

For a 100-yr Storm the Following Values for Point Precipitation were obtained from the NOAA Atlas 14 Frequency Data Server for a point at the centroid of the South Diversion Watershed. See attached NOAA document.

Point Precipitation for 100-yr, 1-hr = $P_{60_Original} := 1.78 \text{ in}$

Point Precipitation for 100-yr, 6-hr = $P_{360_Original} := 2.23 \text{ in}$

Point Precipitation for 100-yr, 24-hr = $P_{1440_Original} := 2.60 \text{ in}$

These point rainfalls should be reduced by a Reduction Factor as found in Figure F-1 of the SSCAFCA DPM (originally from NOAA). Based on this chart the point rainfalls used for this 8 sq. mile watershed should be 0.98 of the original Values. See the attached Figure with line work.

Reduction Factors $RF_{60} := 0.95$ $RF_{360} := 0.98$ $RF_{1440} := 0.99$

$P_{60} := P_{60_Original} \cdot RF_{60} = 1.69 \text{ in}$

$P_{360} := P_{360_Original} \cdot RF_{360} = 2.19 \text{ in}$

$P_{1440} := P_{1440_Original} \cdot RF_{1440} = 2.57 \text{ in}$

Now use the equations provided in the SSCAFCA/CORR DPM on page 22-52 (Same as COA Section 2, of Chapter 22, pg. 22-31) to create a rainfall distribution for the 6-hr storm.

$$A := \frac{\log\left(\frac{P_{360}}{P_{60}}\right)}{\log(6)} = 0.143$$

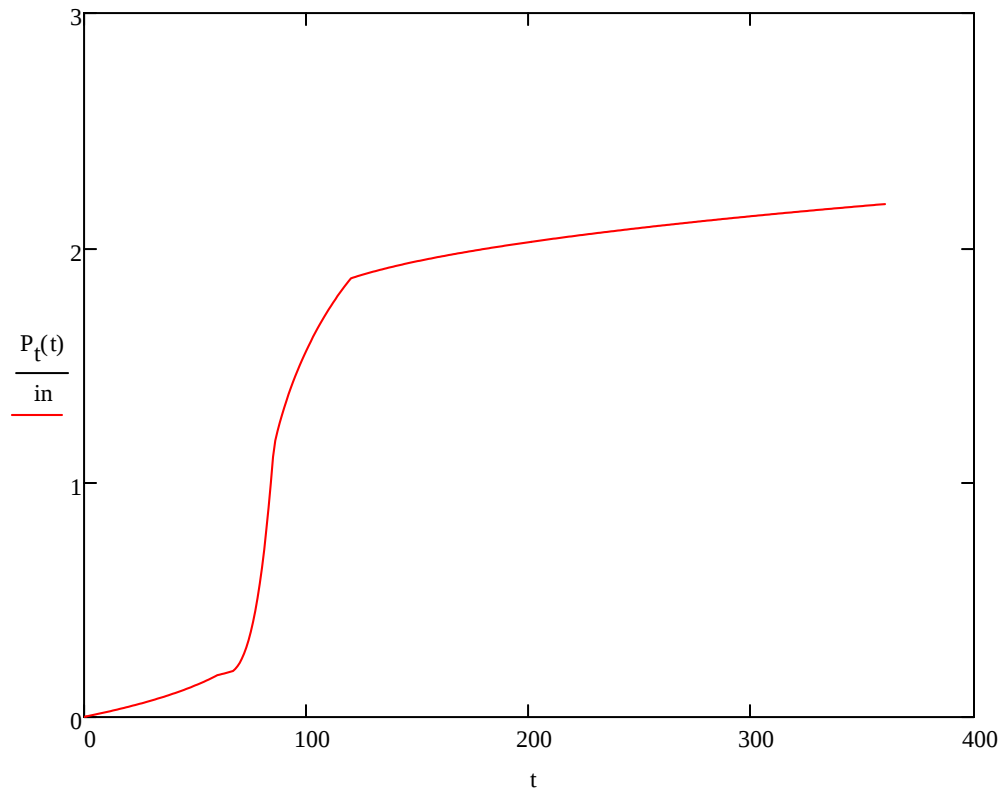
$$B := \frac{\log\left(\frac{P_{1440}}{P_{360}}\right)}{\log(4)} = 0.118$$

$t := 0, 1.. 360$

time in minutes

From SSCAFCA

$$P_t(t) := \begin{cases} 2.334 \cdot (P_{360} - P_{60}) \cdot \left[1.5^A - \left(1.5 - \frac{t}{60} \right)^A \right] & \text{if } 0 \leq t \leq 60 \\ P_t(60) + P_{60} \cdot 0.4754 \cdot \left[0.5^{0.09} - \left(1.5 - \frac{t}{60} \right)^{0.09} \right] & \text{if } 60 < t < 67 \\ P_t(60) + P_{60} \cdot \left[0.0001818182 \cdot (t - 60) + 0.000018338 \cdot (t - 60)^{3.2} \right] & \text{if } 67 \leq t < 85.3 \\ P_t(60) + P_{60} \cdot \left[0.07 \cdot (t - 60) - 1.1886 - 0.0404768 \cdot (t - 85)^{1.0985865} \right] & \text{if } 85.3 \leq t < 120 \\ P_{360} + (P_t(60) + P_{60} - P_{360}) \cdot \frac{4.4^{3 \cdot A} - \left(\frac{t}{60} - 1.6 \right)^{3 \cdot A}}{4.4^{3 \cdot A} - 0.4^{3 \cdot A}} & \text{if } 120 \leq t \leq 360 \end{cases}$$



$$P_t(2) = 0.004 \cdot \text{in}$$

$$P_t(360) = 2.185 \cdot \text{in}$$

$$t := 0, 2 \dots 360$$

$$P_t(t) =$$

0	in
0.004	
0.008	
0.012	
0.016	
0.02	
0.025	
0.029	
0.034	
0.038	
0.043	
0.048	
0.053	
0.058	
0.064	
0.069	
0.075	
0.08	
0.086	
0.092	
0.099	
0.105	
0.112	
0.119	
0.126	
0.134	
0.142	
0.15	
0.159	
0.168	
0.178	
0.183	
0.188	

Summary Table of Calculated Rainfall Distribution
(6 hour storm, depth in inches at 2 minute intervals)

0	1.562	2.023	2.134
0.004	1.601	2.026	2.136
0.008	1.638	2.029	2.137
0.012	1.673	2.031	2.139
0.016	1.705	2.034	2.141
0.02	1.736	2.036	2.143
0.025	1.766	2.039	2.145
0.029	1.794	2.041	2.147
0.034	1.82	2.044	2.148
0.038	1.845	2.047	2.15
0.043	1.869	2.049	2.152
0.048	1.875	2.051	2.154
0.053	1.881	2.054	2.155
0.058	1.887	2.056	2.157
0.064	1.892	2.059	2.159
0.069	1.897	2.061	2.161
0.075	1.902	2.063	2.162
0.08	1.907	2.066	2.164
0.086	1.912	2.068	2.166
0.092	1.917	2.07	2.167
0.099	1.921	2.073	2.169
0.105	1.926	2.075	2.171
0.112	1.93	2.077	2.172
0.119	1.934	2.079	2.174
0.126	1.938	2.082	2.176
0.134	1.942	2.084	2.177
0.142	1.946	2.086	2.179
0.15	1.95	2.088	2.181
0.159	1.954	2.09	2.182
0.168	1.957	2.092	2.184
0.178	1.961	2.094	2.185
0.183	1.965	2.096	
0.188	1.968	2.099	
0.193	1.972	2.101	
0.204	1.975	2.103	
0.23	1.978	2.105	
0.27	1.982	2.107	
0.327	1.985	2.109	
0.404	1.988	2.111	
0.506	1.991	2.113	
0.636	1.994	2.115	
0.797	1.997	2.117	
0.995	2	2.119	
1.177	2.003	2.121	
1.254	2.006	2.122	
1.318	2.009	2.124	
1.375	2.012	2.126	
1.428	2.015	2.128	
1.476	2.018	2.13	
1.52	2.02	2.132	

For a 100-yr Storm the Following Values for Point Precipitation were obtained from the NOAA Atlas 14 Frequency Data Server for a point at the centroid of the modeled watershed. See attached NOAA document.

Point Precipitation for 100-yr, 1-hr = $P_{60_Original} := 1.69\text{in}$

Point Precipitation for 100-yr, 6-hr = $P_{360_Original} := 2.19\text{in}$

Point Precipitation for 100-yr, 24-hr = $P_{1440_Original} := 2.57\text{in}$

Point Rainfalls are often reduced by a Reduction Factor as found in Figure F-1 of the SSCAFCA DPM (originally from NOAA). Due to the relatively small size of this approximately 1 sq. mile watershed, no reduction factor was applied, i.e. factor =1.

Reduction Factors $RF_{60} := 1$ $RF_{360} := 1$ $RF_{1440} := 1$

$P_{60} := P_{60_Original} \cdot RF_{60} = 1.69 \cdot \text{in}$

$P_{360} := P_{360_Original} \cdot RF_{360} = 2.19 \cdot \text{in}$

$P_{1440} := P_{1440_Original} \cdot RF_{1440} = 2.57 \cdot \text{in}$

Now use the equations provided in the SSCAFCA/CORR DPM on page 22-52 (Same as COA Section 2, of Chapter 22, pg. 22-31) to create a rainfall distribution for the 6-hr storm.

$$A := \frac{\log\left(\frac{P_{360}}{P_{60}}\right)}{\log(6)} = 0.145$$

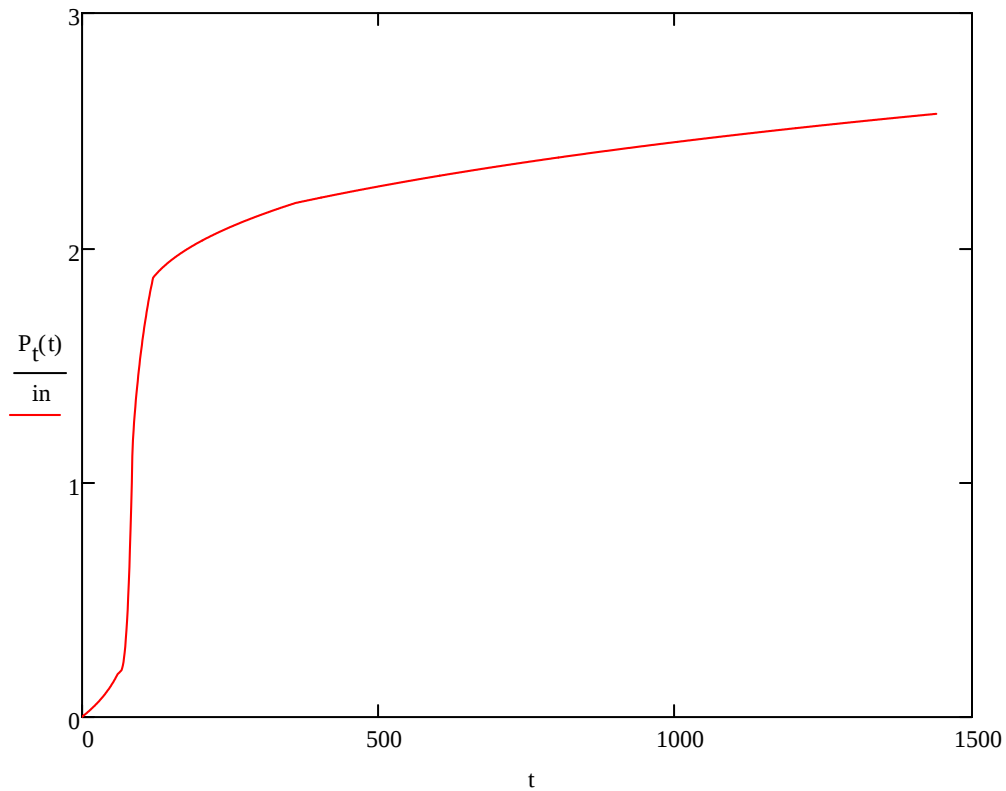
$$B := \frac{\log\left(\frac{P_{1440}}{P_{360}}\right)}{\log(4)} = 0.115$$

$t := 0, 1 \dots 1440$

time in minutes

From SSCAFCA
DPM

$$P_t(t) := \begin{cases} 2.334 \cdot (P_{360} - P_{60}) \cdot \left[1.5^A - \left(1.5 - \frac{t}{60} \right)^A \right] & \text{if } 0 \leq t \leq 60 \\ P_t(60) + P_{60} \cdot 0.4754 \cdot \left[0.5^{0.09} - \left(1.5 - \frac{t}{60} \right)^{0.09} \right] & \text{if } 60 < t < 67 \\ P_t(60) + P_{60} \cdot \left[0.0001818182 \cdot (t - 60) + 0.000018338 \cdot (t - 60)^{3.2} \right] & \text{if } 67 \leq t < 85.3 \\ P_t(60) + P_{60} \cdot \left[0.07 \cdot (t - 60) - 1.1886 - 0.0404768 \cdot (t - 85)^{1.0985865} \right] & \text{if } 85.3 \leq t < 120 \\ P_{360} + (P_t(60) + P_{60} - P_{360}) \cdot \frac{4.4^{3 \cdot A} - \left(\frac{t}{60} - 1.6 \right)^{3 \cdot A}}{4.4^{3 \cdot A} - 0.4^{3 \cdot A}} & \text{if } 120 \leq t \leq 360 \\ \left[P_{1440} + (P_{360} - P_{1440}) \cdot \frac{30^B - \left(\frac{t}{60} + 6 \right)^B}{30^B - 12^B} \right] & \text{if } 360 < t \leq 1440 \end{cases}$$



$P_t(2) = 0.004 \cdot \text{in}$

$P_t(360) = 2.19 \cdot \text{in}$

$t := 0,5 \dots 1440$

$P_t(t) =$

0	in
0.01	
0.021	
0.032	
0.044	
0.057	
0.07	
0.085	
0.101	
0.118	
0.137	
0.158	
0.182	
0.194	
0.234	
0.366	
0.639	
1.111	
1.321	
1.455	
1.565	
1.658	
1.739	
1.81	
1.872	
1.887	
1.9	
1.913	
1.924	
1.935	
1.945	
1.955	
1.964	

Summary Table of Calculated Rainfall Distribution
(24 hour storm, depth in inches at 5 minute intervals)

0	2.087	2.261	2.365	2.449	2.522
0.01	2.093	2.263	2.366	2.451	2.523
0.021	2.098	2.265	2.368	2.453	2.524
0.032	2.103	2.268	2.37	2.454	2.526
0.044	2.109	2.27	2.372	2.456	2.527
0.057	2.114	2.272	2.374	2.457	2.528
0.07	2.119	2.274	2.376	2.459	2.53
0.085	2.124	2.277	2.377	2.46	2.531
0.101	2.128	2.279	2.379	2.462	2.532
0.118	2.133	2.281	2.381	2.463	2.533
0.137	2.138	2.283	2.383	2.465	2.535
0.158	2.143	2.286	2.385	2.466	2.536
0.182	2.147	2.288	2.386	2.468	2.537
0.194	2.152	2.29	2.388	2.469	2.539
0.234	2.156	2.292	2.39	2.471	2.54
0.366	2.161	2.294	2.392	2.472	2.541
0.639	2.165	2.296	2.393	2.474	2.543
1.111	2.169	2.299	2.395	2.475	2.544
1.321	2.173	2.301	2.397	2.477	2.545
1.455	2.178	2.303	2.399	2.478	2.546
1.565	2.182	2.305	2.4	2.48	2.548
1.658	2.186	2.307	2.402	2.481	2.549
1.739	2.19	2.309	2.404	2.483	2.55
1.81	2.193	2.311	2.405	2.484	2.551
1.872	2.195	2.313	2.407	2.485	2.553
1.887	2.198	2.315	2.409	2.487	2.554
1.9	2.201	2.318	2.411	2.488	2.555
1.913	2.203	2.32	2.412	2.49	2.556
1.924	2.206	2.322	2.414	2.491	2.558
1.935	2.209	2.324	2.416	2.493	2.559
1.945	2.211	2.326	2.417	2.494	2.56
1.955	2.214	2.328	2.419	2.495	2.561
1.964	2.216	2.33	2.421	2.497	2.563
1.973	2.219	2.332	2.422	2.498	2.564
1.981	2.222	2.334	2.424	2.5	2.565
1.989	2.224	2.336	2.426	2.501	2.566
1.997	2.227	2.338	2.427	2.502	2.568
2.005	2.229	2.34	2.429	2.504	2.569
2.012	2.232	2.342	2.43	2.505	2.57
2.019	2.234	2.344	2.432	2.507	
2.026	2.237	2.346	2.434	2.508	
2.033	2.239	2.347	2.435	2.509	
2.04	2.242	2.349	2.437	2.511	
2.046	2.244	2.351	2.438	2.512	
2.052	2.246	2.353	2.44	2.513	
2.059	2.249	2.355	2.442	2.515	
2.065	2.251	2.357	2.443	2.516	
2.07	2.254	2.359	2.445	2.518	
2.076	2.256	2.361	2.446	2.519	
2.082	2.258	2.363	2.448	2.52	



POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14



New Mexico 35.047959 N 106.625702 W 5259 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 Nov 22 2010

[Confidence Limits](#)
[Seasonality](#)
[Related Info](#)
[GIS data](#)
[Maps](#)
[Docs](#)
[Return to State Map](#)

Precipitation Frequency Estimates (inches)

AEP* (1-in- Y)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
2	0.20	0.31	0.39	0.52	0.64	0.72	0.76	0.88	0.97	1.10	1.16	1.34	1.53	1.69	2.13	2.54	3.09	3.57
5	0.29	0.45	0.55	0.75	0.93	1.03	1.08	1.22	1.32	1.49	1.56	1.77	2.02	2.23	2.80	3.31	3.98	4.60
10	0.36	0.54	0.67	0.91	1.12	1.25	1.29	1.45	1.57	1.75	1.83	2.07	2.33	2.60	3.22	3.79	4.51	5.21
25	0.44	0.67	0.83	1.12	1.38	1.54	1.59	1.76	1.87	2.09	2.18	2.44	2.73	3.05	3.73	4.35	5.12	5.90
50	0.50	0.76	0.95	1.28	1.58	1.77	1.82	1.99	2.10	2.34	2.43	2.72	3.02	3.39	4.10	4.74	5.52	6.36
100	0.57	0.86	1.07	1.44	1.78	2.01	2.06	2.23	2.34	2.60	2.70	2.99	3.31	3.72	4.44	5.10	5.89	6.78
200	0.64	0.97	1.20	1.61	2.00	2.25	2.32	2.48	2.59	2.86	2.96	3.27	3.58	4.04	4.77	5.45	6.21	7.15
500	0.73	1.11	1.37	1.85	2.28	2.60	2.66	2.83	2.92	3.21	3.31	3.63	3.94	4.46	5.18	5.86	6.57	7.58
1000	0.80	1.22	1.51	2.03	2.51	2.88	2.95	3.10	3.18	3.48	3.58	3.91	4.21	4.78	5.47	6.15	6.80	7.85

* These precipitation frequency estimates are based on an annual maxima series. **AEP** is the Annual Exceedance Probability. Please refer to [NOAA Atlas 14 Document](#) for more information. NOTE: Formatting forces estimates near zero to appear as zero.

* Upper bound of the 90% confidence interval Precipitation Frequency Estimates (inches)

AEP** (1-in- Y)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
2	0.23	0.36	0.44	0.59	0.74	0.84	0.88	1.00	1.09	1.23	1.29	1.45	1.65	1.82	2.30	2.73	3.31	3.83
5	0.34	0.51	0.64	0.86	1.06	1.19	1.24	1.39	1.48	1.66	1.73	1.92	2.18	2.40	3.01	3.55	4.26	4.92
10	0.41	0.62	0.77	1.03	1.28	1.44	1.48	1.65	1.75	1.95	2.02	2.24	2.52	2.79	3.46	4.06	4.83	5.58
25	0.50	0.76	0.94	1.27	1.57	1.77	1.82	2.00	2.10	2.32	2.40	2.64	2.94	3.27	4.01	4.65	5.46	6.32
50	0.57	0.87	1.08	1.45	1.80	2.02	2.08	2.26	2.35	2.60	2.68	2.94	3.26	3.63	4.40	5.07	5.90	6.81
100	0.65	0.98	1.22	1.64	2.03	2.30	2.35	2.54	2.62	2.89	2.97	3.24	3.57	3.98	4.76	5.45	6.28	7.26
200	0.72	1.10	1.36	1.83	2.27	2.58	2.64	2.82	2.89	3.17	3.27	3.54	3.86	4.33	5.10	5.82	6.62	7.66
500	0.83	1.26	1.56	2.10	2.60	2.97	3.04	3.21	3.27	3.57	3.66	3.93	4.26	4.79	5.55	6.27	7.00	8.12
1000	0.91	1.38	1.72	2.31	2.86	3.30	3.38	3.54	3.58	3.87	3.96	4.24	4.55	5.14	5.87	6.58	7.24	8.41

* The **upper** bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are **greater** than.

** These precipitation frequency estimates are based on an annual maxima series. **AEP** is the Annual Exceedance Probability.

Please refer to [NOAA Atlas 14 Document](#) for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

* Lower bound of the 90% confidence interval Precipitation Frequency Estimates (inches)

AEP** (1-in- Y)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
2	0.18	0.27	0.34	0.45	0.56	0.63	0.67	0.77	0.87	0.99	1.05	1.23	1.41	1.56	1.97	2.36	2.88	3.32
5	0.26	0.39	0.48	0.65	0.81	0.90	0.95	1.08	1.18	1.33	1.41	1.63	1.87	2.07	2.59	3.08	3.72	4.29
10	0.31	0.47	0.59	0.79	0.98	1.09	1.13	1.28	1.39	1.57	1.65	1.90	2.16	2.41	2.99	3.52	4.21	4.87
25	0.38	0.58	0.72	0.97	1.20	1.33	1.38	1.53	1.66	1.86	1.96	2.24	2.53	2.82	3.46	4.03	4.77	5.51
50	0.43	0.66	0.81	1.10	1.36	1.52	1.57	1.73	1.85	2.08	2.18	2.49	2.79	3.13	3.79	4.38	5.15	5.94

100	0.48	0.74	0.91	1.23	1.52	1.70	1.76	1.93	2.05	2.31	2.41	2.74	3.05	3.42	4.10	4.72	5.48	6.32
200	0.54	0.82	1.01	1.37	1.69	1.90	1.96	2.13	2.25	2.53	2.64	2.98	3.30	3.71	4.39	5.03	5.77	6.68
500	0.61	0.93	1.15	1.55	1.92	2.17	2.23	2.40	2.51	2.82	2.94	3.30	3.62	4.07	4.76	5.39	6.11	7.07
1000	0.67	1.01	1.25	1.69	2.09	2.38	2.45	2.61	2.71	3.04	3.16	3.54	3.85	4.34	5.02	5.65	6.33	7.34

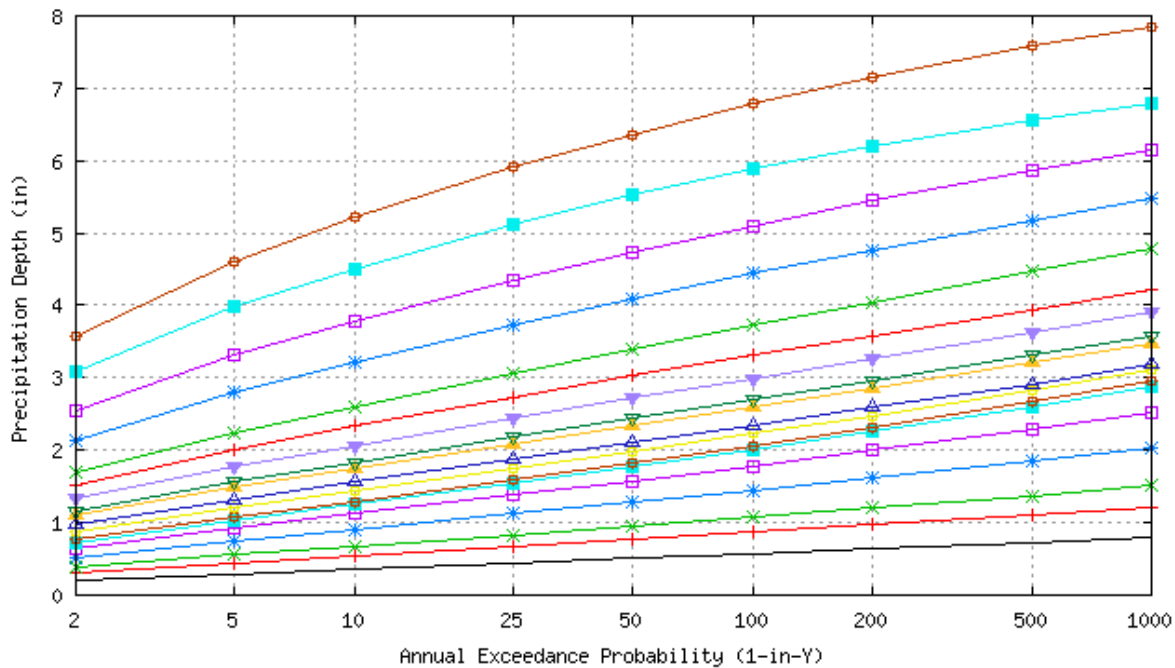
* The lower bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are less than.

** These precipitation frequency estimates are based on an annual maxima series. AEP is the Annual Exceedance Probability.

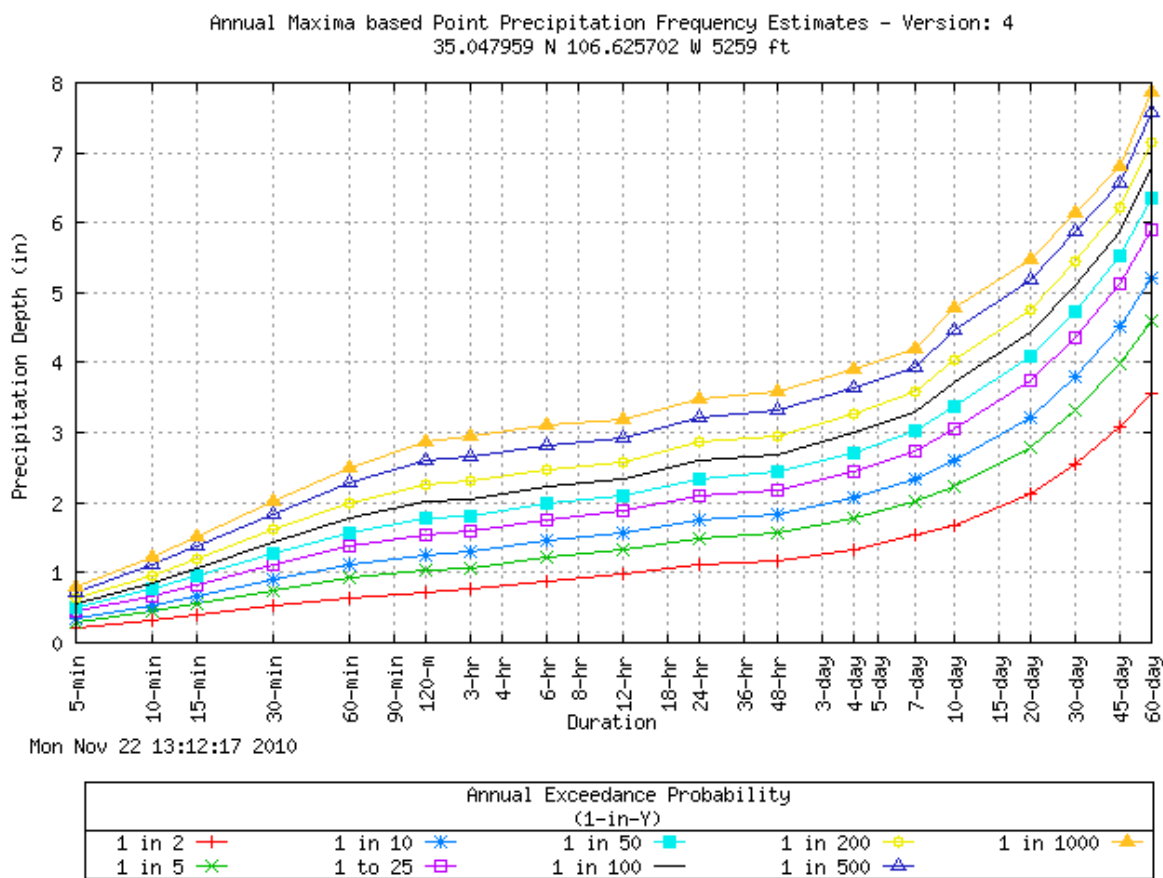
Please refer to [NOAA Atlas 14 Document](#) for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

Text version of tables

Annual Maxima based Point Precipitation Frequency Estimates - Version: 4
35.047959 N 106.625702 W 5259 ft



Duration					
5-min —	30-min *	3-hr —	24-hr —	7-day —	30-day —
10-min —	60-min —	6-hr —	48-hr —	10-day —	45-day —
15-min —	120-m —	12-hr —	4-day —	20-day —	60-day —



Related Information

Maps & Aerials

[Click here](#) to see topographic maps and aerial photographs available for this location from [Microsoft Research Maps](#)

Watershed/Streamflow Information

[Click here](#) to see watershed and streamflow information available for this location from the U.S. Environmental Protection Agency's site

Climate Data Sources

National Climatic Data Center (NCDC) database

Locate NCDC climate stations within:

or

of this location. Digital ASCII data can be obtained directly from [NCDC](#).

Note: Precipitation frequency results are based on analysis of precipitation data from a variety of sources, but largely NCDC. The following links provide general information about observing sites in the area, regardless of if their data was used in this study. For detailed information about the stations used in this study, please refer to the matching documentation available at the [PF Document](#) page

Natural Resources Conservation Service's (NRCS) SNOTEL dataset

At present, there are more than 700 [SNOTEL sites](#) typically located in the mountainous regions of the [Western U.S.](#) that report daily and/or hourly precipitation, air temperature, snow water equivalent and snow depth data.

[US Department of Commerce](#)
[National Oceanic and Atmospheric Administration](#)
[National Weather Service](#)
[Office of Hydrologic Development](#)
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

[Disclaimer](#)