Annual Peak-Flow Frequency Analysis
For more information on the contents of this documentation, see Kessler and others (2013).

Streamgage number and name:

04015400 Miller Creek at Duluth, Minn.

Peak-flow information:

Number of systematic peak flows in record	26
Systematic period begins	1960
Systematic period ends	1985
Length of systematic record	26
Years without information	0
Number of historical peak flows in record	0

Frequency analysis options:

Method	Expected moments algorithm (EMA)
Skew option	STATION SKEW
Low-outlier method	Bulletin 17B Grubbs-Beck test

Bulletin 17B systematic record analysis results:

Moments of the common logarithms of the peak flows:

Mean	Standard deviation	Skewness
2.3466	0.2581	-0.748

Outlier criteria and number of peak flows exceeding:

Low	50.2	1
High	824.3	0

Expected moments algorithm (EMA) Final analysis results:

Moments of the common logarithms of the peak flows:

Mean	Standard deviation	Skewness
2.3535	0.2402	-0.375

Annual frequency curve at selected exceedance probabilities:

Exceedance probability	Peak estimate	Lower-95 level	Upper-95 level
0.9950	NA	NA	NA
0.9900	NA	NA	NA
0.9500	86	31.0	117
0.9000	109	53.2	144
0.8000	144	97.9	184
0.6667	183	138.0	234
0.5000	234	182.0	298
0.4292	257	203.0	328
0.2000	362	286.0	466
0.1000	447	353.0	642
0.0400	551	432.0	976
0.0200	627	473.0	1,230
0.0100	700	499.0	1,510
0.0050	772	513.0	1,840
0.0020	865	520.0	2,400

Peak-flow data used in the analysis:

Explanation of symbols and codes

K Peak affected by regulation

∗ Less than low-outlier threshold

Water year	Peak flow	Peak-flow code
1960	154	K
1961	424	K
1962	193	K
1963	43	K ∗
1964	343	K
1965	190	K
1966	150	K
1967	242	K
1968	167	K
1969	164	K
1970	134	K
1971	254	K
1972	481	K
1973	302	K
1974	282	K
1975	185	K
1976	120	K
1977	360	K
1978	430	K
1979	525	K
1980	360	K
1981	199	K
1982	87	K
1983	370	K
1984	120	K
1985	420	K