Compute Results

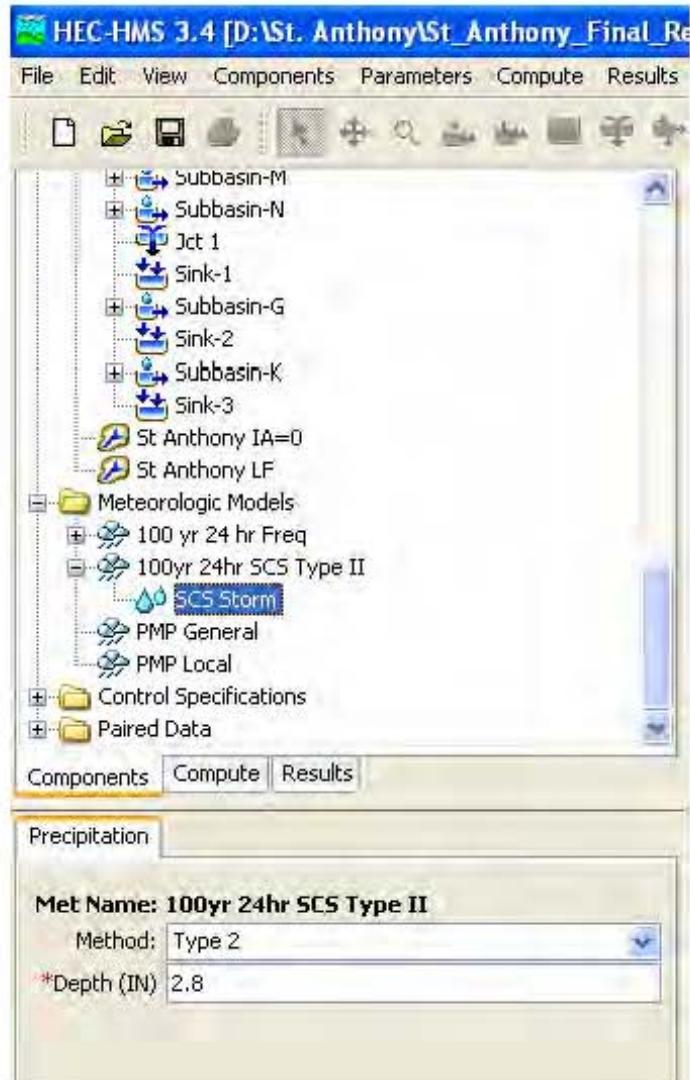


Components Compute Results

Precipitation

Met Name: 100 yr 24 hr Freq

Probability:	0.2 Percent
Input Type:	Annual Duration
Output Type:	Annual Duration
Intensity Duration:	15 Minutes
Storm Duration:	1 Day
Intensity Position:	50 Percent
Storm Area (MI2)	1
5 Minutes (IN)	
*15 Minutes (IN)	1.2000
*1 Hour (IN)	1.9000
*2 Hours (IN)	2.1000
*3 Hours (IN)	2.3000
*6 Hours (IN)	2.5000
*12 Hours (IN)	2.6000
*1 day (IN)	2.8000
2 Days (IN)	
4 Days (IN)	
7 Days (IN)	
10 Days (IN)	



Project: St Anthony Final Rev CB Simulation Run: CB1 100 yr SCS 5min

Start of Run: 22Apr2010, 00:00 Basin Model: Final CB1
 End of Run: 25Apr2010, 00:00 Meteorologic Model: 100yr 24hr SCS Type I
 Compute Time: 07May2010, 11:17:06 Control Specifications: 5-min

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Jct 1	29.0431110	4238.8	22Apr2010, 14:25	2057.1
Jct 10	19.9251000	3133.3	22Apr2010, 13:55	1420.9
Jct 11	8.5487000	1213.7	22Apr2010, 14:15	538.2
Jct 2	28.6455710	4221.2	22Apr2010, 14:25	2030.5
Jct 3	27.1230800	4114.7	22Apr2010, 14:25	1933.8
Jct 4	27.0800800	4114.1	22Apr2010, 14:25	1930.5
Jct 5	26.9160800	4106.6	22Apr2010, 14:20	1918.1
Jct 6	26.6891335	4096.4	22Apr2010, 14:20	1900.9
Jct 7	26.5881335	4092.2	22Apr2010, 14:20	1894.7
Jct 8	26.5204070	4089.1	22Apr2010, 14:15	1889.6
Jct 9	0.3494413	236.5	22Apr2010, 12:05	24.0
Rch 1	28.6455710	4220.4	22Apr2010, 14:25	2030.5
Rch 10	0.1930000	113.7	22Apr2010, 12:15	12.2
Rch 11	19.9251000	3131.3	22Apr2010, 14:05	1421.0
Rch 12	8.5487000	1213.3	22Apr2010, 14:40	538.3
Rch 2	1.4549000	521.1	22Apr2010, 12:40	91.6
Rch 3	27.1230800	4114.2	22Apr2010, 14:25	1933.8
Rch 4	27.0800800	4112.6	22Apr2010, 14:25	1930.6
Rch 5	26.9160800	4106.1	22Apr2010, 14:25	1918.1
Rch 6	26.6891335	4094.8	22Apr2010, 14:20	1900.9
Rch 7	26.5881335	4091.8	22Apr2010, 14:20	1894.7
Rch 8	26.5204070	4088.8	22Apr2010, 14:20	1889.6
Rch 9	0.3494413	230.5	22Apr2010, 12:15	24.0
Sink-1	29.0431110	4238.8	22Apr2010, 14:25	2057.1
Sink-2	0.5251900	588.6	22Apr2010, 12:00	39.8
Sink-3	0.2090000	239.3	22Apr2010, 12:00	15.8

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Subbasin-1	7.0999000	1035.3	22Apr2010, 14:30	442.2
Subbasin-2	1.4488000	386.4	22Apr2010, 13:05	96.0
Subbasin-3	6.9934000	1247.4	22Apr2010, 14:25	514.9
Subbasin-4	4.3830000	1622.3	22Apr2010, 13:00	367.8
Subbasin-5	6.1670000	980.1	22Apr2010, 14:40	438.5
Subbasin-6	1.4549000	521.1	22Apr2010, 12:40	91.6
Subbasin-A	0.1313500	129.3	22Apr2010, 12:05	10.0
Subbasin-B	0.1930000	114.0	22Apr2010, 12:15	12.1
Subbasin-C	0.0250913	31.3	22Apr2010, 12:00	1.9
Subbasin-D	0.0788657	80.6	22Apr2010, 12:05	6.0
Subbasin-E	0.0677265	69.5	22Apr2010, 12:00	5.1
Subbasin-F	0.0249465	35.2	22Apr2010, 11:55	1.9
Subbasin-G	0.5251900	588.6	22Apr2010, 12:00	39.8
Subbasin-H	0.2020000	181.0	22Apr2010, 12:05	15.3
Subbasin-I	0.1640000	199.1	22Apr2010, 12:00	12.4
Subbasin-J	0.0430000	60.7	22Apr2010, 11:55	3.3
Subbasin-K	0.2090000	239.3	22Apr2010, 12:00	15.8
Subbasin-L	0.0675910	95.4	22Apr2010, 11:55	5.1
Subbasin-M	0.2589300	234.1	22Apr2010, 12:10	21.1
Subbasin-N	0.1386100	88.9	22Apr2010, 11:55	5.4
Subbasin-O	0.1010000	85.2	22Apr2010, 12:00	6.2

Project: St Anthony Final Rev CB Simulation Run: CB1 100 yr freq 5 min

Start of Run: 22Apr2010, 00:00 Basin Model: Final CB1
 End of Run: 25Apr2010, 00:00 Meteorologic Model: 100 yr 24 hr Freq
 Compute Time: 07May2010, 11:23:48 Control Specifications: 5-min

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Subbasin-1	7.0999000	1367.4	22Apr2010, 14:40	441.1
Subbasin-2	1.4488000	534.2	22Apr2010, 13:20	95.8
Jct 11	8.5487000	1595.8	22Apr2010, 14:15	536.9
Rch 12	8.5487000	1595.5	22Apr2010, 14:40	537.1
Subbasin-3	6.9934000	1632.7	22Apr2010, 14:35	513.7
Subbasin-4	4.3830000	2245.5	22Apr2010, 13:10	367.0
Jct 10	19.9251000	4123.2	22Apr2010, 13:55	1417.8
Rch 11	19.9251000	4122.9	22Apr2010, 14:10	1418.1
Subbasin-5	6.1670000	1274.4	22Apr2010, 14:50	437.6
Subbasin-B	0.1930000	167.1	22Apr2010, 12:25	12.1
Rch 10	0.1930000	164.1	22Apr2010, 12:25	12.1
Subbasin-A	0.1313500	185.7	22Apr2010, 12:15	9.9
Subbasin-C	0.0250913	47.0	22Apr2010, 12:10	1.9
Jct 9	0.3494413	337.7	22Apr2010, 12:20	24.0
Rch 9	0.3494413	333.4	22Apr2010, 12:25	24.0
Subbasin-D	0.0788657	120.7	22Apr2010, 12:15	6.0
Jct 8	26.5204070	5325.9	22Apr2010, 14:25	1885.6
Rch 8	26.5204070	5325.2	22Apr2010, 14:25	1885.6
Subbasin-E	0.0677265	104.8	22Apr2010, 12:15	5.1
Jct 7	26.5881335	5327.5	22Apr2010, 14:25	1890.7
Rch 7	26.5881335	5326.7	22Apr2010, 14:25	1890.8
Subbasin-O	0.1010000	128.9	22Apr2010, 12:15	6.2
Jct 6	26.6891335	5329.8	22Apr2010, 14:25	1897.0
Rch 6	26.6891335	5326.8	22Apr2010, 14:25	1897.0
Subbasin-H	0.2020000	260.3	22Apr2010, 12:20	15.3
Subbasin-F	0.0249465	51.6	22Apr2010, 12:10	1.9

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Jct 5	26.9160800	5335.0	22Apr2010, 14:25	1914.2
Rch 5	26.9160800	5334.6	22Apr2010, 14:30	1914.1
Subbasin-I	0.1640000	282.9	22Apr2010, 12:10	12.4
Jct 4	27.0800800	5340.0	22Apr2010, 14:30	1926.5
Rch 4	27.0800800	5337.6	22Apr2010, 14:30	1926.6
Subbasin-J	0.0430000	88.9	22Apr2010, 12:10	3.3
Jct 3	27.1230800	5338.9	22Apr2010, 14:30	1929.8
Rch 3	27.1230800	5338.2	22Apr2010, 14:30	1929.9
Subbasin-6	1.4549000	747.3	22Apr2010, 12:50	91.3
Rch 2	1.4549000	741.9	22Apr2010, 12:55	91.3
Subbasin-L	0.0675910	139.8	22Apr2010, 12:10	5.1
Jct 2	28.6455710	5454.5	22Apr2010, 14:25	2026.3
Rch 1	28.6455710	5454.3	22Apr2010, 14:30	2026.3
Subbasin-M	0.2589300	344.4	22Apr2010, 12:20	21.1
Subbasin-N	0.1386100	153.5	22Apr2010, 12:10	5.4
Jct 1	29.0431110	5467.0	22Apr2010, 14:30	2052.8
Sink-1	29.0431110	5467.0	22Apr2010, 14:30	2052.8
Subbasin-G	0.5251900	837.3	22Apr2010, 12:15	39.7
Sink-2	0.5251900	837.3	22Apr2010, 12:15	39.7
Subbasin-K	0.2090000	333.3	22Apr2010, 12:15	15.8
Sink-3	0.2090000	333.3	22Apr2010, 12:15	15.8