NOAA Atlas 14

Precipitation-Frequency Atlas of the United States

Volume 2 Version 3.0: Delaware, District of Columbia, Illinois, Indiana, Kentucky, Maryland, New Jersey, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, West Virginia

Geoffrey M. Bonnin, Deborah Martin, Bingzhang Lin, Tye Parzybok, Michael Yekta, David Riley

U.S. Department of Commerce

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Silver Spring, Maryland, 2004
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1. Abstract

NOAA Atlas 14 contains precipitation frequency estimates with associated confidence limits for the United States and is accompanied by additional information such as temporal distributions and seasonality. The Atlas is divided into volumes based on geographic sections of the country. The Atlas is intended as the official documentation of precipitation frequency estimates and associated information for the United States. It includes discussion of the development methodology and intermediate results. The Precipitation Frequency Data Server (PFDS) was developed and published in tandem with this Atlas to allow delivery of the results and supporting information in multiple forms via the Internet.

2. Preface to Volume 2

NOAA Atlas 14 Volume 2 contains precipitation frequency estimates for Delaware, District of Columbia, Illinois, Indiana, Kentucky, Maryland, New Jersey, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, and West Virginia. These areas were addressed together in a single project focused on the Ohio River basin and surrounding states. The Atlas supercedes precipitation frequency estimates contained in Technical Paper No. 40 “Rainfall frequency atlas of the United States for durations from 30 minutes to 24 hours and return periods from 1 to 100 years” (Hershfield, 1961), NWS HYDRO-35 “Five- to 60-minute precipitation frequency for the eastern and central United States” (Frederick et al., 1977) and Technical Paper No. 49 “Two- to ten-day precipitation for return periods of 2 to 100 years in the contiguous United States” (Miller et al., 1964). The updates are based on more recent and extended data sets, currently accepted statistical approaches, and improved spatial interpolation and mapping techniques.

The work was performed by the Hydrometeorological Design Studies Center within the Office of Hydrologic Development of the National Oceanic and Atmospheric Administration’s National Weather Service. Funding for the work was provided by the National Weather Service, the Ohio River Basin Commission and its member States, U.S. Army Corps of Engineers, Tennessee Valley Authority, Federal Emergency Management Administration, Natural Resources Conservation Service, and Bureau of Reclamation. Any use of trade names in this publication is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Citation and Version History. This documentation and associated artifacts such as maps, grids, and point-and-click results from the PFDS, are part of a whole with a single version number and can be referenced as: “Precipitation-Frequency Atlas of the United States” NOAA Atlas 14, Volume 2, Version 3.0, G. M. Bonnin, D. Martin, B. Lin, T. Parzybok, M. Yekta, and D. Riley, NOAA, National Weather Service, Silver Spring, Maryland, 2006.

The version number has the format P.S where:

P is an integer representing successive releases of primary information. Primary information is essentially the data – the values of precipitation frequencies (in ASCII grids of the precipitation frequency estimates and output from the PFDS), shapefiles, cartographic maps, temporal distributions, and seasonality.

S is an integer representing successive releases of secondary information. S reverts to zero (or nothing; i.e., Version 2 and Version 2.0 are equivalent) when P is incremented. Secondary information includes documentation and metadata.

When new information is completed and added, such as draft documentation, *without changing any prior information*, the version number is not incremented.

The primary version number is stamped on the artifact or is included as part of the filename where the format does not allow for a version stamp (for example, the grids). An examination of any of the artifacts available through the Precipitation Frequency Data Server (PFDS) provides an immediate indication of the primary version number associated with all artifacts. All output from the PFDS is stamped with the version number and date of download.

Several versions of the project have been released. Table 2.1 lists the version history associated with NOAA Atlas 14 Volume 2, the Ohio River basin and surrounding states precipitation frequency project and indicates the nature of changes made. If major discrepancies are observed or identified by users, a new release may be warranted.

Table 2.1. Version History of the NOAA Atlas 14 Volume 2.

Version no.	**Date**	**Notes**
Version 1	August 15, 2003	Draft data used in peer review
Version 2	July 29, 2004	Final released data
Version 2.0	February 17, 2005	Draft documentation released
Version 2.1	June 2, 2005	Final documentation released
Version 3	August 17, 2006	Updated final data (includes 1-year ARI)
Version 3.0	October 4, 2006	Updated final documentation released

3. Introduction

3.1. Objective

NOAA Atlas 14 Volume 2 provides precipitation frequency estimates for the Ohio River basin and surrounding states which includes Delaware, District of Columbia, Illinois, Indiana, Kentucky, Maryland, New Jersey, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, and West Virginia. Figures 4.1.1 and 4.1.2 show the project core area where estimates are available (enclosed in the bold line) and also include all stations used in the analysis, even those outside the core area. This Atlas provides precipitation frequency estimates for 5-minute through 60-day durations at average recurrence intervals of 1-year through 1,000-year. The estimates are based on the analysis of annual maximum series and then converted to partial duration series results. The information in NOAA Atlas 14 Volume 2 supercedes precipitation frequency estimates contained in Technical Paper No. 40 “Rainfall frequency atlas of the United States for durations from 30 minutes to 24 hours and return periods from 1 to 100 years” (Hershfield, 1961), NWS HYDRO-35 “Five- to 60-minute precipitation frequency for the eastern and central United States” (Frederick et al., 1977) and Technical Paper No. 49 “Two- to ten-day precipitation for return periods of 2 to 100 years in the contiguous United States” (Miller et al., 1964). The results are provided at high spatial resolution and include confidence limits for the estimates. The Atlas includes temporal distributions designed for use with the precipitation frequency estimates (Appendix A.1) and seasonal information for heavy precipitation (Appendix A.2). In addition, the potential effects of climate change were examined (Appendix A.3).

The new estimates are based on improvements in three primary areas: denser data networks with a greater period of record, the application of regional frequency analysis using L-moments for selecting and parameterizing probability distributions and new techniques for spatial interpolation and mapping. The new techniques for spatial interpolation and mapping account for topography and have allowed significant improvements in areas of complex terrain.

NOAA Atlas 14 Volume 2 precipitation frequency estimates for the Ohio River basin and surrounding states are available via the Precipitation Frequency Data Server at http://hdsc.nws.noaa.gov/hdsc/pfds which provides the additional ability to download digital files. The types of results and information found there include:

- point estimates (via a point-and-click interface)
- ArcInfo© ASCII grids
- ESRI shapefiles
- color cartographic maps for each state
- associated Federal Geographic Data Committee-compliant metadata
- data series used in the analyses: annual maximum series and partial duration series
- temporal distributions of heavy precipitation (6-hour, 12-hour, 24-hour and 96-hour)
- seasonal exceedance graphs: counts of events that exceed the 1 in 2, 5, 10, 25, 50 and 100 annual exceedance probabilities for the 60-minute, 24-hour, 48-hour, and 10-day durations.

As discussed in Sections 4.8.4 and 4.8.5, the color cartographic maps and ESRI shapefiles were created to serve as visual aids and, unlike Technical Paper 40, are not recommended for interpolating final point or area precipitation frequency estimates. Users are urged to take advantage of the Precipitation Frequency Data Server or the underlying ArcInfo© ASCII grids for accessing estimates.

3.2. Terminology; Partial Duration and Annual Maximum Series

This publication adopts the terminology “average recurrence interval” (ARI) and “annual exceedance probability” (AEP) presented in Australian Rainfall and Runoff (Institute of Engineers, Australia, 1987) which in turn is based on Laurenson (1987). NOAA Atlas 14 is based on the analysis of annual maximum series data with the results converted to represent estimates based on partial duration series. The results for these two types of series differ at shorter average recurrence intervals and have different meanings. Factors for converting between these results are provided in Section 4.6.4.

An annual maximum series is constructed by taking the highest accumulated precipitation for a particular duration in each successive year of record, whether the year is defined as a calendar year or using some other arbitrary boundary such as a water year. Calendar years are used in this Atlas. An annual maximum series inherently excludes other extreme cases that occur in the same year as a more extreme case. In other words, the second highest case on record at an observing station may occur in the same year as the highest case on record but will not be included in the annual maximum series. A partial duration series is constructed by taking all of the highest cases above a threshold regardless of the year in which the case occurred. In this Atlas, partial duration series consist of the N largest cases in the period of record, where N is the number of years in the period of record at the particular observing station.

Analysis of annual maximum series produces estimates of the average period between *years when a particular value is exceeded*. On the other hand, analysis of partial duration series gives the average period between *cases of a particular magnitude*. The two results are numerically similar at rarer average recurrence intervals but differ at shorter average recurrence intervals (below about 20 years). The difference can be important depending on the application.

Typically, the use of AEP and ARI reflects the analysis of the different series. However, in some cases, average recurrence interval is used as a general term for ease of reference.

3.3. Approach

The approach used in this project largely follows the regional frequency analysis using the method of L-moments described in Hosking and Wallis (1997). This section provides an overview of the approach. Greater detail on the approach is provided in Section 4.2.

NOAA Atlas 14 introduces a change from past NWS publications by its use of regional frequency analysis using L-moments for selecting and parameterizing probability distributions. Both annual maximum series and partial duration series were extracted at each observing station from quality controlled data sets. Because of the greater reliability of the analysis of annual maximum series, an average ratio of partial duration series to annual maximum series precipitation frequency estimates (quantiles) was computed and then applied to the annual maximum series quantiles to obtain the final equivalent partial duration series quantiles.

Quality control was performed on the initial observed data sets (see Section 4.3) and it continued throughout the process as an inherent result of the performance parameters of intermediate steps.

To support the regional approach, potential regions were initially determined based on climatology. They were then tested statistically for homogeneity. Individual stations in each region were also tested statistically for discordancy. Adjustments were made in the definition of regions based on underlying climatology in cases where homogeneity and discordancy criteria were not met.

A variety of probability distributions were examined and the most appropriate distribution for each region and duration was selected using several different performance measures. The final determination of the appropriate distributions for each region and duration was made based on sensitivity tests and a desire for a relatively smooth transition between distributions from region to region. Probability distributions selected for annual maximum series were not necessarily the same as those selected for partial duration series.

Quantiles at each station were determined based on the mean of the data series at the station and the regionally determined higher order moments of the selected probability distribution. There were a number of stations where the regional approach did not provide the most effective choice of probability distribution. In these cases the most appropriate probability distribution was chosen and parameterized based solely on data at that station. Quantiles for durations below 60-minutes (n-minute durations) were computed using an average ratio between the n-minute and 60-minute quantiles due to the small number of stations recording data at less than 60-minute intervals.

For the first time, the National Weather Service is providing confidence limits for the precipitation frequency estimates in the area covered by NOAA Atlas 14. Monte Carlo Simulation was used to produce upper and lower bounds at the 90% confidence level.

In the regional approach, the second and higher order moments are constant for each region resulting in a potential for discontinuities in the quantiles at regional boundaries. In order to avoid potential discontinuities and to achieve an effective spatial interpolation of quantiles between observing stations, the data series means at each station for each duration were spatially interpolated using PRISM technology by the Spatial Climate Analysis Service (SCAS) at Oregon State University (Appendix A.4). Because the mean was derived directly at each observing station from the data series and independently of the regional computations, it was not subject to the same discontinuities. The grid of quantiles for each successive average recurrence interval was then derived in an iterative process using a strong linear relationship between a particular duration and average recurrence interval and the next rarer average recurrence interval of the same duration (see Section 4.8.2). The resulting set of grids were tested and adjusted in cases where inconsistencies occurred between durations and frequencies. Computations were made over a geographic domain that was larger than the published domain to ensure continuity at the edges of the published domain.

Both the spatial interpolation and the point estimates were subject to external peer reviews (see Section 6 and Appendix A.5). Based on the results of the peer review, adjustments were made where necessary by the addition of new observations or removal of questionable ones. Adjustments were also made in the definition of regions.

Temporal precipitation patterns were extracted for use with the precipitation frequency estimates presented in the Atlas (Appendix A.1). The temporal patterns are presented in probabilistic terms and can be used in Monte Carlo development of ensembles of possible scenarios. They were specifically designed to be consistent with the definition of duration used for the precipitation frequency estimates.

The seasonality of heavy precipitation is represented in seasonal exceedance graphs that are available through the Precipitation Frequency Data Server. The graphs were developed for each region by tabulating the number of events exceeding the precipitation frequency estimate at each station for a given annual exceedance probability (Appendix A.2).

The 1-day annual maximum series were analyzed for linear trends in mean and variance and shifts in mean to determine whether climate change during the period of record was an issue in the production of this Atlas (Appendix A.3). The results showed little observable or geographically consistent impact of climate change on the annual maximum series during the period of record and so the entire period of record was used. The estimates presented in this Atlas make the necessary assumption that there is no effect of climate change in future years on precipitation frequency estimates. The estimates will need to be modified if that assumption proves quantifiably incorrect.

4. Method

4.1. Data

4.1.1. Properties

Sources. Daily, hourly, and n-minute (defined below) measurements of precipitation from various sources were used for this project (Table 4.1.1). Figure 4.1.1 shows the locations of daily stations in the project area. Figure 4.1.2 shows the hourly and n-minute stations.

The National Weather Service (NWS) Cooperative Observer Program's (COOP) daily and hourly stations were the primary source of precipitation gauge records. The following data sets of COOP data were obtained from National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center (NCDC):

- Hourly data set: TD3240
- Daily data set: TD3200 and TD3206
- N-minute data set: TD9649 and an additional dataset covering 1973-1979

Other sources were United States Geological Survey and local datasets, which included data from:

- Midwestern Climate Center Digitization Project
- Tennessee Valley Authority
- Huntington District United States Army Corps of Engineers
- Nashville District United States Army Corps of Engineers
- Louisville District United States Army Corps of Engineers

Table 4.1.1. Number of stations in each state in the project area.

State	Daily	Hourly	N-min
Delaware	12	2	1
Illinois	192	80	6
Indiana	156	75	5
Kentucky	166	59	5
Maryland	74	16	2
New Jersey	76	22	3
North Carolina	196	51	6
Ohio	225	104	9
Pennsylvania	278	139	8
South Carolina	107	25	3
Tennessee	166	47	5
Virginia	156	47	6
Washington DC	3	0	0
West Virginia	141	42	5
Border states*	898	285	32
Total	2846	994	96

*Border states include parts of Alabama, Arkansas, Connecticut, Georgia, Iowa, Michigan, Mississippi, Missouri, New York and Wisconsin that are directly adjacent to the project core area.

Figure 4.1.1. Map of daily stations for NOAA Atlas 14 Volume 2.

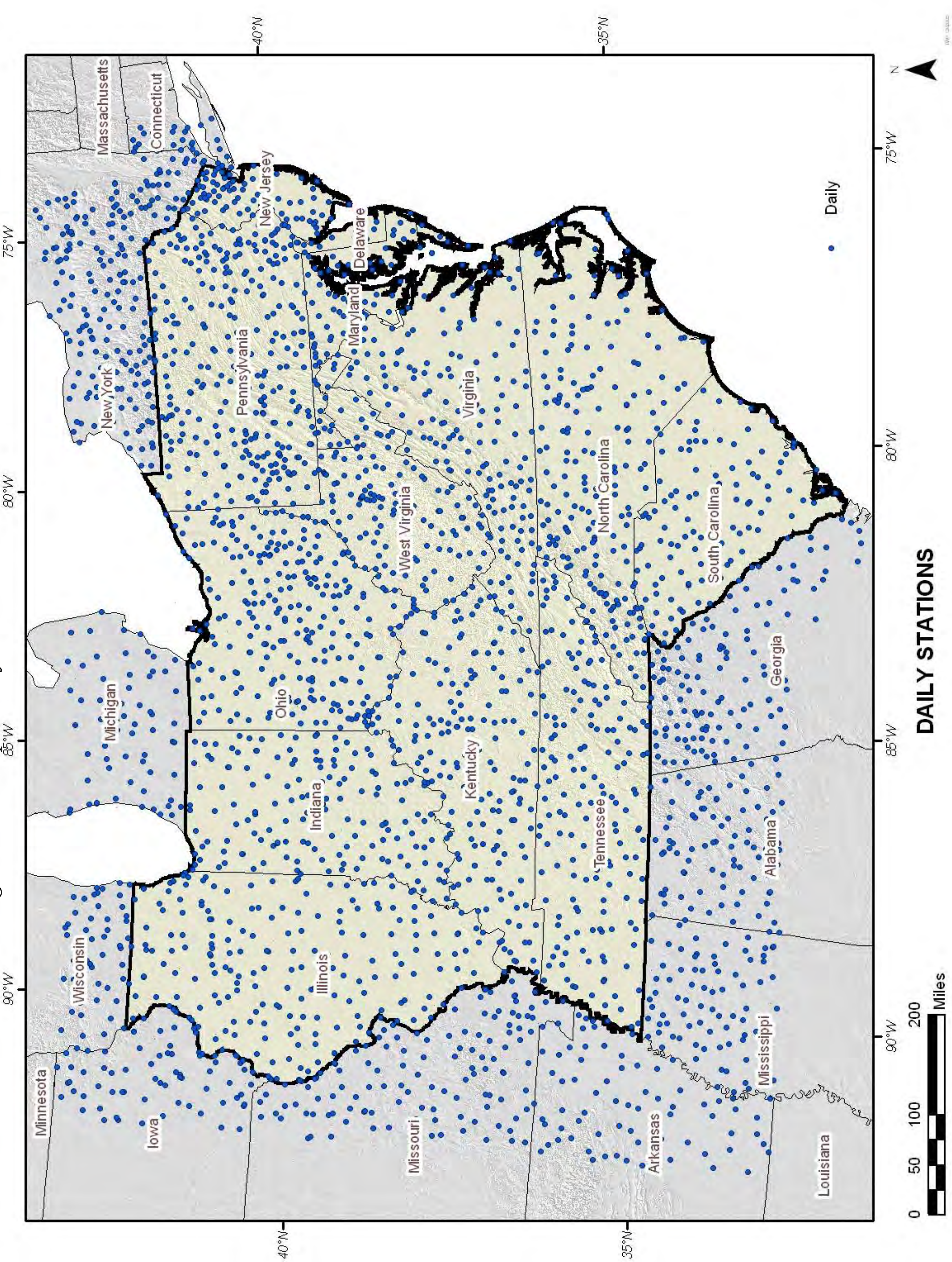
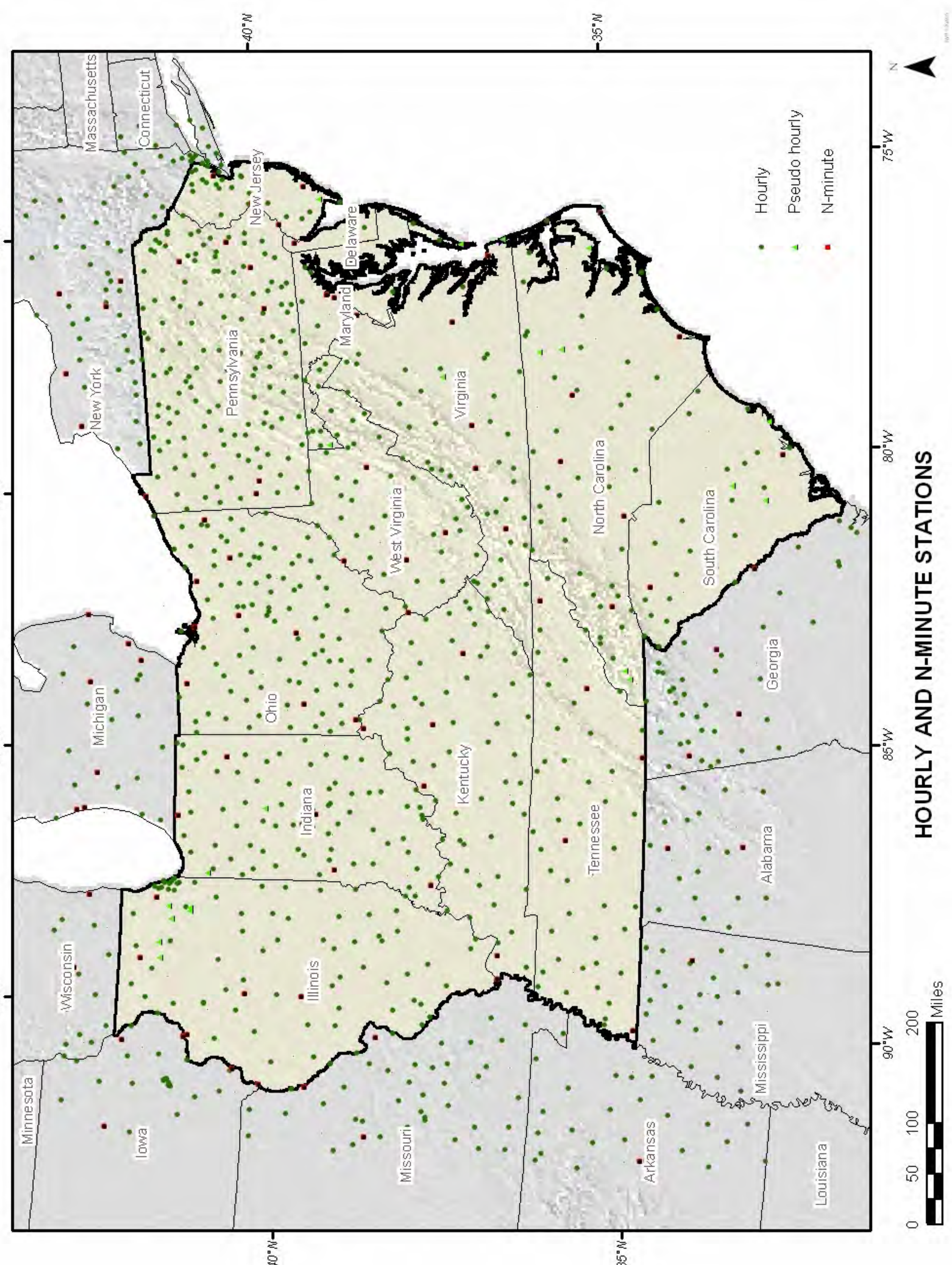


Figure 4.1.2. Map of hourly and n-minute stations for NOAA Atlas 14 Volume 2.



Record length. Record length may be characterized by the entire period of record or by the number of years of useable data within the total period of record (data years). For this project, only daily stations with 30 or more data years and hourly stations with 20 or more data years were used in the analysis. The records of these stations extend through December 2000 and average 63 data years in length for daily stations and 40 data years for hourly (Table 4.1.2). Most, 99%, of the hourly stations have 55 data years or less, but 3 stations have 97, 99, and 101 data years respectively. Figures 4.1.3 and 4.1.4 show the number of data years by percent of stations for the daily and hourly data. N-minute records used in the analysis had 14 to 105 years of data with records extending through May 1997. At the time of this project the n-minute data at NCDC had not been updated beyond 1997 (not through December 2000). (See Appendix A.6 for a complete list of stations or http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_data.html for downloadable comma-delimited station lists.)

Table 4.1.2. Information for daily, hourly datasets through 12/2000 and n-minute datasets through 12/1997.

	Daily	**Hourly**	**N-minute**
No. of stations	2846	994	96
Longest record length (data yrs) (Station ID)	126 (30-5801)	101 (36-6889)	105 (31-9457)
Average record length (data yrs)	63	40	67

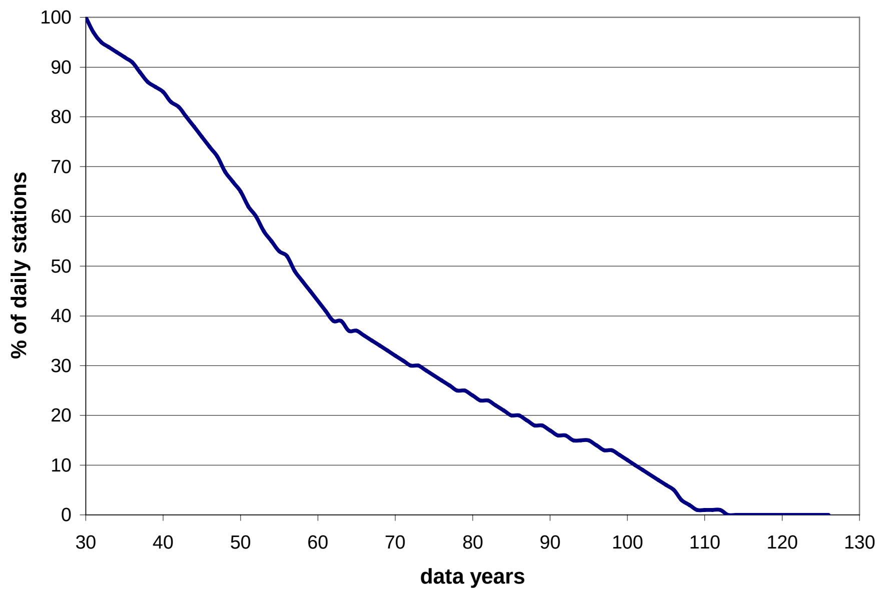


Figure 4.1.3. Plot of percentage of total number of daily stations used in NOAA Atlas 14 Volume 2 versus data years.

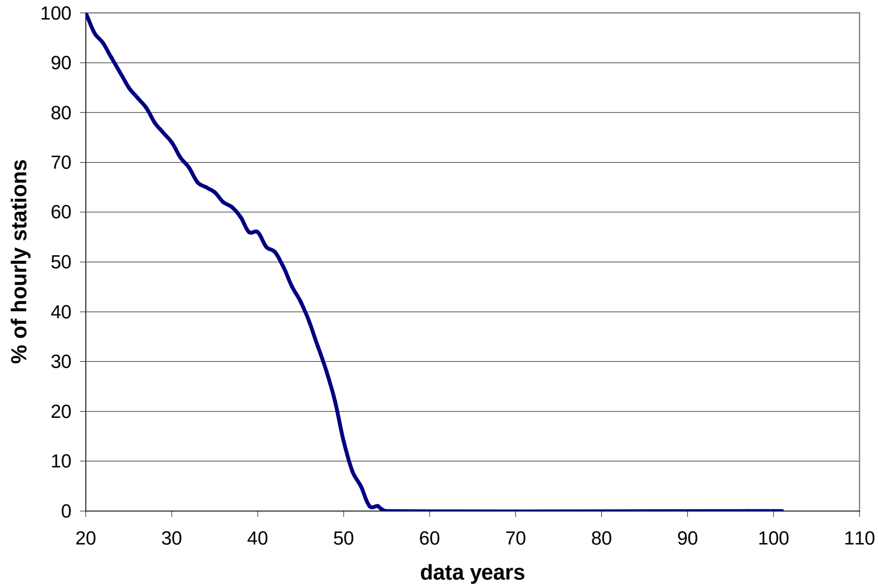


Figure 4.1.4. Plot of percentage of hourly stations used in NOAA Atlas 14 Volume 2 versus data years.

N-minute data. N-minute data are precipitation data measured at a temporal resolution of 5-minutes that can be summed to various “n-minute” durations (10-minute, 15-minute, 30-minute, and 60-minute). Because of the small number of n-minute data available, n-minute precipitation frequencies were estimated by applying a linear scaling to 60-minute data. The linear scaling factors were developed using ratios of n-minute quantiles to 60-minute quantiles from 96 co-located n-minute and hourly stations divided into 2 regions (Figure 4.1.5). Because there were relatively so few stations, the stations were grouped into 2 large regions, a northern region and a southern region based on the similarity of ratios. The ratios were calculated from quantiles computed for each large region. Tables 4.1.3 and 4.1.4 show the ratios used for the northern and southern regions.

The ratios are consistent with Technical Paper 40 (Hershfield, 1961). Table 4.1.5 shows the ranges of n-minute ratios (n-min/60-min) computed for all recurrence intervals in NOAA Atlas 14 Volume 2 and those reported in Technical Paper 40 (Hershfield, 1961) for 5, 10, 15, and 30 minutes.

Figure 4.1.5. Regional groupings for n-minute data for NOAA Atlas 14 Volume 2.

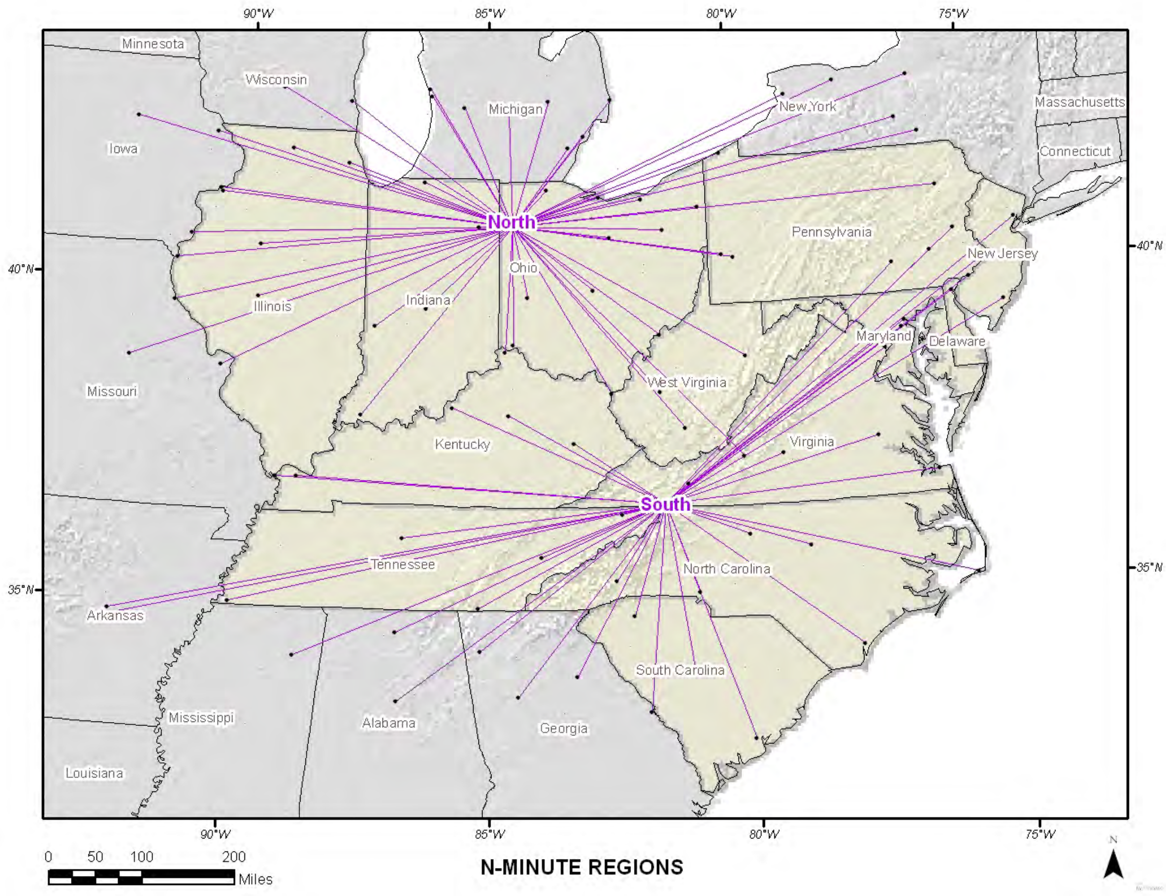


Table 4.1.3. N-minute ratios for the northern region of NOAA Atlas Volume 2: 5-, 10-, 15- and 30-minute to 60-minute. *Note that the 1.58-year was computed to equate the 1-year average recurrence interval (ARI) for partial duration series results (see Section 4.6.2) and the 1.58 year results were not released as annual exceedance probabilities (AEP).

Annual Exceedance Probability	5-min	10-min	15-min	30-min
1 in 1.58 (1-year ARI)	0.325	0.505	0.619	0.819
1 in 2	0.319	0.498	0.609	0.815
1 in 5	0.305	0.474	0.582	0.797
1 in 10	0.298	0.460	0.566	0.786
1 in 25	0.289	0.442	0.546	0.771
1 in 50	0.283	0.429	0.531	0.759
1 in 100	0.277	0.417	0.518	0.748
1 in 200	0.272	0.406	0.505	0.737

Annual Exceedance Probability	5-min	10-min	15-min	30-min
1 in 500	0.266	0.391	0.488	0.723
1 in 1,000	0.261	0.380	0.475	0.712

Table 4.1.4. N-minute ratios for the southern region of NOAA Atlas Volume 2: 5-, 10-, 15- and 30-minute to 60-minute. *Note that the 1.58-year was computed to equate the 1-year average recurrence interval (ARI) for partial duration series results (see Section 4.6.2) and the 1.58 year results were not released as annual exceedance probabilities (AEP).

Annual Exceedance Probability	5-min	10-min	15-min	30-min
1 in 1.58 (1-year ARI)	0.293	0.468	0.585	0.802
1 in 2	0.287	0.459	0.577	0.797
1 in 5	0.271	0.434	0.549	0.780
1 in 10	0.262	0.419	0.530	0.768
1 in 25	0.251	0.400	0.507	0.751
1 in 50	0.243	0.387	0.490	0.738
1 in 100	0.236	0.375	0.474	0.726
1 in 200	0.229	0.363	0.458	0.713
1 in 500	0.220	0.348	0.438	0.697
1 in 1,000	0.214	0.337	0.423	0.685

Table 4.1.5. Ranges of NOAA Atlas 14 Volume 2 n-minute ratios compared to Technical Paper 40: 5-, 10-, 15- and 30-minute to 60-minute.

	5-min	10-min	15-min	30-min
NOAA Atlas 14 Volume 2 northern region	**0.261-0.325**	**0.380-0.505**	**0.475-0.619**	**0.712-0.819**
NOAA Atlas 14 Volume 2 southern region	**0.214-0.293**	**0.337-0.468**	**0.423-0.585**	**0.685-0.802**
Technical Paper 40	*0.29*	*0.45*	*0.57*	*0.79*

Multi-day/hour durations. Maxima for durations greater than 24-hour were generated by accumulating daily data. The multi-day maxima, 2-day through 60-day, were extracted in an iterative process where 1-day observations were summed and compared with the value of the previous summation shifted by 1 day. Multi-hour durations, 2-hour through 48-hour, were generated by accumulating hourly data. (See Section 4.1.3 for additional details on the annual maximum series and partial duration series extraction process.)

Technical Paper 40 data comparison. Technical Paper 40 (Hershfield, 1961), herein after referred to simply as Technical Paper 40, which covered the entire contiguous United States was the most recent update of the precipitation frequencies for the eastern half of the United States for durations 30-minutes through 24-hours. NOAA Atlas 14 Volume 2 covers the Ohio River basin and surrounding states which represents a subset of Technical Paper 40 states east of the Mississippi River. For several reasons, it is difficult to make a direct comparison of the numbers of stations used in Technical Paper 40 and NOAA Atlas 14 Volume 2. Unlike NOAA Atlas 14, Technical Paper 40 utilized stations differently depending on their record length. Stations with longer records were used to establish relationships between estimates for the rarer average recurrence intervals and the 2-year average recurrence interval. Stations with short record lengths were used to establish spatial patterns for the 2-year estimates only. However, in NOAA Atlas 14 Volume 2, all stations meeting the minimum requirement for number of years of data were used for all durations and recurrence intervals. Detailed lists of stations used in Technical Paper 40 are not available, so making a direct comparison was not possible.

Even so, it can be said that NOAA Atlas 14 Volume 2 utilized more stations with longer periods of record than Technical Paper 40. Technical Paper 40 used data through 1958, whereas NOAA Atlas 14 Volume 2 used data through 2000, vastly increasing the amount of data available. Some stations available for NOAA Atlas 14 Volume 2 had more than 40 more years of record than those used in Technical Paper 40. This allowed for the exclusion of shorter, less reliable data records. Technical Paper 40 used a minimum of 14 data years, and for the 2-year average recurrence interval even considered records with 5 years of data, whereas for NOAA Atlas 14 Volume 2 the minimum was increased to 30 data years for daily stations and 20 data years for hourly. Table 4.1.6 shows the differences in the average record lengths of stations used in both projects.

Table 4.1.6. Comparison of the average record length of stations that were used in Technical Paper 40 and NOAA Atlas 14 Volume 2.

Data type	Technical Paper 40 (years)	NOAA Atlas 14 Volume 2 (years)	% increase in record length
N-minute*	48	67	40%
Hourly	14	40	186%
Daily**	16-47	63	34-293%

*This average for N-minute stations in Technical Paper 40 may include 1-day stations.
**The average for Technical Paper 40 depended on type of gauge and use.

4.1.2. Conversions of data

Daily. Daily data have varying observation times. Maximum 24-hour amounts seldom fall within a single daily observation period. In order to make the daily and hourly data comparable, a conversion was necessary from 'observation day' (constrained observation) to 24 hours (unconstrained observation). Both NOAA Atlas 2 (Miller et al., 1973) and Technical Paper 40 used the empirically derived value of 1.13 to convert daily data to 24-hour data. The conversion factor for this project was computed using ratios of the 2-year quantiles computed from monthly maxima series at 86 first order stations with at least 15 years of concurrent hourly and daily data in the project area. Time series for concurrent time periods were generated for 24-hour precipitation values summed from hourly observations and co-located daily precipitation observations. The series were analyzed separately using L-moments. Ratios of 2-year 24-hour to 2-year 1-day quantiles were then generated and averaged. The conversion factor, 1.134, was the same using different distributions (GNO, GEV, GLO). This conversion factor was comparable to results from a regression of daily/24-hourly monthly maxima that occurred on the same day. The linear regression was based on 39,503 pairs of concurrent data (i.e., monthly daily/24-hourly maxima that occurred on the same day) at 86 first order stations in the project area. Figure 4.1.6 illustrates the regression using averaged monthly maxima for each of the 86 first order stations used, but the conversion factor, 1.132, was computed using all 39,503 pairs. The conversion factor used in this project was 1.13, which is in exact agreement with the conversion factor used in Technical Paper 40 and NOAA Atlas 2 (Miller et al., 1973) and in close agreement with NOAA Atlas 14 Volume 1 which used 1.14 (see Table 4.1.7). Similarly, a 2-day to 48-hour conversion factor of 1.04 was generated for NOAA Atlas 14 Volume 2. This factor had not been previously calculated in the other studies, but is in close agreement with the conversion factor of 1.03 used in NOAA Atlas 14 Volume 1. All daily and 2-day data were converted to equivalent 24-hour and 48-hour unconstrained values, respectively.

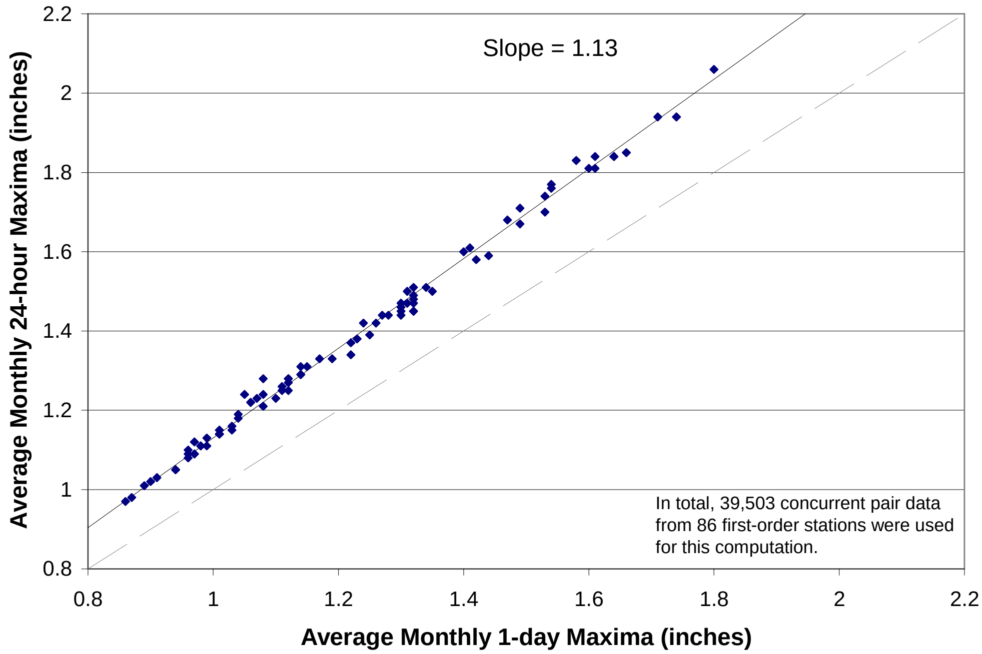


Figure 4.1.6. Regression of average monthly maxima at concurrent hourly/daily stations used in NOAA Atlas 14 Volume 2 demonstrating the derivation of the 1-day to 24-hour conversion factor.

Hourly. In order to make hourly and 60-minute data comparable, a conversion was necessary from the constrained 'clock hour' to unconstrained 60-minute and from 2 hours to 120-minute. Conversion factors were computed using ratios of the 2-year quantiles computed from annual maxima series at 69 first-order stations with co-located hourly and n-minute stations in the project area (only 68 stations were used for the 2 hours to 120-minute factor). Time series from concurrent time periods were generated for 60-minute precipitation values summed from n-minute observations and co-located hourly precipitation observations. The series were analyzed separately using L-moments. Ratios of 2-year 60-minute to 2-year 1-hour quantiles were generated and averaged. The resulting conversion factor was further verified by a regression analysis of 2,511 concurrent annual maxima data pairs at 69 first order 1-hour/60-minute stations. The resulting conversion factor was 1.16 for 1-hour to 60-minute and 1.05 for 2-hour to 120-minute. This is in close agreement with NOAA Atlas 2 (Miller et al., 1973) and Technical Paper 40 which used 1.13 for the 1-hour to 60-minute conversion and NOAA

Atlas 14 Volume 1 which used 1.12 (see Table 4.1.7). No conversion was provided for 2-hour to 120-minutes in those studies except for NOAA Atlas 14 Volume 1 which used a factor of 1.03.

Table 4.1.7. Conversion factors for constrained to unconstrained observations.

	Conversion Factors			
Project	**1-day to 24-hour**	**2-day to 48-hour**	**1-hour to 60-minute**	**2-hour to 60-minute**
NOAA Atlas 14 Vol. 1 (Semiarid Southwestern United States)	1.14	1.03	1.12	1.03
NOAA Atlas 14 Vol. 2 (Ohio River Basin and Surrounding States)	**1.13**	**1.04**	**1.16**	**1.05**
Technical Paper 40	1.13	N/A	1.13	N/A
NOAA Atlas 2 (Miller et al., 1973)	1.13	N/A		N/A

4.1.3. Extraction of series

Two methods were used for extracting series of data at a station for the analysis of precipitation frequency: **Annual Maximum Series (AMS)** and **Partial Duration Series (PDS)**.

The AMS method selected the largest single case that occurred in each calendar year of record. If a large case was not the largest in a particular year, it was not included in the series.

The PDS method recognized that more than one large case may occur during a single calendar year. For this Atlas, the largest N cases in the entire period of record, where N is the number of years of data, were selected to create the partial duration series. More than one case could be selected from any particular year and a large case that is not the largest in a particular year could appear in the series. Such a series is also called an annual exceedance series (AES) (Chow et al., 1988).

Differences in the meaning of the results of analysis using these two different types of series are discussed in Section 3.2. Average empirical conversion factors were developed to provide PDS-based results from the AMS-based results (see Section 4.6.4). The data series used in the analysis (and associated documentation) are provided through the Precipitation Frequency Data Server which can be found at http://hdsc.nws.noaa.gov/hdsc.

The procedure for extracting maxima from the dataset used specific criteria. The criteria, described below, ensured that each year had a sufficient number of data, particularly in the assigned "wet season", to accurately extract statistically meaningful values. The "wet season" for each location was defined as the months in which extreme cases were mostly likely to occur and was assigned by assessing histograms of annual maximum precipitation for each homogeneous region (Tables 4.1.8 and 4.1.9). [The development and verification of the homogeneous regions are discussed in Section 4.4 and shown in Figures 4.4.1 and 4.4.2.]

Table 4.1.8. “Wet season” months for daily regions of NOAA Atlas 14 Volume 2.

Region	start month	end month
Daily Regions		
1	7	9
2	6	9
3	6	9
4	6	9
5	6	9
6	6	10
7	6	10
8	6	10
9	6	10
10	6	10
11	7	10
12	7	10
13	7	10
14	7	10
15	7	10
16	6	10
17	6	10
18	6	10
19	6	10
20	6	10
21	6	10
22	6	10
23	6	10
24	1	12
25	1	12
26	1	12
27	1	12
28	1	12
29	6	9
30	6	9
31	6	9
32	1	12
33	1	12
34	1	12
35	1	12
36	1	12
37	1	12
38	1	12
39	6	9
40	6	9
41	6	9
42	6	9
43	6	9
44	6	9
45	6	9
46	1	12
47	1	12
48	1	12
49	6	9
50	6	9
51	6	9
52	6	9
53	6	9
54	6	9
55	6	9
56	6	9
57	6	9
58	6	9
59	6	9
60	6	9
61	1	12
62	6	9
63	6	9
64	6	9
65	5	9
66	5	9
67	5	9
68	5	9
69	5	9
70	5	9
71	1	12
72	1	12
73	1	12
74	1	12
75	1	12
76	1	12
77	1	12
78	1	12
79	1	12
80	5	9
81	6	9
82	6	9
83	7	10
84	6	10
A1	6	9
A2	1	12

Table 4.1.9. “Wet season” months for hourly regions of NOAA Atlas 14 Volume 2.

Region	start month	end month
Hourly Regions		
1	7	9
2	6	9
3	6	10
4	7	10
5	6	10
6	6	10
7	6	10
8	6	10
9	1	12
10	1	12
11	6	9
12	6	9
13	1	12
14	1	12
15	1	12
16	6	9
17	6	9
18	6	9
19	6	9
20	6	9
21	6	9
22	5	9
23	1	12
24	1	12
25	1	10
26	6	10

Criteria for hourly annual maximum series. For all hourly durations (1-hour through 48-hours), the highest value in each year was extracted as the annual maximum for that particular year. Cases that spanned January 1st were assigned to the date on which the greatest hourly precipitation occurred during the corresponding duration.

A month was invalid and the maximum precipitation for that month was set to missing:

- if the hours of available data in a month were less than the duration hours
- if 240 hours or more in a month were missing and the maximum precipitation for the month <= 0.01 inches
- if 360 or more hours in a month were missing and the maximum precipitation for the month was less than 33% of the average precipitation for that month at that station
- if 50% or more hours (for a specific duration) were missing

Also, if more than 50% of the months in the wet season for a given region were missing, then the maximum precipitation for the year was set to missing.

Criteria for daily annual maximum series. An annual maximum was extracted for daily durations (1-day through 60-day), if at least 50% of the months in the assigned wet season and at least 50% of the data for the accumulated period were present. The highest value in each year was extracted as the annual maximum for that particular year. Cases that spanned January 1st were assigned to the date on which the greatest daily precipitation occurred during the corresponding duration.

In addition, the following criteria applied:

1-day:
If all the days in the month were missing, or if more than 10 days of the month were missing and the maximum precipitation for the month was 0.00", or if more than 15 days were missing and the maximum for the month was less than 30% of the average 1-day maximum precipitation for that month over the period of record at that station, then that month was set to missing.

2-day:
If there was only 1 day of data for the month and the rest of the days were missing, or if more than 10 days of the month were missing and the maximum precipitation for the month was 0.00", or if more than 15 days were missing and the maximum for the month was less than 30% of the average 2-day maximum precipitation for that month over the period of record at that station, then that month was set to missing.

4-day:
If more than 96% of the days in a given year were missing, or if 50% of the days of the year were missing and the maximum precipitation for the year was 0.3" or less, then that year was set to missing.

7-day:
If more than 93% of the days in a given year were missing, or if 50% of the days of the year were missing and the maximum precipitation for the year was 0.3" or less, then that year was set to missing.

10-day:
If more than 93% of the days in a given year were missing, or if 50% of the days of the year were missing and the maximum precipitation for the year was 0.35" or less, then that year was set to missing.

20-day:
If more than 88% of the days in a given year were missing, or if 50% of the days of the year were missing and the maximum precipitation for the year was 0.35” or less, then that year was set to missing.

30-day:
If more than 82% of the days in a given year were missing, or if 50% of the days of the year were missing and the maximum precipitation for the year was 0.45” or less, then that year was set to missing.

45-day:
If more than 73% of the days in a given year were missing, or if 50% of the days of the year were missing and the maximum precipitation for the year was 0.45” or less, then that year was set to missing.

60-day:
If more than 64% of the days in a given year were missing, or if 50% of the days of the year were missing and the maximum precipitation for the year was 0.45” or less, then that year was set to missing.

Criteria for partial duration series. The criteria listed above also apply for deciding whether a month or year has enough data to be included in the extraction process for a partial duration series. Cases that spanned January 1st were assigned to the date on which the greatest precipitation observation occurred during the corresponding duration.

Precipitation accumulations for each duration were extracted and then sorted in descending order. The highest N accumulations for each duration were retained where N is the number of actual data years for each station.

4.2. Regional approach based on L-moments

4.2.1. Overview

Hosking and Wallis (1997) describe regional frequency analysis using the method of L-moments. This approach, which stems from work in the early 1970s but which only began seeing full implementation in the 1990s, is now accepted as the state of the practice. The National Weather Service has used Hosking and Wallis, 1997, as its primary reference for the statistical method for this Atlas.

The method of L-moments (or linear combinations of probability weighted moments) provides great utility in choosing the most appropriate probability distribution to describe the precipitation frequency estimates. The method provides tools for estimating the shape of the distribution and the uncertainty associated with the estimates, as well as tools for assessing whether the data are likely to belong to a homogeneous region (e.g., climatic regime).

The regional approach employs data from many stations in a region to estimate frequency distribution curves for the underlying population at each station. The approach assumes that the frequency distributions of the data from many stations in a homogeneous region are identical apart from a site-specific scaling factor. This assumption allows estimation of shape parameters from the combination of data from all stations in a homogeneous region rather than from each station individually, vastly increasing the amount of information used to produce the estimate, and thereby increasing the accuracy. Weighted averages that are proportional to the number of data years at each station in the region are used in the analysis.

The regional frequency analysis using the method of L-moments assists in selecting the appropriate probability distribution and the shape of the distribution, but precipitation frequency estimates (quantiles) are estimated uniquely at each individual station by using a scaling factor, which, in this project, is the mean of the annual maximum series, at each station. The resulting quantiles are more reliable than estimates obtained based on single at-site analysis (Hosking and Wallis, 1997).

4.2.2. L-moment description

Regional frequency analysis using the method of L-moments provided tools to test the quality of the dataset, test the assumptions of regional homogeneity, select a frequency distribution, estimate precipitation frequencies, and estimate confidence limits for this Atlas. Details and equations for the analysis may be found in other sources (Hosking and Wallis, 1997; Lin et al., 2004). What follows here is a brief description.

By necessity, precipitation frequency analysis employs a limited data sample to estimate the characteristics of the underlying population by selecting and parameterizing a probability distribution. The distribution is uniquely characterized by a finite set of parameters. In previous NWS publications such as NOAA Atlas 2, the parameters of a probability distribution have been estimated using the Moments of Product or the Conventional Moments Method (CMM). However, sample moment estimates based on the CMM have some undesirable properties. The higher order sample moments such as the third and fourth moments associated with skewness and kurtosis, respectively, can be severely biased by limited data length. The higher order sample moments also can be very sensitive or unstable to the presence of outliers in the data (Hosking and Wallis, 1997; Lin et al., 2004).

L-moments are expectations of certain linear combinations of order statistics (Hosking, 1989). They are expressed as linear functions of the data and hence are less affected by the sampling variability and, in particular, the presence of outliers in the data compared to CMM (Hosking and Wallis, 1997). The regional application of L-moments further increases the robustness of the estimates by deriving the shape parameters from all stations in a homogeneous region rather than from each station individually.

Probability distributions can be described using coefficient of L-variation, L-skewness, and L-kurtosis, which are analogous to their CMM counterparts. Coefficient of L-variation provides a measure of dispersion. L-skewness is a measure of symmetry. L-kurtosis is a measure of peakedness. L-moment ratios of these measures are normalized by the scale measure to estimate the parameters of the distribution shape independent of its scale. Unbiased estimators of L-moments were derived as described by Hosking and Wallis (1997).

Since these scale-free frequency distribution parameters are estimated from regionalized groups of observed data, the result is a dimensionless frequency distribution common to the N stations in the region. By applying the site-specific scaling factor (the mean) to the dimensionless distribution (regional growth factors), site-specific quantiles for each frequency and duration can be computed (Section 4.6.1).

Regional frequency analysis using the method of L-moments also provides tools for determining whether the data likely belong to similar homogeneous regions (e.g., climatic regimes) and for detecting potential problems in the quality of the data record. A measure of heterogeneity in a region, H1, uses coefficient of L-variation to test between-site variations in sample L-moments for a group of stations compared with what would be expected for a homogeneous region (Hosking and Wallis, 1997) (Section 4.4). A discordancy measure is used to determine if a station's data are consistent with the set of stations in a region based on coefficient of L-variation, L-skewness, and L-kurtosis (Section 4.3).

4.3. Dataset preparation

Rigorous quality control is a major and integral part of dataset preparation. The methods used in this project for ensuring data quality included a check of extreme values above thresholds, L-moment discordancy tests, and a real-data-check (RDC) of quantiles, among others. Also, analyses such as a trend analysis of annual maximum series, a study of cross-correlation between stations, and testing of data series with large gaps in record provided additional data quality assurance. An interesting and valuable aspect of the analysis process, including spatial interpolation, is that throughout the process there are interim results and measures which allow additional evaluation of data quality. At each step, these measures indicate whether the data conform to the procedural assumptions. Measures indicating a lack of conformance were used as flags for data quality.

Quality control and data assembly methods. Initial quality control included a check of extreme values above thresholds, merging appropriate nearby stations, and checking for large gaps in records. Erroneous observations were eliminated from the daily, hourly, and n-minute datasets through a check of extreme values above thresholds. The thresholds were established for 1-hour and 24-hour values based on climatological factors and previous precipitation frequency estimates in a given region. Observations above these thresholds were checked against nearby stations, original records and other climatological bulletins.

Daily stations in the project area within 5 miles in horizontal distance and 100 feet in elevation with records that contain an overlap of less than 5 years or a gap between records of 5 years or less were considered for merging to increase record length and reduce spatial overlaps. The 24-hour annual maximum series of candidate stations were tested using a statistical t-test (at the 90% confidence level) to ensure the samples were from the same population and appropriate to be merged.

In addition, the quality of longer duration (24-hour through 60-day) data was ensured in two ways. First, all longer duration annual maxima that exceeded their 1,000-year confidence limit estimate by more than 5% were investigated for data quality and appropriate regionalization. This process was termed the "real-data-check" since it was comparing computed precipitation frequency estimates with observed ("real") data and is used again in identifying homogeneous regions (Section

4.4). "Real-data-check" is used to refer to any check or test that compares the real observations or empirical frequencies with the calculated quantiles. The term is also used regarding a test for best-fitting distributions (Section 4.5). Second, common errors that potentially impacted the accumulation of longer durations were identified and corrected if necessary. For example, raw daily data were screened for repeating values in a month that were erroneously recorded or monthly totals that were entered as having occurred in a single day.

Discordancy. The L-moment discordancy measure (Hosking and Wallis, 1997) was used for data quality control. In evaluating regions, it was also used to determine if a station had been inappropriately assigned to a region. The measure is based on coefficient of L-variation, L-skewness and L-kurtosis, which represent a point in 3-dimensional space for each station. Discordancy is a measure of the distance of each point from the cluster center of the points for all stations in a region. The cluster center is defined as the unweighted mean of the three L-moments for the stations within the region being tested. Stations at which the discordancy value was 3.0 or greater were scrutinized for suspicious or unusual data or to consider if they belonged in another region or as an at-site (Section 4.4). Some stations that captured a single high event or had a short data record were discordant but were accepted in a homogeneous region since no climatological or physical reason was found to justify their exclusion. Discordancy was checked at stations for n-minute, 1-hour, 24-hour, and some longer durations (typically the 10-day). Appendix A.6 which provides lists of stations used in the project also provides the L-statistics and discordancy measure for the 24-hour data or 60-minute data for each station in its region.

Annual maximum series screening. The 1-day annual maximum series (AMS) data were thoroughly scrutinized. For instance, large gaps (i.e., sequential missing years) in the annual maximum series of stations were screened since it was not possible to guarantee that the two given data segments were from the same population (i.e., same climatology, same rain gauge, same physical environment). The screening process assured data series consistency before the data were used. Station records with large gaps were flagged and examined on a case-by-case basis. Nearby stations were inspected for concurrent data years to fill in the gap if they passed a statistical test for consistency. If there were a sufficient number of years (at least 10 years of data) in each data segment, a t-test (at the 90% confidence level) was conducted to assess the statistical integrity of the data record. To produce more congruent data records for analysis, station record lengths were adjusted where appropriate.

Inconsistencies in the annual maxima of co-located daily and hourly stations were corrected where appropriate. If the 24-hour hourly annual maximum for a given year at a co-located station was greater than the 24-hour daily annual maximum due to missing or unreliable data in the daily dataset, the daily observations were manually corrected by inserting 24-hour accumulations from the hourly observations as the daily value on the appropriate day (and vice versa). Data were replaced at co-located stations with only real values temporally derived or accumulated from their co-located counter-part on a case by case basis and only in cases where regionalization would have been impacted.

The 1-day AMS data were also checked for linear trends in mean, linear trends in variance, and shifts in mean. Overall, the data were statistically free from trends and shifts. See Appendix A.3 for more details.

And finally, the 1-day AMS data were investigated for cross correlation between stations to assess intersite dependence, since it is assumed for precipitation frequency analysis that events are independent. Cases where annual maxima overlapped (+/- 1 day) at stations within 50 miles and with more than 30 years of data were analyzed using a t-test for correlation coefficients that were statistically significant at the 90% confidence level. It was found that the degree of cross correlation between stations in the project area was very low. Only 6% of the data in the entire project area showed significant correlation based on t-test results. The impact of cross correlation on the daily quantiles was very small. Relative errors were calculated by looking at the 14 regions where the percentage of cross-correlated stations was greater than 25%. For these 14 regions, the results of an analysis using all stations versus an analysis using only stations that were not cross-correlated were compared. The average relative errors in quantile estimation for all 14 worst case regions were small, 0.25%, 0.34%, 1.3% and 2.6% for 2-year, 10-year, 100-year and 1,000-year, respectively. Therefore, since the final quantiles were only minimally affected in the worst cases, it was concluded that it was not necessary to embed any measures to address dependence structures in the data.

4.4. Development and verification of homogeneous regions

The underlying assumption of the regional approach is that stations can be grouped in sets or "regions" in which stations have similar frequency distribution statistics except for a site-specific scale factor. Regions which satisfy this assumption are referred to as "homogeneous." The key to the regional approach is to construct a set of homogeneous regions for the entire project area. Hosking and Wallis (1997) make the case that homogeneous regions should be identified based on factors other than the statistics used to test the assumption of homogeneity. Regions in this project were first delineated subjectively based on climate, season(s) of highest precipitation, type of precipitation (e.g., general storm, convective, tropical storms or hurricanes, or a combination), topography and the homogeneity of such characteristics in a given geographic area.

The regions were then investigated using statistical homogeneity tests and other checks. As suggested in Hosking and Wallis (1997), adjustments of regions, such as moving stations from one region to another or subdividing a region, were made to reduce heterogeneity. The heterogeneity measure, H1, tests between-site variations in sample L-moments for a group of sites with what would be expected for a homogeneous region based on coefficient of L-variation (Hosking and Wallis, 1997). Earlier studies (Hosking and Wallis, 1997; also, personal discussion with Hosking at NWS, 2001) indicated that a threshold of 2 is conservative and reasonable. Therefore, an H1 measure greater than 2 (H1>2) indicated heterogeneity and H1<2 indicated homogeneity.

The regions for daily durations (24-hour through 60-day), Figure 4.4.1, were based on the 24-hour duration. Long duration (48-hour through 60-day) L-moment results where H1 was greater than 2 were closely examined to validate data quality. In most of these cases, one or several stations were driving the H1 measure due to the nature of their data sampling. Omitting the offending station(s) would decrease H1 significantly and the 100-year precipitation frequency estimates and regional growth factors would change by 5% or less. Once identified and checked, the high H1 values in these regions were sometimes accepted without modifying the regions themselves.

Similarly, the hourly regions, Figure 4.4.2, were based on the 60-minute data. The other short durations (2-hour through 24-hour) where H1 was greater than 2 were also closely examined to validate data quality. In each case where the H1 measure was greater than 2, after validating data quality, tests were conducted where 1 to 3 stations were omitted. In each case, omitting the offending station(s) would decrease H1 significantly and the 100-year precipitation frequency estimates and regional growth factors would change by 5% or less. Given the geographic locations of the stations and the validity of their data, the suspect stations were often retained in the region and the region was accepted as is, regardless of its high H1.

Ideally, coefficient of L-variation is sufficient to assess regional homogeneity. However, in practice, the National Weather Service found that sole use of H1 was not optimum for defining a homogenous region. The effect of L-skewness on the formation of a homogenous region was also considered, particularly since coefficient of L-variation and L-skewness do not necessarily correlate, and to take into account effects on longer average recurrence intervals (ARI). L-skewness and L-kurtosis were accounted for using a so-called "real-data-check" process. Real-data-check flags occurred where a maximum observation in the real (observed) data series at a station exceeded a given frequency estimate or confidence limit, in this case the 1,000-year upper confidence limit. These stations were carefully investigated for data quality and appropriate regionalization.

The number of real-data-check flags increased with increasing duration (from 28 at 24-hour to 223 at 60-day), in part because the regions were derived primarily using 24-hour duration data. It was decided not to pursue further mitigating procedures, such as subdividing based on longer durations or applying different distributions to different durations, for a number of reasons including the following:

1. The current regions are statistically homogeneous for the longer durations.
2. 1,000-year estimates are less stable given the limited data available.
3. In the analyses, annual maximum durations are defined as a given number of sequential days in which the most amount of rain fell in a given year. This means that a given longer duration may include parts of storms or more than 1 storm event or in some cases increasing longer durations may have an increasing percentage of dry days.
4. Given the number of stations in the project (>2700) with an average of 55 years of data, one might expect to find an average of 150 1,000-year real-data-check flags at each duration, and up to 174 at the 95% probability assuming a Poisson distribution about the mean.
5. The real-data-check cases are spatially scattered in regions randomly, indicating no systematic inadequacy in the analysis.

Overall, effort was made during the subdivision process to mitigate discrepancies that could be caused by (1) sampling error due to small sample sizes, or (2) regionalization that does not reflect a local situation. The purpose of the regionalization process was to obtain reliable quantiles at each station to reflect local conditions and reduce the relative error. The final groups of stations in the project area are illustrated in Figures 4.4.1 for daily regions and 4.4.2 for hourly regions. Appendix A.7 lists the H1 values and regionally-averaged L-moment statistics for all regions for the 24-hour and 60-minute durations. The heterogeneity measures (H1) for each region and all durations are provided in Appendix A.8.

Figure 4.4.1. Regional groupings for daily data used to prepare NOAA Atlas 14 Volume 2.

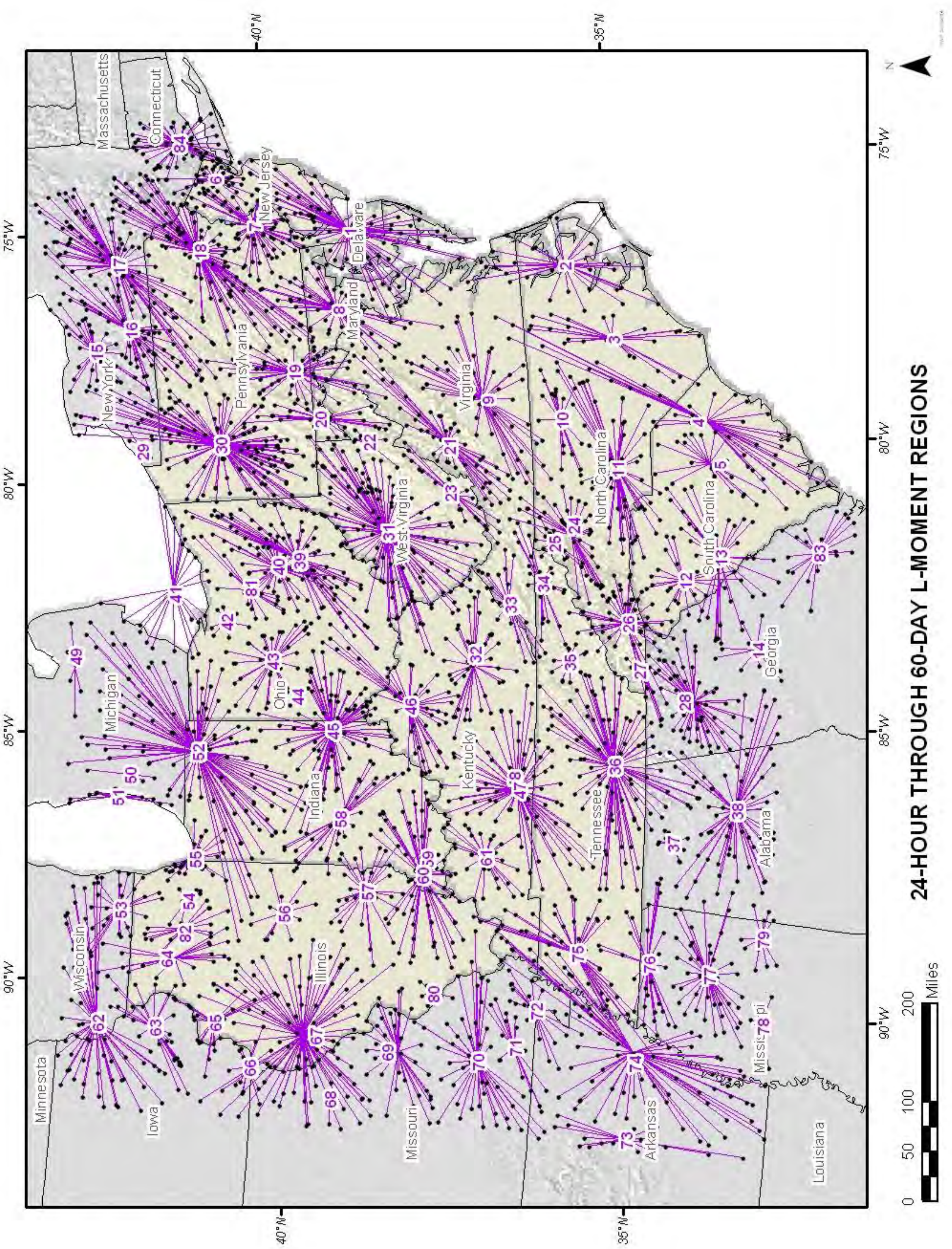
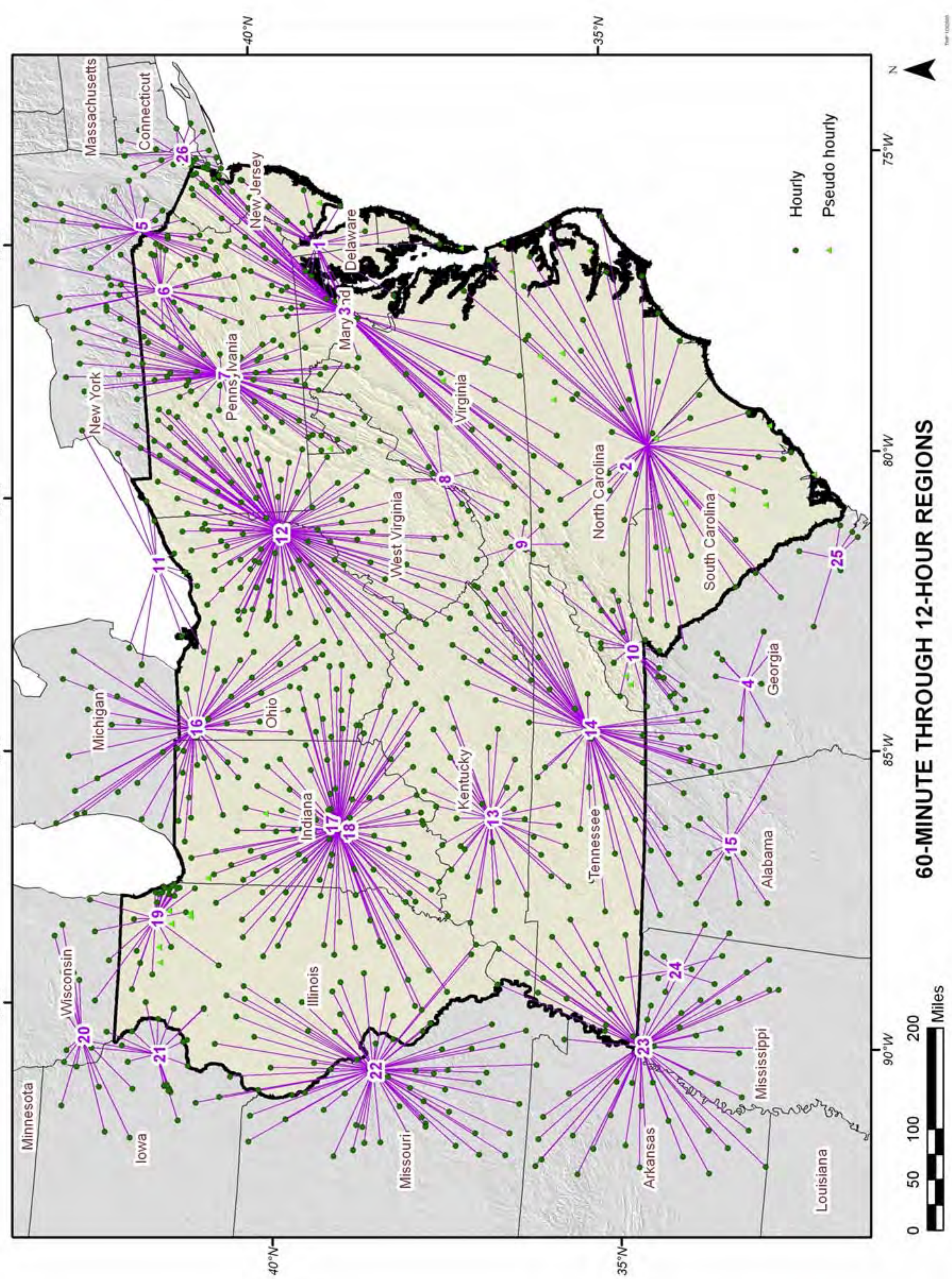


Figure 4.4.2. Regional groupings for hourly data used to prepare NOAA Atlas 14 Volume 2.



At-site stations. At some daily stations an at-site, instead of a regional, frequency analysis was a better approach to estimating the precipitation frequency quantiles. There were no hourly at-sites in the project. At-site stations were used because:

- They accounted for observed extreme precipitation regimes that the regional method could not resolve;
- They had more than 50 data years to produce reasonable estimates independent of a region;
- The spatial interpolation process was able to accommodate them;
- Error in the estimate was reduced compared to when included in a region.

Although at-sites have advantages in some cases, their use was considered a last-resort option because their precipitation frequency estimates sometimes caused irregularities in the spatial interpolation. All attempts to include a station in a region were considered before it was analyzed as an at-site. In fact, at-site stations had to meet at least 4 of the following criteria:

- Observed station data were markedly atypical and did not conform to adjacent regions;
- The at-site station caused adjacent regions to which it would otherwise belong to be heterogeneous;
- The root mean-square-error (RMSE) of L-moments for a region was lower when the station was excluded in the region;
- The at-site station was flagged during the discordancy check or the "real-data-check;"
- The at-site station had at least 50 data years (in most cases they actually had more than 100 data years);
- The absence of the at-site station in an adjacent region did not greatly impact final regional precipitation frequency estimates;
- There was a compelling local climatological or topographical reason to support an at-site analysis.

Empirical frequency plots provided a tool for assessing the accuracy of chosen distributions at a given station. In the case of at-sites, the difference between the empirical frequencies and the theoretical distribution precipitation frequency estimates, effectively the root-mean-square-error (RMSE), was much smaller from the at-site analysis than if the station was included in a region. For instance, figure 4.4.3 shows the empirical distribution for Paris Waterworks, IL as an at-site.

Because at-site stations are often statistical exceptions and they ultimately influence the spatial pattern in an area, they were carefully investigated. However, the spatial impact of the at-site stations, if any, was mitigated by spatial smoothing. The smoothing helped to spatially blend the at-site precipitation frequency estimates with those derived from the regional-approach.

For NOAA Atlas 14 Volume 2, one pair of stations and one daily station were analyzed using at-site analyses (Table 4.4.1). They are labeled A1 and A2. A2 is outside of the core domain and therefore are not specifically addressed in this documentation.

Table 4.4.1. Stations analyzed using an at-site analysis.

At-site	Station ID	Station Name	Data years
A1	11-6610; 12-1626*H	Paris Waterworks, IL; Clinton, IN	107; 39
A2	22-1880	Columbus Luxapillila, MS	104

*H designates an hourly station.

The following is a brief discussion of the core area at-site station:

- A1. Paris Waterworks, IL (11-6610):

Observed maximum precipitation at 11-6610 was not consistent with its vicinity. The advantage of this at-site was that it accounted for an extreme precipitation event (10.20 inches on 6/28/1957) that was higher than surrounding regions. The empirical frequencies verses the theoretical precipitation frequency estimates (Figure 4.4.3) suggested that an at-site resulted in reduced RMSE. To make the precipitation frequency estimates at 11-6610 more consistent with the surrounding area, the nearby hourly station 12-1626 was included with A1. The resulting spatial pattern when using an at-site analysis was consistent with the surrounding area at this location.

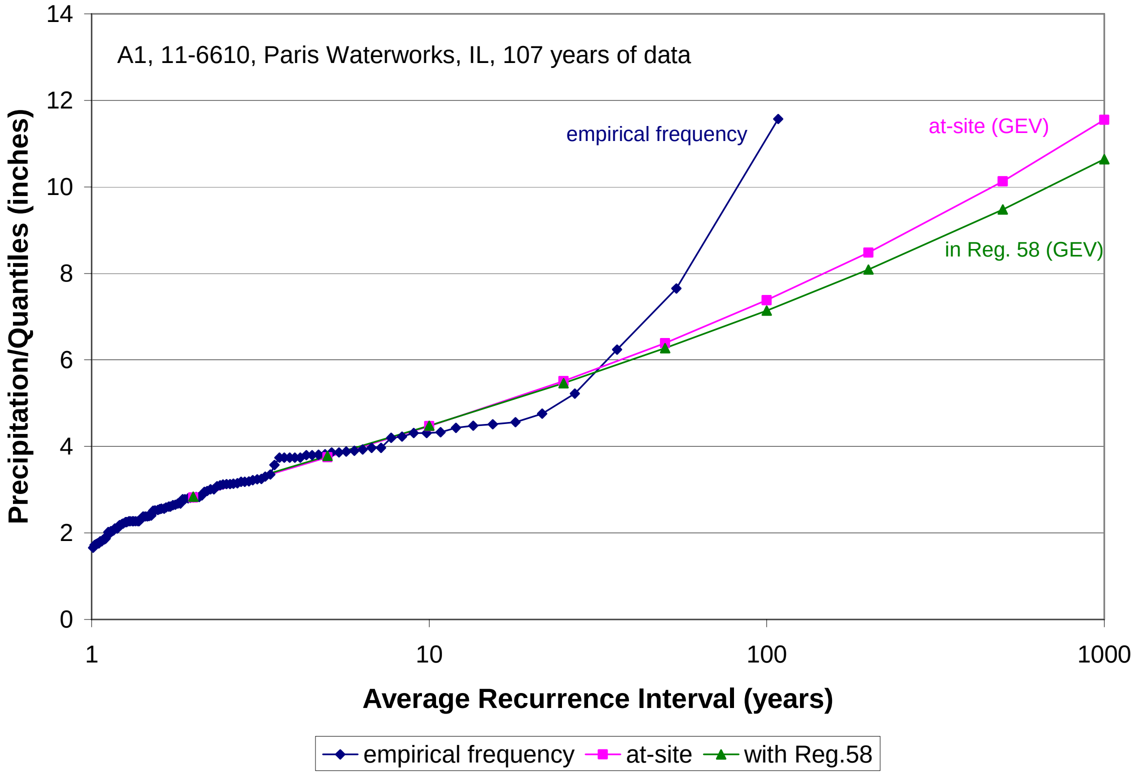


Figure 4.4.3. Empirical frequency plot of Paris Waterworks, IL comparing at-site and regional analyses.

In NOAA Atlas 14 Volume 1, some at-site stations accounted for localized 24-hour or longer duration extreme precipitation regimes and their precipitation frequency estimates sometimes did not relate well to the spatially interpolated hourly precipitation frequency estimates. In those cases, it was necessary to make the precipitation frequency estimates temporally consistent by adding hourly pseudo data (Section 4.8.3). However, in NOAA Atlas Volume 2, no such inconsistencies were observed and so no hourly pseudo data were added for at-site stations.

4.5. Choice of frequency distribution

It was assumed that the stations within a region shared the same shape but not scale of their precipitation frequency distribution curves. It was not assumed that these factors or the distribution itself were common from region to region. In other words, a probability distribution was selected and its parameters were calculated for each region separately. Later during the sensitivity testing stage of the process, the selected distributions and their parameters were examined to ensure that they varied reasonably across the project domain. The goal was to select the distribution that best described the underlying precipitation frequencies. This goal was not necessarily achieved by a best fit to the sample data. Since a three-parameter distribution, which behaves both relatively reliably and flexibly, is more often selected to represent the underlying population, candidate theoretical distributions included: Generalized Logistic (GLO), Generalized Extreme Value (GEV), Generalized Normal (GNO), Generalized Pareto (GPA), and Pearson Type III (PE3). The five-parameter Wakeby distribution would have been considered only if the three-parameter distributions were found unsuitable for a region, but this did not happen. Three goodness-of-fit measures were used in this project to select the most appropriate distribution for the region. These were the Monte Carlo Simulation test, real-data-check test, and RMSE of the sample L-moments.

The Monte Carlo Simulation test. 1,000 synthetic data sets with the same record length and sample L-moments at each station in a region were generated using Monte Carlo simulation. Tests showed that 1,000 simulations were sufficient since means converged. Regional means of L-skewness and L-kurtosis were calculated for each simulation weighted by station data length. The regional means of all simulations were then calculated and plotted in an L-skewness versus L-kurtosis diagram and considered against candidate theoretical distributions (Figure 4.5.1). Assuming the distribution has L-skewness equal to the regional average L-skewness, the goodness-of-fit was then judged by the deviation from the simulated mean point to the theoretical distributions in the L-skewness dimension. To account for sampling variability, the deviation was standardized, (denoted as GZ) by assuming a Standardized Normal distribution Z. For the 90% confidence level, a distribution was acceptable if | GZ | ≤ 1.64. Among accepted distributions, the distribution with the smallest GZ was identified as the most appropriate distribution (Hosking, 1991).

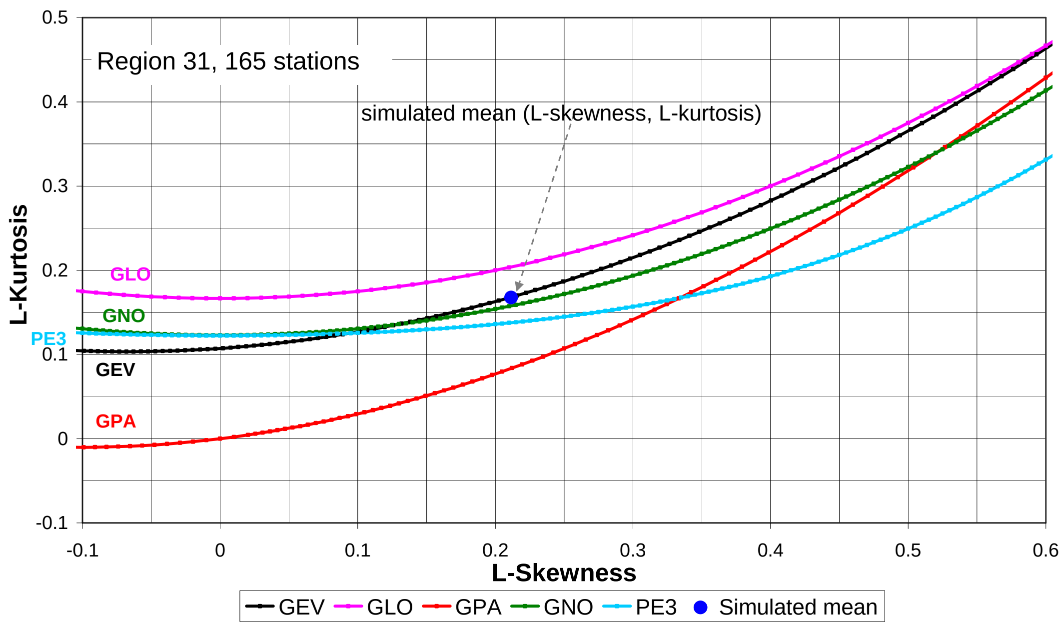


Figure 4.5.1. Plot of mean point from Monte Carlo simulations and theoretical distributions in L-skewness versus L-kurtosis diagram.

Real-data-check test. Similar to the practical application of a real-data-check in the construction of homogeneous regions, the real-data-check as a goodness-of-fit measure compared each theoretical distribution with empirical frequencies of the real (observed) data series at all stations in a region for recurrence intervals from 2-year to 100-year (Lin and Vogel, 1993). The relative error (or relative bias) of each distribution was calculated by comparing the quantiles that resulted from each fitted distribution to the empirical frequencies at each station. These were then averaged over all quantiles and stations in the region. This provided an indication of the degree of consistency between the empirical frequencies and the theoretical probabilities for the region. A smaller relative error indicated a better fit for that distribution. Although, relative error for a single station, or a few stations, is less meaningful in terms of goodness-of-fit due to sampling error, a relative error that is calculated over a number of stations to get a regional average is of statistical significance and was used as an index for the most appropriate distribution. For the ease of ranking distributions based on this test, the relative error was converted to an index in which the higher index indicated a smaller error.

RMSE of the sample L-moments. Unlike the Monte Carlo simulation test that emphasizes the effect of a simulated regional mean, the L-skewness and L-kurtosis of the real data were used in this test to assess the distribution. The deviation from the sample point (L- skewness, L- kurtosis) at each station against a given theoretical distribution in L- kurtosis scale was calculated. Then, the root-mean-square-error (RMSE) over the total set of deviations at all stations was obtained. The computation of the RMSE was done for each of the candidate distributions. The distribution with the smallest RMSE was identified as the most appropriate distribution based on this test.

Selecting the most appropriate distribution. A final decision of the most appropriate distribution for a region was primarily based upon a summary of the three tests. The goodness-of-fit tests were done on a region-by-region basis. Table 4.5.1 shows the results of the three tests for the 24-hour data in each of the 84 daily regions and 2 at-sites. Table 4.5.2 shows the results for the 60-minute data in each of the 26 hourly regions. The results from the three tests provide a strong statistical basis for selecting the most appropriate distribution. However, the goodness-of-fit results were then weighed against climatologic and geographic consistency considerations. To reduce bull's eyes and/or gradients in precipitation frequency estimates between regions, the distribution identified by the three methods was sometimes changed during a review of results on a macro-scale. An effort was also made to maintain consistency of selected distribution from region to region. The use of an alternate distribution was supported with sensitivity testing to ensure that results using the selected distribution were acceptable (i.e., changes in 100-year quantiles were less than 5%). For example, in daily region 32, GEV was not ranked first statistically, but using the statistically best-fitting distribution, GNO, would have created a climatologically unreasonable low bull's eye in the estimates amidst other regions where GEV was the statistically best-fitting distribution. Sensitivity tests showed that the 100-year 24-hour estimates in region 32 increased by only 0.9% when using GEV rather than GNO. Therefore, GEV was selected for this region.

Based on the goodness-of-fit results, climatological considerations and sensitivity testing for all regions in the project area, GEV was selected to best represent the underlying distributions of the annual maximum data for 68 daily regions, GNO for 10 daily regions and GLO for 8 daily regions. GEV was selected to best represent the annual maximum data for all 26 hourly regions. GEV was also selected for the 5-, 10-, 15- and 30-minute annual maximum data that were used in the calculation of the n-minute ratios.

Table 4.5.1. Goodness-of-fit test results for 24-hour annual maximum series data in each daily region calculated for NOAA Atlas 14 Volume 2.

region	rank	Monte Carlo Simulation		Real-data-check test		RMSE test		selected
		distribution	test value	distribution	test value	distribution	RMSE	
1	1st	GEV	1.00	GNO	22.0	GEV	0.07471	GEV
	2nd	GNO	-1.73	PE3	19.0	GNO	0.07485	

region	rank	Monte Carlo Simulation		Real-data-check test		RMSE test		selected
		distribution	test value	distribution	test value	distribution	RMSE	
	3rd	GLO	4.80	GEV	14.5	GLO	0.08711	
2	1st	GEV	-0.40	GLO	20.0	GEV	0.09562	GEV
	2nd	GNO	-1.97	GEV	20.0	GNO	0.09791	
	3rd	GLO	2.37	GNO	18.0	GLO	0.10342	
3	1st	GEV	0.01	GNO	19.0	GEV	0.09208	GEV
	2nd	GNO	-1.63	GEV	18.5	GNO	0.09370	
	3rd	GLO	2.06	GLO	16.5	GLO	0.09767	
4	1st	GNO	-0.78	GEV	20.5	GNO	0.08748	GNO
	2nd	GEV	0.99	GNO	19.5	GEV	0.08805	
	3rd	PE3	-3.93	PE3	15.0	PE3	0.09396	
5	1st	GEV	-0.61	GEV	21.5	GEV	0.13464	GEV
	2nd	GLO	1.08	GNO	17.5	GNO	0.13721	
	3rd	GNO	-2.04	GLO	17.0	GLO	0.13772	
6	1st	GEV	-1.26	GEV	19.5	GEV	0.08543	GEV
	2nd	GLO	1.26	GNO	18.5	GLO	0.08749	
	3rd	GNO	-2.90	GLO	17.0	GNO	0.08926	
7	1st	GEV	0.77	GNO	21.5	GNO	0.07135	GEV
	2nd	GNO	-1.31	PE3	18.5	GEV	0.07178	
	3rd	PE3	-5.08	GEV	18.5	PE3	0.08087	
8	1st	GNO	-1.16	GNO	20.0	GEV	0.08125	GEV
	2nd	GEV	1.40	PE3	19.0	GNO	0.08153	
	3rd	GLO	4.70	GEV	15.0	GLO	0.09252	
9	1st	GNO	-1.01	GNO	19.0	GNO	0.07288	GEV
	2nd	GEV	1.07	GEV	19.0	GEV	0.07390	
	3rd	PE3	-4.67	PE3	16.0	PE3	0.08327	
10	1st	PE3	-0.53	GNO	17.5	PE3	0.10407	GNO
	2nd	GNO	1.30	GLO	16.5	GNO	0.10531	
	3rd	GEV	2.17	GEV	16.5	GEV	0.10732	
11	1st	PE3	-0.93	PE3	18.0	PE3	0.08238	GNO
	2nd	GNO	2.30	GNO	17.0	GNO	0.08240	
	3rd	GEV	3.97	GLO	14.0	GEV	0.08431	
12	1st	GLO	0.75	GLO	19.0	GEV	0.13540	GLO
	2nd	GEV	-1.02	GEV	19.0	GLO	0.13783	
	3rd	GNO	-2.47	GNO	16.5	GNO	0.14084	
13	1st	GEV	0.51	GNO	20.5	GEV	0.09097	GEV
	2nd	GNO	-1.19	GEV	18.5	GNO	0.09126	
	3rd	GLO	4.18	PE3	16.5	PE3	0.09923	
14	1st	PE3	-0.54	GEV	22.0	GNO	0.09033	GNO
	2nd	GNO	0.55	GNO	19.0	PE3	0.09051	
	3rd	GEV	0.97	PE3	17.5	GEV	0.09191	
15	1st	GEV	0.01	GNO	19.0	GEV	0.09605	GEV

region	rank	Monte Carlo Simulation		Real-data-check test		RMSE test		selected
		distribution	test value	distribution	test value	distribution	RMSE	
	2nd	GNO	-1.21	GEV	19.0	GNO	0.09734	
	3rd	PE3	-3.54	GLO	16.0	PE3	0.10316	
16	1st	GLO	0.12	GLO	19.0	GEV	0.07306	GLO
	2nd	GEV	-3.19	GEV	19.0	GLO	0.07498	
	3rd	GNO	-4.86	GNO	17.5	GNO	0.08090	
17	1st	GEV	-1.84	GNO	20.5	GEV	0.05312	GEV
	2nd	GNO	-3.31	GEV	20.5	GNO	0.05547	
	3rd	GLO	4.70	PE3	18.0	GLO	0.06519	
18	1st	GEV	-0.12	GEV	23.0	GEV	0.07150	GLO
	2nd	GNO	-2.95	GNO	19.5	GNO	0.07510	
	3rd	GLO	4.82	GLO	13.0	GLO	0.08248	
19	1st	GNO	-0.40	PE3	24.0	GNO	0.08502	GEV
	2nd	GEV	1.43	GNO	19.0	GEV	0.08546	
	3rd	PE3	-3.75	GEV	15.0	PE3	0.09034	
20	1st	GLO	-0.57	GEV	20.5	GLO	0.10257	GEV
	2nd	GEV	-2.32	GLO	17.5	GEV	0.10292	
	3rd	GNO	-3.81	GNO	17.0	GNO	0.11054	
21	1st	GEV	0.59	GNO	20.5	GEV	0.07503	GEV
	2nd	GNO	-1.10	GEV	18.5	GNO	0.07699	
	3rd	PE3	-4.14	PE3	14.5	GLO	0.08738	
22	1st	GLO	-2.10	GLO	20.0	GLO	0.14635	GEV
	2nd	GEV	-3.08	GEV	19.0	GEV	0.15465	
	3rd	GNO	-3.73	GNO	15.0	GNO	0.16285	
23	1st	GEV	-0.30	GNO	17.5	GEV	0.09956	GEV
	2nd	GNO	-1.02	PE3	17.0	GNO	0.10027	
	3rd	PE3	-2.64	GEV	16.5	PE3	0.10476	
24	1st	GNO	-0.49	GNO	21.0	GNO	0.09382	GNO
	2nd	GEV	0.86	PE3	20.0	GEV	0.09464	
	3rd	PE3	-3.04	GEV	18.0	PE3	0.09751	
25	1st	GNO	0.02	GNO	20.5	GEV	0.16041	GEV
	2nd	GEV	1.07	PE3	16.5	GNO	0.16066	
	3rd	PE3	-1.85	GEV	15.5	PE3	0.16489	
26	1st	GNO	0.14	GNO	18.0	GNO	0.08453	GEV
	2nd	GEV	1.54	GEV	17.0	GEV	0.08517	
	3rd	PE3	-2.70	PE3	16.0	PE3	0.08793	
27	1st	GEV	-0.55	GLO	22.5	GEV	0.22113	GEV
	2nd	GLO	0.56	GEV	17.0	GLO	0.22239	
	3rd	GNO	-1.22	GNO	14.0	GNO	0.22349	
28	1st	PE3	2.26	PE3	21.0	PE3	0.06535	GNO
	2nd	GNO	4.29	GNO	19.5	GNO	0.06719	
	3rd	GEV	4.78	GEV	14.5	GEV	0.06723	

region	rank	Monte Carlo Simulation		Real-data-check test		RMSE test		selected
		distribution	test value	distribution	test value	distribution	RMSE	
29	1st	GLO	-0.26	GEV	23.0	GLO	0.23559	GEV
	2nd	GEV	-1.03	GNO	17.0	GEV	0.23566	
	3rd	GNO	-1.66	GLO	17.0	GNO	0.23804	
30	1st	GEV	-2.03	GEV	21.5	GEV	0.05998	GEV
	2nd	GNO	-4.41	GNO	19.5	GNO	0.06419	
	3rd	GLO	5.28	GLO	16.0	GLO	0.06828	
31	1st	GEV	-0.51	GNO	24.0	GEV	0.05761	GEV
	2nd	GNO	-2.72	GEV	19.0	GNO	0.05978	
	3rd	PE3	-7.14	PE3	17.0	PE3	0.06956	
32	1st	GEV	-0.48	GNO	17.5	GNO	0.07831	GEV
	2nd	GNO	-1.37	GEV	17.5	GEV	0.07857	
	3rd	PE3	-3.29	GLO	16.0	PE3	0.08212	
33	1st	GLO	-0.90	GLO	23.0	GLO	0.08423	GEV
	2nd	GEV	-2.93	GEV	18.5	GEV	0.09078	
	3rd	GNO	-3.89	GNO	15.5	GNO	0.09792	
34	1st	GNO	0.05	GNO	19.5	GNO	0.04663	GEV
	2nd	GEV	0.32	GEV	19.5	GEV	0.04764	
	3rd	PE3	-1.04	PE3	17.5	PE3	0.04881	
35	1st	GLO	0.36	PE3	22.0	GEV	0.16991	GEV
	2nd	GEV	-0.93	GPA	18.0	GNO	0.17112	
	3rd	GNO	-1.72	GNO	15.0	GLO	0.17205	
36	1st	GNO	0.32	PE3	20.0	GNO	0.06650	GEV
	2nd	GEV	1.86	GNO	18.0	GEV	0.06712	
	3rd	PE3	-3.06	GEV	15.0	PE3	0.06861	
37	1st	GNO	0.47	PE3	17.0	GNO	0.14620	GEV
	2nd	PE3	-1.04	GNO	16.0	PE3	0.14767	
	3rd	GEV	1.32	GEV	15.0	GEV	0.14790	
38	1st	GNO	-0.46	GEV	20.0	GNO	0.07412	GEV
	2nd	GEV	1.30	GNO	18.0	GEV	0.07450	
	3rd	PE3	-3.79	PE3	16.0	PE3	0.07944	
39	1st	GNO	-0.53	PE3	20.5	GEV	0.07669	GEV
	2nd	GEV	0.78	GEV	19.5	GNO	0.07737	
	3rd	PE3	-3.16	GNO	19.0	PE3	0.08256	
40	1st	GEV	-1.36	GLO	23.0	GEV	0.07425	GEV
	2nd	GLO	1.83	GEV	21.0	GNO	0.07988	
	3rd	GNO	-3.37	GNO	15.0	GLO	0.08142	
41	1st	GEV	-0.17	GNO	18.0	GEV	0.10854	GEV
	2nd	GNO	-1.27	GEV	17.0	GNO	0.10904	
	3rd	GLO	2.61	GLO	16.0	PE3	0.11448	
42	1st	GLO	-0.78	GLO	20.0	GLO	0.18901	GEV
	2nd	GEV	-1.89	GEV	18.5	GEV	0.18976	

region	rank	Monte Carlo Simulation		Real-data-check test		RMSE test		selected
		distribution	test value	distribution	test value	distribution	RMSE	
	3rd	GNO	-2.62	GNO	15.5	GNO	0.19462	
43	1st	GEV	0.66	GNO	21.5	GEV	0.07800	GEV
	2nd	GNO	-0.82	GEV	21.5	GNO	0.07898	
	3rd	PE3	-3.62	PE3	16.0	PE3	0.08670	
44	1st	GLO	-0.15	GLO	19.0	GLO	0.23328	GEV
	2nd	GEV	-1.13	GEV	19.0	GEV	0.23595	
	3rd	GNO	-1.66	GNO	16.0	GNO	0.23909	
45	1st	GNO	-0.49	GEV	23.0	GEV	0.06538	GEV
	2nd	GEV	0.74	GNO	22.0	GNO	0.06594	
	3rd	PE3	-3.59	PE3	15.0	PE3	0.06999	
46	1st	GEV	-0.18	GEV	20.5	GEV	0.07849	GEV
	2nd	GNO	-2.01	GNO	19.5	GNO	0.07900	
	3rd	GLO	3.72	PE3	14.5	GLO	0.08546	
47	1st	GNO	-0.63	GEV	21.0	GEV	0.07586	GEV
	2nd	GEV	1.02	GNO	20.5	GNO	0.07610	
	3rd	PE3	-3.87	PE3	12.5	PE3	0.08129	
48	1st	GLO	0.39	GNO	19.0	GEV	0.16839	GEV
	2nd	GEV	-0.62	GPA	18.0	GLO	0.17062	
	3rd	GNO	-1.40	PE3	16.5	GNO	0.17141	
49	1st	GLO	-2.73	GLO	20.5	GLO	0.24135	GEV
	2nd	GEV	-3.42	GEV	20.0	GEV	0.24508	
	3rd	GNO	-4.15	GNO	15.5	GNO	0.25157	
50	1st	GLO	-0.55	GNO	20.0	GLO	0.22210	GEV
	2nd	GEV	-1.20	GEV	19.5	GEV	0.22318	
	3rd	GNO	-1.89	GLO	15.5	GNO	0.22713	
51	1st	GLO	0.86	GEV	19.0	GEV	0.14096	GEV
	2nd	GEV	-0.89	GNO	18.0	GNO	0.14352	
	3rd	GNO	-1.86	GLO	15.0	GLO	0.14543	
52	1st	GNO	-1.10	GNO	20.5	GEV	0.05963	GEV
	2nd	GEV	1.32	PE3	17.0	GNO	0.06050	
	3rd	PE3	-5.77	GEV	15.5	PE3	0.06785	
53	1st	GNO	-0.29	GNO	19.0	GEV	0.10278	GEV
	2nd	GEV	0.34	PE3	17.5	GNO	0.10343	
	3rd	PE3	-1.85	GEV	17.5	PE3	0.10561	
54	1st	GLO	-1.44	GNO	19.5	GLO	0.23579	GLO
	2nd	GEV	-2.22	GEV	19.5	GEV	0.23614	
	3rd	GNO	-3.00	GLO	14.0	GNO	0.23925	
55	1st	GEV	-1.03	GEV	19.5	GEV	0.10847	GEV
	2nd	GLO	1.62	GNO	18.5	GNO	0.10982	
	3rd	GNO	-2.31	GLO	15.0	GLO	0.11244	
56	1st	GLO	0.98	GLO	23.0	GEV	0.13358	GLO

region	rank	Monte Carlo Simulation		Real-data-check test		RMSE test		selected
		distribution	test value	distribution	test value	distribution	RMSE	
	2nd	GEV	-1.39	GEV	18.5	GLO	0.13614	
	3rd	GNO	-2.24	GNO	15.5	GNO	0.13763	
57	1st	GNO	-0.27	PE3	22.0	GEV	0.08989	GEV
	2nd	GEV	0.73	GNO	21.0	GNO	0.09163	
	3rd	PE3	-2.34	GEV	14.0	PE3	0.09728	
58	1st	GNO	-0.56	GNO	20.0	GEV	0.09951	GEV
	2nd	GEV	0.78	PE3	16.5	GNO	0.09974	
	3rd	PE3	-2.96	GEV	16.0	PE3	0.10650	
59	1st	GLO	0.22	GLO	19.0	GLO	0.16059	GEV
	2nd	GEV	-0.72	GNO	17.5	GEV	0.16152	
	3rd	GNO	-1.21	GEV	17.5	GNO	0.16420	
60	1st	GNO	-0.78	GEV	24.0	GEV	0.08111	GEV
	2nd	GEV	0.80	GNO	18.5	GNO	0.08188	
	3rd	PE3	-3.86	PE3	13.5	PE3	0.08802	
61	1st	GNO	0.07	PE3	18.5	GEV	0.09957	GEV
	2nd	GEV	1.35	GNO	17.0	GNO	0.10044	
	3rd	PE3	-2.28	GEV	15.5	PE3	0.10734	
62	1st	GEV	0.85	GNO	20.5	GNO	0.07725	GEV
	2nd	GNO	-1.29	GEV	20.0	GEV	0.07744	
	3rd	GLO	5.08	PE3	15.5	PE3	0.08573	
63	1st	GEV	-0.51	GNO	20.5	GEV	0.09179	GEV
	2nd	GNO	-1.40	GEV	20.5	GNO	0.09360	
	3rd	PE3	-3.32	PE3	19.0	GLO	0.09904	
64	1st	GEV	0.44	GNO	21.5	GEV	0.10451	GEV
	2nd	GNO	-0.59	GEV	16.5	GNO	0.10487	
	3rd	PE3	-2.48	PE3	16.0	PE3	0.11105	
65	1st	GEV	0.13	PE3	18.5	GEV	0.11141	GEV
	2nd	GNO	-1.31	GNO	16.5	GNO	0.11202	
	3rd	GLO	2.96	GPA	14.5	GLO	0.11844	
66	1st	GEV	0.44	GLO	18.0	GEV	0.08625	GEV
	2nd	GNO	-0.69	GEV	17.0	GNO	0.08652	
	3rd	GLO	2.66	PE3	15.0	GLO	0.09527	
67	1st	PE3	-1.43	PE3	22.0	GNO	0.05075	GNO
	2nd	GNO	2.53	GNO	17.0	PE3	0.05082	
	3rd	GEV	4.42	GPA	15.0	GEV	0.05284	
68	1st	PE3	-0.25	GEV	17.0	GPA	0.31039	GNO
	2nd	GNO	0.69	GLO	16.0	PE3	0.31103	
	3rd	GPA	-1.12	PE3	15.0	GNO	0.31133	
69	1st	GLO	0.68	GLO	21.5	GEV	0.09434	GLO
	2nd	GEV	-2.01	GEV	20.5	GLO	0.09606	
	3rd	GNO	-3.65	GNO	17.0	GNO	0.09918	

region	rank	Monte Carlo Simulation		Real-data-check test		RMSE test		selected
		distribution	test value	distribution	test value	distribution	RMSE	
70	1st	GNO	0.01	GEV	20.0	GEV	0.07134	GEV
	2nd	GEV	0.57	GNO	19.0	GNO	0.07312	
	3rd	PE3	-1.86	PE3	16.5	PE3	0.07650	
71	1st	GLO	0.39	GLO	23.0	GLO	0.12058	GLO
	2nd	GEV	-1.54	GEV	19.5	GEV	0.12085	
	3rd	GNO	-2.56	GNO	15.5	GNO	0.12506	
72	1st	GNO	-0.31	GNO	20.0	GEV	0.11994	GEV
	2nd	GEV	0.63	GEV	18.0	GNO	0.12032	
	3rd	PE3	-2.14	PE3	17.5	PE3	0.12394	
73	1st	GLO	0.80	GEV	22.5	GEV	0.12589	GEV
	2nd	GEV	-0.89	GLO	17.0	GLO	0.12802	
	3rd	GNO	-1.99	GNO	16.5	GNO	0.13051	
74	1st	PE3	1.97	GNO	19.0	PE3	0.06346	GNO
	2nd	GNO	4.51	PE3	18.5	GEV	0.06427	
	3rd	GEV	5.16	GLO	16.5	GNO	0.06443	
75	1st	GEV	-0.59	GNO	21.0	GEV	0.08360	GEV
	2nd	GNO	-1.94	GEV	20.0	GNO	0.08465	
	3rd	GLO	3.00	PE3	15.0	GLO	0.09081	
76	1st	GNO	0.62	PE3	17.5	GEV	0.08113	GEV
	2nd	PE3	-1.29	GNO	17.5	GNO	0.08142	
	3rd	GEV	1.34	GEV	16.0	PE3	0.08249	
77	1st	GEV	0.20	GEV	23.0	GNO	0.08124	GEV
	2nd	GNO	-1.27	GNO	21.5	GEV	0.08135	
	3rd	PE3	-4.10	PE3	15.5	PE3	0.08647	
78	1st	PE3	0.16	PE3	18.5	GNO	0.16216	GNO
	2nd	GNO	0.84	GPA	17.0	GEV	0.16218	
	3rd	GEV	1.02	GNO	17.0	PE3	0.16250	
79	1st	GEV	0.11	GNO	18.0	GEV	0.13537	GEV
	2nd	GNO	-0.91	PE3	16.0	GNO	0.13587	
	3rd	GLO	2.18	GEV	16.0	GLO	0.14048	
80	1st	GNO	0.02	GNO	19.5	GNO	0.18986	GEV
	2nd	GEV	0.68	PE3	18.5	GEV	0.19050	
	3rd	PE3	-1.19	GEV	16.5	PE3	0.19110	
81	1st	GEV	-0.80	GEV	22.0	GLO	0.11484	GEV
	2nd	GNO	-1.45	GLO	19.0	GNO	0.11496	
	3rd	GLO	2.31	GNO	17.5	GEV	0.11624	
82	1st	GLO	0.34	GEV	21.5	GLO	0.13648	GLO
	2nd	GEV	-1.49	GLO	18.0	GEV	0.13713	
	3rd	GNO	-2.39	GNO	16.0	GNO	0.14071	
83	1st	GNO	-0.10	GNO	20.5	GNO	0.12864	GEV
	2nd	GEV	1.07	PE3	19.5	GEV	0.12966	

region	rank	Monte Carlo Simulation		Real-data-check test		RMSE test		selected
		distribution	test value	distribution	test value	distribution	RMSE	
	3rd	PE3	-2.19	GEV	15.5	PE3	0.13284	
84	1st	GEV	-1.33	GEV	22.5	GEV	0.08777	GEV
	2nd	GLO	2.61	GNO	18.5	GNO	0.09187	
	3rd	GNO	-3.06	PE3	13.5	GLO	0.09343	
A1	1st	GEV	-0.09	GEV	21.5	GEV	0.30580	GEV
	2nd	GNO	-0.56	GNO	17.5	GNO	0.30609	
	3rd	GLO	0.64	GLO	15.5	GLO	0.30759	
A2	1st	GLO	-0.15	GEV	17.5	GLO	0.58489	GEV
	2nd	GEV	-0.43	GNO	15.5	GEV	0.58534	
	3rd	GNO	-0.76	GLO	15.0	GNO	0.58701	

Table 4.5.2. Goodness-of-fit test results for 60-minute annual maximum series data in each hourly region calculated for NOAA Atlas 14 Volume 2.

region	rank	Monte Carlo Simulation		Real-data-check test		RMSE test		selected
		distribution	test value	distribution	test value	distribution	RMSE	
1	1st	GEV	-0.90	GNO	19.5	GEV	0.09885	GEV
	2nd	GNO	-1.20	GEV	18.5	GNO	0.10014	
	3rd	GLO	2.31	GLO	17.0	GLO	0.10407	
2	1st	GEV	-0.34	GEV	24.0	GNO	0.07704	GEV
	2nd	GNO	-1.25	GNO	19.0	GEV	0.07808	
	3rd	PE3	-3.25	GLO	14.5	PE3	0.08044	
3	1st	GNO	0.02	GNO	19.5	GEV	0.08602	GEV
	2nd	GEV	0.61	PE3	19.0	GNO	0.08609	
	3rd	PE3	-1.60	GEV	18.5	PE3	0.08808	
4	1st	GNO	-0.01	GLO	19.0	GEV	0.05935	GEV
	2nd	GEV	-0.09	GNO	18.0	GNO	0.06440	
	3rd	PE3	-0.42	PE3	16.5	PE3	0.07059	
5	1st	GEV	0.44	PE3	21.0	GNO	0.11237	GEV
	2nd	GNO	-0.54	GNO	18.5	GEV	0.11447	
	3rd	PE3	-2.31	GPA	15.0	PE3	0.11488	
6	1st	GNO	-0.23	GNO	19.0	GNO	0.06398	GEV
	2nd	GEV	-0.33	GLO	18.5	GEV	0.06426	
	3rd	PE3	-0.88	GEV	18.0	PE3	0.06458	
7	1st	GEV	-1.13	GNO	20.0	GEV	0.08564	GEV
	2nd	GNO	-2.26	GEV	18.0	GNO	0.08607	
	3rd	GLO	3.25	PE3	15.0	PE3	0.09207	
8	1st	GNO	0.46	PE3	23.5	PE3	0.11363	GEV
	2nd	PE3	-0.80	GNO	18.5	GNO	0.11498	
	3rd	GEV	1.06	GEV	18.0	GEV	0.11736	

region	rank	Monte Carlo Simulation		Real-data-check test		RMSE test		selected
		distribution	test value	distribution	test value	distribution	RMSE	
9	1st	GEV	-0.10	GNO	22.0	GEV	0.19376	GEV
	2nd	GNO	-0.70	GEV	19.5	GNO	0.19392	
	3rd	GLO	1.22	PE3	14.5	PE3	0.19817	
10	1st	PE3	0.36	PE3	20.0	PE3	0.07960	GEV
	2nd	GNO	1.48	GNO	17.5	GNO	0.07970	
	3rd	GEV	1.91	GEV	16.5	GEV	0.07983	
11	1st	GNO	0.22	GEV	19.5	GNO	0.13899	GEV
	2nd	GEV	0.55	GNO	18.0	GEV	0.13959	
	3rd	PE3	-0.62	PE3	16.0	PE3	0.14067	
12	1st	GNO	0.11	PE3	22.0	GEV	0.06192	GEV
	2nd	GEV	1.23	GNO	19.5	GNO	0.06248	
	3rd	PE3	-2.66	GEV	15.5	PE3	0.06570	
13	1st	GEV	-0.88	GEV	22.0	GEV	0.09717	GEV
	2nd	GNO	-1.50	GNO	18.0	GNO	0.09939	
	3rd	GLO	2.58	PE3	17.0	GLO	0.10298	
14	1st	GEV	-0.32	GNO	21.5	GEV	0.08545	GEV
	2nd	GNO	-1.71	GEV	21.5	GNO	0.08554	
	3rd	GLO	3.27	PE3	15.5	PE3	0.09244	
15	1st	GEV	-0.38	GLO	19.5	GEV	0.10042	GEV
	2nd	GNO	-0.66	GNO	17.0	GNO	0.10092	
	3rd	PE3	-1.45	GEV	16.0	PE3	0.10327	
16	1st	GEV	0.36	GEV	21.5	GEV	0.06650	GEV
	2nd	GNO	-0.58	GNO	21.0	GNO	0.06817	
	3rd	PE3	-2.65	PE3	17.5	PE3	0.07463	
17	1st	GNO	0.08	GLO	18.5	GNO	0.13568	GEV
	2nd	GEV	0.82	GNO	18.0	GEV	0.13578	
	3rd	PE3	-1.39	GEV	17.0	PE3	0.13817	
18	1st	GEV	-0.23	GEV	24.0	GEV	0.06518	GEV
	2nd	GNO	-1.18	GNO	21.0	GNO	0.06614	
	3rd	PE3	-3.51	PE3	15.0	PE3	0.07152	
19	1st	GNO	-0.05	GNO	20.5	GEV	0.10916	GEV
	2nd	GEV	0.41	GEV	19.5	GNO	0.11098	
	3rd	PE3	-1.23	GLO	16.5	PE3	0.11447	
20	1st	PE3	0.09	GNO	17.0	PE3	0.12946	GEV
	2nd	GNO	0.72	GEV	17.0	GNO	0.12960	
	3rd	GEV	0.74	GLO	16.5	GEV	0.12962	
21	1st	GLO	0.47	GEV	20.0	GEV	0.11836	GEV
	2nd	GEV	-1.73	GNO	18.0	GLO	0.11968	
	3rd	GNO	-2.39	PE3	16.0	GNO	0.12126	
22	1st	GEV	-0.66	PE3	19.0	GNO	0.08089	GEV
	2nd	GNO	-1.43	GNO	17.5	GEV	0.08094	

region	rank	Monte Carlo Simulation		Real-data-check test		RMSE test		selected
		distribution	test value	distribution	test value	distribution	RMSE	
	3rd	PE3	-3.38	GEV	17.5	PE3	0.08565	
23	1st	GEV	-0.78	GNO	20.0	GNO	0.07450	GEV
	2nd	GNO	-1.31	GEV	20.0	GEV	0.07504	
	3rd	PE3	-2.93	PE3	14.5	PE3	0.07730	
24	1st	GNO	-0.09	PE3	19.5	GNO	0.18539	GEV
	2nd	GEV	0.54	GNO	19.0	GEV	0.18579	
	3rd	PE3	-1.23	GPA	14.5	PE3	0.18832	
25	1st	GLO	0.63	GNO	17.5	GEV	0.17915	GEV
	2nd	GEV	-0.93	GEV	17.5	GNO	0.18150	
	3rd	GNO	-1.11	PE3	16.0	GLO	0.18434	
26	1st	GNO	0.42	PE3	20.5	GNO	0.11493	GEV
	2nd	PE3	-0.67	GNO	16.5	GEV	0.11508	
	3rd	GEV	0.87	GEV	15.5	PE3	0.11723	

4.6. Estimation of quantiles

4.6.1. Regional growth factors

In the index-flood based regional analysis approach, the regional growth factors (RGFs) are defined as the quantiles of a regional dimensionless distribution. Regional growth factors are obtained by fitting the selected dimensionless distribution function with the weighted average L-moment ratios (or parameters) for a region that were computed using data re-scaled by the mean of the annual maximum series (Hosking and Wallis, 1997). Because the parameters are constant for each region, there is a single RGF for each region that varies only with frequency and duration. A table of RGFs for all durations for each region is provided in Appendix A.9. The RGFs are then multiplied by the site-specific scaling factor to produce the quantiles at each frequency and duration for each site. The site-specific scaling factor used in this project was the mean of the annual maximum series at each site. This scaling factor is often referred to as the “Index Flood” because the genesis of the statistical approach was in flood frequency analysis.

In this project, the scaling factors for each duration were first spatially interpolated to fine scale grids (Section 4.8.1) to take advantage of the RGFs at each frequency and obtain grids of the quantiles. A unique spatial interpolation procedure (Section 4.8.2) was developed to maintain differences between regions but generate spatially smooth quantiles across regional boundaries.

4.6.2. 1-year computation

The 1-year average recurrence interval (ARI) precipitation frequency estimates were computed for this project. ARI is the average period between exceedances (at a particular location and duration) and is associated with the partial duration series (PDS). Annual exceedance probability (AEP) is the probability that a particular level of rainfall will be exceeded in any particular year (at a particular location and duration) and is derived using the annual maximum series (AMS). An AEP depth or intensity may be exceeded once or more than once in a year. (Section 3.2 provides additional discussion on this topic.)

A 1-year AEP estimate, associated with AMS, has little meaning statistically or physically. However, the 1-year ARI, associated with PDS does have meaning and is used in several practical applications. The equation $T_{PDS} = [\ln(\frac{T_{AMS}}{T_{AMS}-1})]^{-1}$ (Chow et al., 1988), which is distribution free, provided a mathematical base for converting between frequencies for the AMS data and the PDS data. Here, T_{AMS} and T_{PDS} stand for the frequency associated with the AMS data and the frequency associated with the PDS data, respectively. The equation can be transformed into the following:

$$T_{AMS} = \frac{1}{1 - e^{-\frac{1}{T_{PDS}}}}$$

Therefore, T_{AMS} = 1.58-year when T_{PDS} = 1-year from the equation. This means that a PDS 1-year event is equivalent to an AMS 1.58-year event. This relationship was used to calculate the 1-year ARI from AMS data for this project. Appendix A.9 provides the regional growth factors computed for the 1.58-year AMS results. However, for all ARIs other than 1-year, the results were obtained by analyzing both AMS and PDS data separately, averaging ratios of PDS to AMS quantiles and then applying the average ratio to the AMS results (Section 4.6.4).

4.6.3. Practical consistency adjustments

In reality, data do not always behave ideally. Nor are datasets always collected perfectly through time or in dense spatial networks. Since quantiles for each duration and station in this project were computed independently, the practical adjustments described below were applied to produce realistic final results that are consistent in duration, frequency and space.

Annual maximum consistency adjustment. At some daily stations, there were inconsistencies in the annual maximum time series from one duration to the next. Specifically, a shorter duration observation in a given year may have sometimes been greater than the subsequent longer duration. Often this occurred because there were a significant number of missing data surrounding that particular case. A longer duration for the case could not be accumulated if the data immediately adjacent the relevant observations were not available. It also occurred in some cases when the average conversion factors that account for different sampling intervals were applied (e.g., 1-day data to 24-hour data; Section 4.1.2). If left unadjusted, these inconsistencies could result in a negative bias of longer duration precipitation frequency estimates relative to reality. Therefore, large inconsistencies in the annual maxima of a given year from one duration to the next were investigated and data added or corrected where possible. If missing data could not be found and/or the difference between the 2 durations was small (<10%), then the longer duration was set equal to the shorter duration. This adjustment ensured consistency from one duration to the next longer duration for each given year at a station.

Co-located hourly and daily station adjustment. Since hourly and daily durations were computed separately and from different data sets, it was necessary to ensure consistency of precipitation frequency estimates through the durations at co-located daily and hourly stations. At co-located daily and hourly stations the 24-hour estimates from the daily data were retained since they were based on more stations, generally had longer record lengths, and were less prone to under-catch precipitation. The quantiles of co-located stations were adjusted for consistency particularly across the 12-hour and 24-hour durations where disparities could occur. There are a number of possible reasons for such disparities, such as gage differences or different recording periods. The adjustment preserved the daily 24-hour quantiles and the hourly distribution for the 120-minute (2-hour) through 12-hour quantiles at the given hourly station. The 24-hour through 2-hour quantiles for co-located hourly stations were adjusted using *station-specific* ratios of the station daily and hourly 24-hour means and ratios of the daily and hourly 24-hour regional growth factors (RGFs) at all frequencies (1.58-yr, 2-yr, 5-yr, …, 1,000-yr).

The Ohio River basin and surrounding states project area required additional consideration of the adjustment to the 60-minute quantile to accommodate an increasing number of different hourly and daily regions, relatively close spatial proximity of most stations, the average 1-hour to 60-minute conversion factor, and application of n-minute ratios. A process was developed to ultimately avoid discontinuities at the 60-minute quantile relative to adjusted 2-hour through 24-hour quantiles and n-minute quantiles and reduce spatial bull's eyes in the final maps.

In some cases, the station-specific ratios of daily region versus hourly region RGFs at co-located stations were less than 1.0. This was not common but did occur. When the daily 100-year 24-hour RGF/hourly 100-year 24-hour RGF, which was used as an index, was *less* than 1.0, the station-specific adjustment ratios were applied from 24-hour through 60-minute to maintain consistency over all hourly durations and avoid over-adjusting. However, when the station-specific 100-year 24-hour RGF ratio was *greater* than 1.0, the 60-minute quantile was adjusted using regionally averaged RGF and 24-hour mean ratios calculated from all co-located stations in the hourly region to achieve a more spatially consistent result.

The final result using the station-specific adjustment of the 60-minute quantile may not be as spatially smooth as the regionally averaged adjustment. However, the station-specific adjustment is more representative of the station data and mitigates the risk of over-adjusting.

In addition, the co-located adjustment was modified slightly for lessons learned in Volume 3 to accommodate unique cases. The unique data characteristics at a few stations coupled with the different daily and hourly regional characteristics created discontinuities relative to nearby stations. At these few stations, the daily to hourly RGF ratios at each frequency were unusually low. The data of two or more hourly durations at the stations shared the same annual maximum or had a very close values which created a very flat slope for quantiles from 5-year through 1,000-year. To ensure the consistency of precipitation frequency estimates in such a case, the regional RGF ratio and station-specific mean ratio were used to adjust the 60-minute duration at a station when the following criteria were met: (1) the station-specific daily/hourly 100-year RGF ratio was less than 1.0, and (2) the difference (range) of the 100-year RGF ratios of all hourly stations in the hourly region was greater than 0.2, and (3) the range divided by the lowest 100-year RGF ratio was equal to or greater than 0.4. These criteria were empirically determined and tested in Volume 3. The adjustment results in precipitation frequency estimates at such a co-located station that are more reasonable and consistent throughout the durations (60-minute through 24-hour) and with respect to other stations in that hourly region.

Hourly-only station consistency adjustment. To ensure that hourly-only stations were consistent with nearby co-located hourly/daily stations that occur in different regions and reduce spatial bull's eyes observed in hourly results, an adjustment was applied to hourly-only stations of the Ohio River basin and surrounding states project area. Specifically, the 48-hour through 60-minute quantiles for hourly-only stations were adjusted using a regionally averaged ratio of the daily and hourly 24-hour means and a set of regionally averaged RGF ratios at all frequencies (1.58-yr, 2-yr, 5-yr, …, 1,000-yr) calculated from all co-located stations within the hourly region.

Internal consistency adjustment. Since the quantiles of each duration at a given station were calculated separately, inconsistencies could occur where a shorter duration had a quantile that was higher than the next longer duration at a given average recurrence interval. For example, it could happen that a 100-year 2-hour quantile was greater than a 100-year 3-hour quantile at a station. This result, although based on sound statistical analysis, is physically unreasonable. Such results primarily occurred where durations had similar mean annual maxima but the shorter duration had higher regional parameters, such as coefficient of L-variation and L-skewness that produced a quantile higher than the longer duration quantile. The underlying causes of such an anomaly were primarily discontinuities in selection and parameterization of distribution functions between durations, data sampling variability, and the application of average conversion factors to convert 1-hour data to 60-minute and to convert 1-day data to 24-hour.

Such inconsistencies were identified when the ratio of the longer duration to the next shorter duration quantiles was less than 1.0 for a given average recurrence interval. If the inconsistency occurred in the higher frequencies, it was mitigated by distributing the surplus of the ratio, which was greater than 1.0, of the previous frequency for those durations at a constant slope to the ratios of the inconsistent frequency and higher through 1,000-year, until it converged at 1.0 after 1,000-year (Table 4.6.1). If the inconsistency occurred in the lower frequencies, it was mitigated by distributing the surplus of the ratio, which was greater than 1.0, of the following frequency for those durations at a constant slope to the ratios of the inconsistent frequency and lower through 1.58-year, until it converged at 1.0 before 1.58-year. The adjusted ratios were then, appropriately, greater than or equal to 1.0. Table 4.6.1 shows an example of the 3-hour to 2-hour ratios for average recurrence intervals from 2-year to 1,000-year at a station before and after the internal consistency adjustment. Figure 4.6.1 shows the associated 3-hour quantiles before and after adjustment.

In most cases, applying the adjustment from 1.58-year through 1,000-year was sufficient. However, in some cases where the inconsistency occurred only for some frequencies, such as between 50-year and 500-year only, adjustments were still required from 1.58-year through 1,000-year to ensure consistency without changing the existing compliant quantiles.

Table 4.6.1. Example of the internal consistency adjustment of quantiles showing the ratios of 3-hour to 2-hour quantiles for 1.58-year to 1,000-year at station 15-3709, Hazard, Kentucky.

3-hour to 2-hour ratios	1.58-yr	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	200-yr	500-yr	1,000-yr
Before adjustment	1.025	1.022	1.017	1.009	1.004	0.997	0.994	0.990	0.983	0.979
After adjustment	1.025	1.022	1.017	1.009	1.004	1.003	1.003	1.002	1.002	1.001

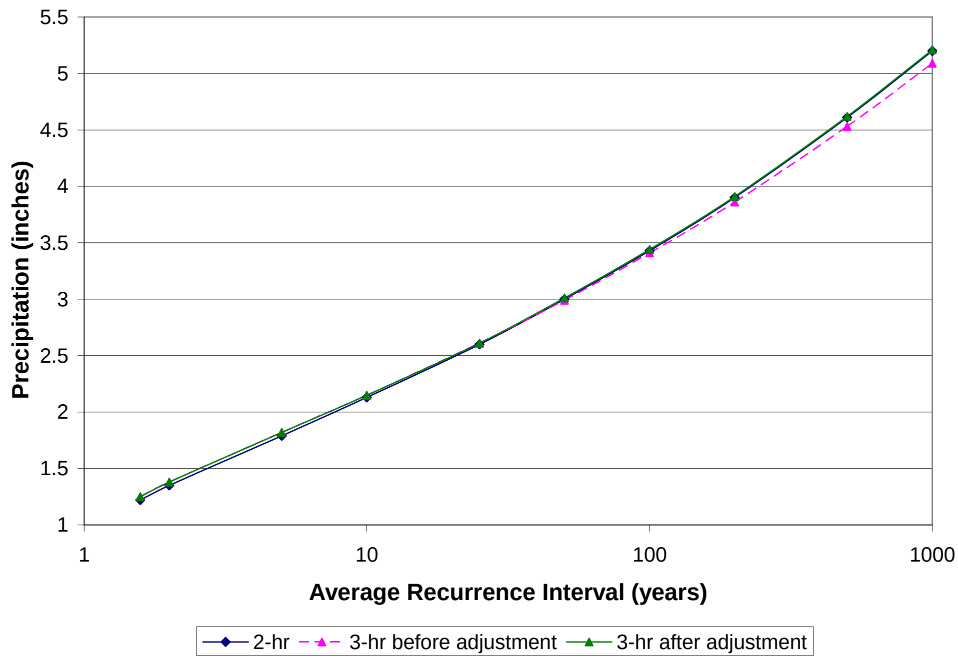


Figure 4.6.1. Example of internal consistency adjustment between the 3-hour and 2-hour quantiles at station 15-3709, Hazard, Kentucky.

4.6.4. Conversion factors for AMS to PDS

Annual maximum series (AMS) data consist of the largest case in each year, regardless of whether the second largest case in a year exceeds the largest cases of other years. In this project, the partial duration series (PDS) data is a subset of the complete data series where highest N cases are selected and N equals the number of years in the record. Such a series is also called an annual exceedance series (AES) (Chow et al., 1988). In this Atlas, the use of PDS refers to AES.

AMS data were used for all durations from 5-minute to 60-day and for annual exceedance probabilities of 1 in 2 to 1 in 1,000. The use of the AMS data is consistent with the concept of frequency analysis and the manipulation of annual probabilities of exceedance, and is consistent with the basis of development of the statistics used in this project. The statistical approach is less well demonstrated for PDS data. However, to remain consistent with the previous studies (e.g., NOAA Atlas 2) and to meet today's needs at lower return periods, NOAA Atlas 14 is also presented in terms of PDS results. The differences in meaning between AMS-based results and PDS-based results are discussed in Section 3.2.

PDS results were obtained by analyzing both AMS and PDS data separately, averaging ratios of PDS to AMS quantiles and then applying the average ratio to the AMS results. The PDS-AMS ratios were developed by independently fitting distributions to AMS and PDS data separately for each region before averaging. Figure 4.6.2 shows the average results of the PDS-AMS ratios for 24-hour data over the 84 homogenous regions in the project area. To account for sampling variability and to generate a smooth consistent curve, an asymptote of 1.004 was applied for 50-year and above.

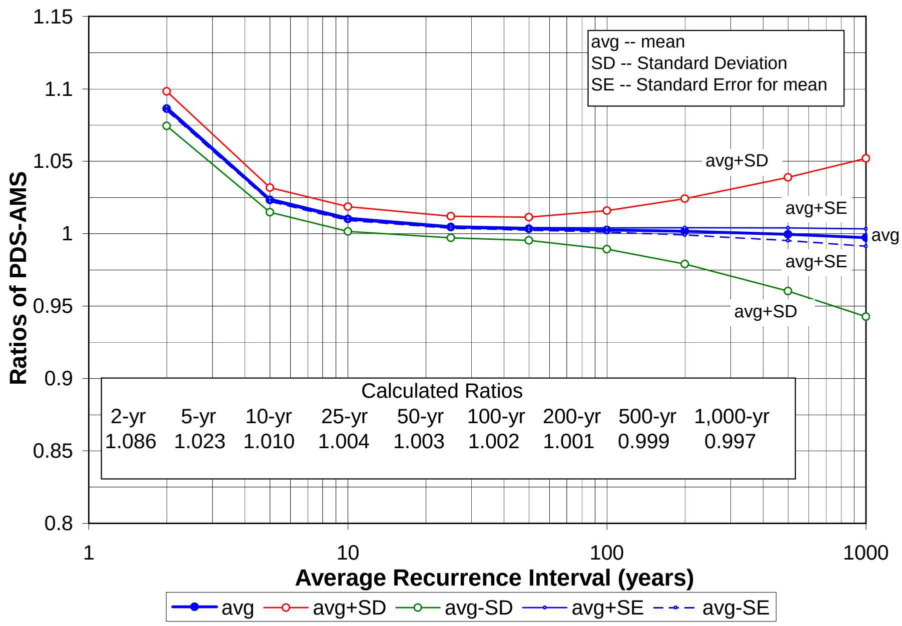


Figure 4.6.2. PDS-AMS ratio results for average recurrence intervals for the 24-hour duration over the 84 homogeneous regions used to prepare NOAA Atlas 14 Volume 2.

The ratios for this Atlas (Table 4.6.2) are consistent with NOAA Atlas 2 and theoretical computations. For example, Chow (1988) proposed a mathematical relation in terms of recurrence interval (T) between PDS (or AES) and AMS:

$$T_{AES} = [\ln(\frac{T_{AMS}}{T_{AMS} - 1})]^{-1}$$

According to this relation, a 2-year AMS value is equivalent to a 1.44-year AES (or PDS) value. Figure 4.6.3 shows that results were consistent with this relation using daily region 36 as an example. The ratios are also consistent with results from the recently released NOAA Atlas 14 Volume 1 for the semiarid southwest precipitation frequency project (Bonnin et al., 2003). The consistency of these PDS to AMS ratios with other derivations lends strong support to the validity of the results of this project because the PDS and AMS quantiles were derived independently using different probability distributions. To derive the PDS to AMS ratios, regional data, excluding at-site stations, were used. The best-fitting distributions for each individual region for the AMS and PDS computations were used.

Table 4.6.2. NOAA Atlas 14 Volume 2 PDS to AMS ratios for all durations with asymptote applied after 50-year.

2-year	5-year	10-year	25-year	50-year	100-year	200-year	500-year	1,000-year
1.086	1.023	1.010	1.004	1.004	1.004	1.004	1.004	1.004

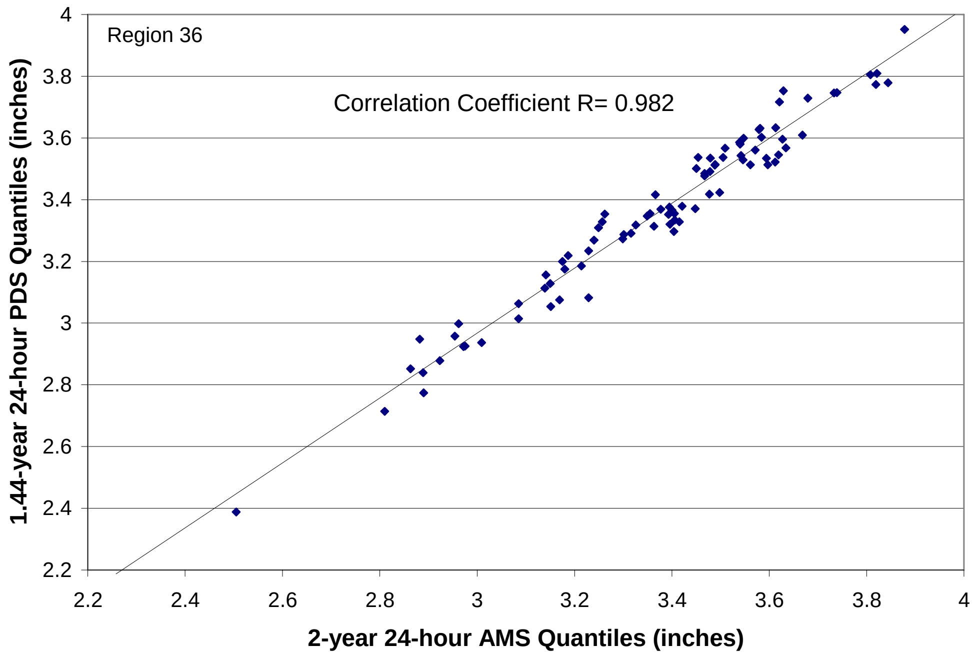


Figure 4.6.3. 2-year 24-hour AMS versus 24-hour 1.44-year PDS for daily region 36 from NOAA Atlas 14 Volume 2.

4.7. Estimation of confidence limits

For the first time, the National Weather Service is providing confidence limits for the estimates to quantify uncertainty. This will allow users a greater understanding of the uncertainty and will thus improve the utility of the estimates in engineering and environmental design practice. The quantiles per se are statistical variables that vary within an unknown range following an unknown distribution. To quantitatively assess the uncertainty, a Monte Carlo simulation technique was used to generate 1,000 synthetic data sets having the same statistical features.

Upper and lower confidence limits at the 90% confidence level were computed for each station's precipitation frequency estimate using Monte Carlo simulations coupled with the regional L-moments method, as suggested by Hosking and Wallis (1997). The sample parameters at each station were used in 1,000 Monte Carlo simulations to produce 1,000 samples with the same data length and same average regional parameters as the actual data. 1,000 quantiles were calculated for each station and then the upper 5% and lower 5% were delineated to produce the upper and lower confidence bounds. For n-minute data, the n-minute ratios (n-minute to 60-minute mean precipitation frequency estimates) were applied to the 60-minute upper/lower grids to compute the upper and lower bounds for n-minute estimates.

Confidence limits were adjusted to be consistent with their corresponding quantiles by applying ratios of the unadjusted quantiles and the adjusted quantiles in a manner comparable to the co-located hourly and daily station and hourly-only station consistency adjustments. 24-hour confidence limits at co-located or daily-only stations were derived from the station in the daily region analysis.

The estimation of confidence limits provides error bounds on the quantiles themselves under the assumption that the data have been well quality controlled and does not include error associated with rainfall measurement and the spatial interpolation procedure.

4.8. Spatial interpolation

4.8.1. Mean annual maximum (or "Index flood") grids

As explained in Section 4.6.1, mean annual maximum values were used as the site-specific scaling factor to generate precipitation frequency estimates from regional growth factors (RGFs). The station mean annual maximum values were spatially interpolated to produce mean annual maximum, or "index flood", grids using technology developed by Oregon State University's Spatial Climate Analysis Service (SCAS). SCAS has developed PRISM (Parameter-elevation Regressions on Independent Slopes Model), a hybrid statistical-geographic approach to mapping climate data (Daly and Neilson, 1992; Daly et al., 1994; Daly et al., 1997; Daly et al., 2002). PRISM spatially interpolated the HDSC-calculated mean annual maximum values by using a naturally strong relationship with mean annual precipitation.

SCAS adapted PRISM to use their existing mean annual precipitation grids (USDA-NRCS, 1998), transformed using the square-root, as the predictor grid for interpolating mean annual maximum precipitation to a uniformly spaced grid. Mean annual precipitation was used as the predictor because it is based on a large data set, accounts for spatial variation of climatic information and is consistent with methods used in previous projects, including NOAA Atlas 2 (Miller et al., 1973). PRISM uses a unique regression function for each target grid cell and has the ability to account for: user knowledge, the distance of an observing station to the target cell, if the station is in a cluster of stations grouped together, the difference between station and target cell mean annual precipitation, topographic facet, and coastal proximity. Other parameters include radius of influence, minimum number of stations on a facet, and total number of stations required for the regression to estimate the mean annual maximum precipitation at a given grid cell. PRISM cross-validation statistics were computed where each observing station was deleted from the data set one at a time and a prediction made in its absence. Results indicated that any overall bias was less than 2 percent and mean standard error was about 10 percent for this Atlas. Appendix A.4 provides additional information regarding the details of the work done by SCAS for HDSC.

Table 4.8.1 lists the mean annual maximum (a.k.a. "index flood") grids, one for each duration of the project, that were interpolated by PRISM. The resulting high-resolution (30-second, or about 0.5 mile x 0.5 mile) mean annual maximum grids then served as the basis for deriving precipitation frequency estimates at different recurrence intervals using a unique HDSC-developed spatial interpolation procedure, the Cascade, Residual Add-Back (CRAB) derivation procedure (described in detail in Section 4.8.2).

Deviations may occur between the observed point mean annual maximum values in the HDSC database and the resulting grid cell value due to spatial interpolating and smoothing techniques employed by PRISM. The "HDSC database" consists of precipitation frequency estimates, mean annual maximum values and metadata (longitude, latitude, period of record, etc.) for each station. These deviations occur because PRISM produces interpolated values that mitigate differences between the observed point estimates and surrounding stations with similar climate, mean annual precipitation, elevation, aspect, distance from large water bodies and rain-shadow influences. See Appendix A.4 for more details.

Table 4.8.1. Mean annual maximum grids interpolated by PRISM.

Duration
60-minute
120-minute
3-hour
6-hour
12-hour
24-hour
48-hour
4-day
7-day
10-day
20-day
30-day
45-day
60-day
Total 14

4.8.2. Derivation of precipitation frequency grids

The Cascade, Residual Add-Back (CRAB) grid derivation procedure is a unique spatial interpolation technique, developed by HDSC, to convert mean annual maximum grids into grids of precipitation frequency estimates (see Figure 4.8.1). The CRAB philosophy was first used in the derivation of several of the National Climatic Data Center's Climate Atlas of the United States maps (Plantico et al., 2000).

CRAB accommodates spatial smoothing and interpolating across "region" boundaries to eliminate potential discontinuities due to different RGFs as a result of the regional L-moment analysis. The CRAB process, as the term cascade implies, uses the previously derived grid to derive the next grid in a cascading fashion. The technique derives grids along the frequency dimension with quantile estimates for different durations being separately interpolated. Hence, duration-dependent spatial patterns evolve independently of other durations. The CRAB process utilizes the inherently strong relationship between different frequencies for the same duration. In reality, this linear relationship is equivalent to the ratio of RGFs (e.g., 100-year 24-hour RGF over the 50-year 24-hour RGF) and is a constant for each region. CRAB initially makes a generalization that all regions have the same RGF ratios, thereby causing the linearly-predicted precipitation frequency estimates in some regions to be over predicted, while others under predicted. To account for these regional differences, CRAB utilizes residuals – the differences between the precipitation frequency estimates from the generalized all-region RGF ratios and the actual precipitation frequency estimates at each station. As a by-product of the generalization, the residuals (at each station) within each individual region are either all positive, negative or close to zero thereby supporting spatial autocorrelation and skill in interpolating the residuals. This combined with the inherently strong linear predictability from one frequency to the next makes CRAB an effective and accurate method for deriving the suite of precipitation frequency grids.

As mentioned above, the CRAB derivation process utilizes the strong, linear relationship between a particular duration and frequency, the *predictor* estimates, and the next rarer frequency of the same duration. Figure 4.8.2 shows the relationship between the *predictor* precipitation frequency estimates, 50-year 24-hour in this example, and the subsequent precipitation frequency estimates, 100-year 24-hour. The R-squared value here of 0.9986 is very close to 1.0 which was common throughout all of the regressions. Since this was calculated using all stations in the project area, the slope of this relationship (1.1658) can be thought of as an average domain-wide RGF ratio. Regional differences are then accounted for using residuals.

A summary of the complete CRAB derivation procedure is illustrated in Figure 4.8.1 and can be summarized in a series of steps. In this description, the term *predictor* refers to the previous grid upon which the subsequent grid is based.

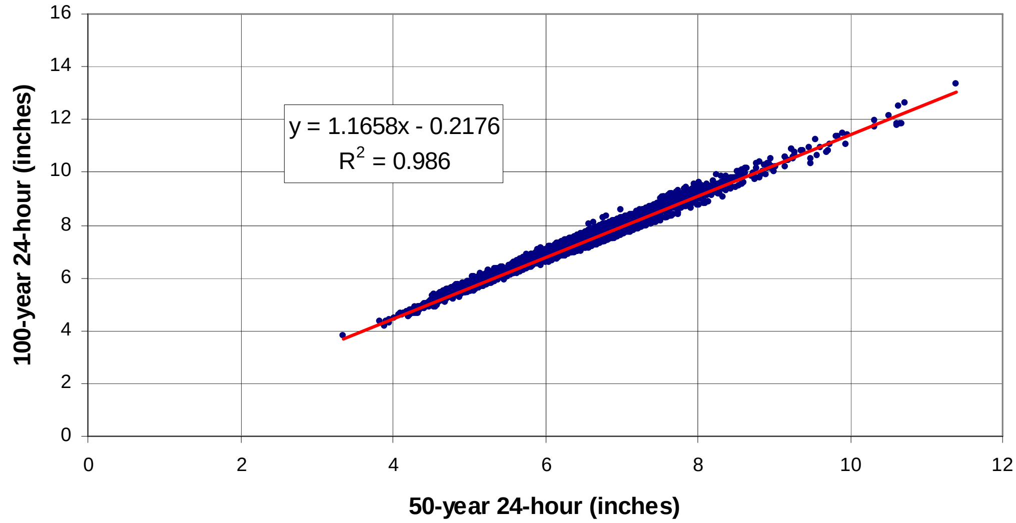


Figure 4.8.2. A scatter plot of 100-year 24-hour vs. 50-year 24-hour precipitation frequency estimates and the linear regression line from NOAA Atlas 14 Volume 2.

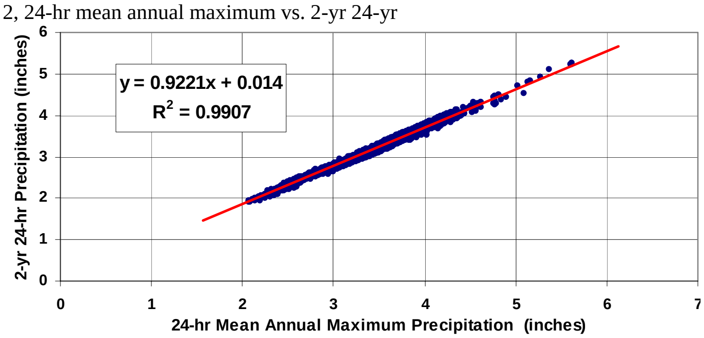
Step 1: Development of regression. The cascade began with the mean annual maximum grid derived by SCAS using PRISM for a given duration as the initial *predictor grid* (e.g., 24-hour mean annual maximum) and the 2-year frequency as the subsequent grid (e.g., 2-year 24-hour). All precipitation frequency estimates in the HDSC database were adjusted to accommodate the spatial smoothing of the PRISM mean annual maximum grids. An adjustment factor was calculated based on the difference between the mean annual maximum PRISM grid cell value and the point mean annual maximum as computed from observed data as listed in the HDSC database. The adjustment factor was a station-unique value applied to the precipitation frequency estimates and was independent of frequency. For example, a station has an observed mean annual maximum 60-minute value (from the database) of 0.82 inches, but the PRISM grid cell at this station has a value of 0.861 inches. This results in an adjustment factor of 1.05 which is applied to each of the 60-minute precipitation frequencies (2-years through 1,000-years) before constructing the regression equation. These adjusted precipitation frequency estimates are equivalent to the *actual estimates*. In most cases, this adjustment was ±5% (See Appendix A.4 for more details). A global (all-region) relationship for each duration/frequency pair was developed at the beginning of each iteration based on station precipitation frequency estimates, adjusted for spatial smoothing, at all stations.

To develop the global relationship, an x-y data file was built where initially x was the mean annual maximum for a given duration and y the 2-year precipitation frequency estimate for that duration for each observing station. The slope and y-intercept of a least-square fit linear regression line using x and y for all stations in the domain was calculated. For each individual region, the slope of such a line is equivalent to the 2-year RGF in the initial run and equivalent to the RGF ratio in subsequent runs.

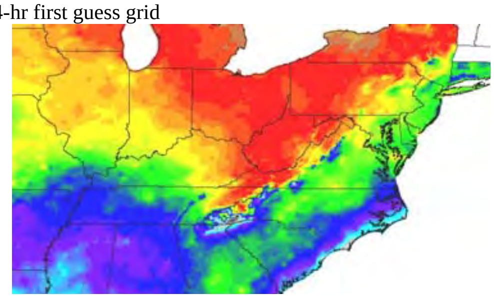
Figure 4.8.1. Flowchart of the cascade residual add-back (CRAB) grid derivation procedure beginning with the mean annual maximum grid of the x-duration and deriving the 2-year x-duration grid as an example.

Using PRISM, produce mean annual maximum grid for duration x (see accompanying documentation for details)

Build an x-y data file where initially **x is mean annual maximum** (for duration x) and **y the 2-year x-duration precipitation frequency estimate**. Calculate slope and y-intercept of a least-square fit linear regression line using x and y for ALL stations in the domain. Example: NOAA Atlas 14 Volume 2, 24-hr mean annual maximum vs. 2-yr 24-yr

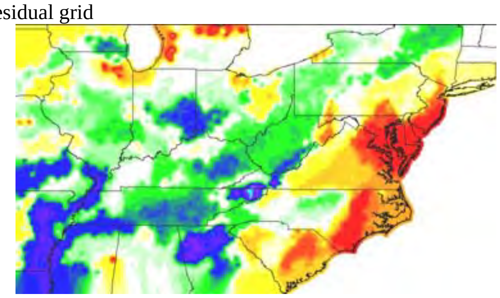


Based on slope, y-intercept and PRISM mean annual maximum grid, calculate a **first guess y grid**. Example:2-yr 24-hr first guess grid



Using the actual y value and the predicted y value, calculate the residual (actual minus predicted). Normalize the residual by dividing by the mean annual maximum, regardless of iteration.

Spatially interpolate the **normalized residual** values using inverse-distance weighting. Example:2-yr 24-hr normalized residual grid

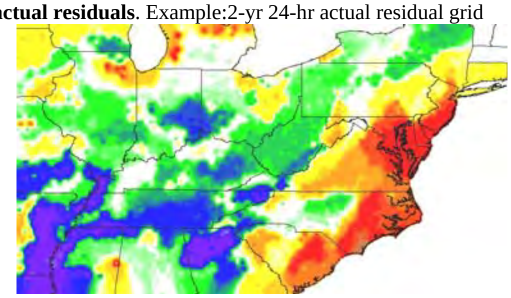


Iteration: Repeat for each frequency (e.g., mean annual maximum becomes 2yr, 2yr becomes 5yr, etc.). Then repeat for each duration (e.g., after the first mean annual maximum iteration, the duration starts at 60-minute, then 2-hour, etc.)

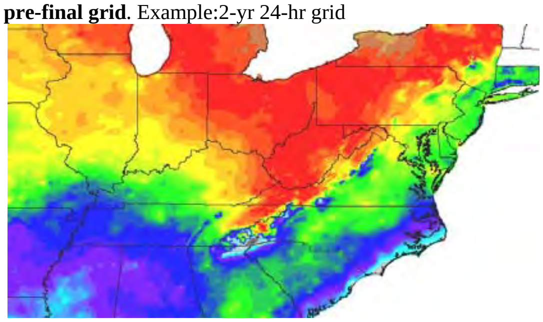
Continued on next page.

Figure 4.8.1. cont'd

Multiply the **normalized residual grid** by the mean annual maximum grid, regardless of iteration, to obtain a grid of **actual residuals**. Example:2-yr 24-hr actual residual grid



Add the actual residual grid to the first guess grid to obtain **pre-final grid**. Example:2-yr 24-hr grid



The unmasked, unfiltered, unadjusted (for internal consistency (IC) violations) grid is saved and used as the next **predictor grid**. Apply advanced spatial smoothing algorithm that smoothes estimates in areas with flat terrain and similar climates, but retains patterns in complex terrain where more variability is expected and appropriate. Then apply small (5x5 grid cell) center-weighted, block filter to the entire pre-final filtered grid to blend the smoothing threshold boundaries, lightly filter the coastlines and complex terrain, and promote smooth contours.

In cases where x is not mean annual maximum (*Note: mean annual maximum is only used in the first iteration)*, check the **pre-final, filtered grid** for duration-based IC violations by making sure y is greater than the next lower duration final grid at the same frequency (e.g., 5y24h>5y12h). For grid cells that violate this rule, adjust y by setting the grid cell equal to the next lower duration plus 1%.

In cases where x is not mean annual maximum (*Note: mean annual maximum is only used in the first iteration.)*, check the **pre-final, filtered grid** for frequency-based IC violations by making sure y is greater than x (the next higher frequency final grid, e.g. 5y24h>2y24h). For grid cells that violate this rule, adjust y by setting the grid cell equal to the next higher frequency plus 1%. The result is the **final grid**.

If x & y represent upper and/or lower precipitation frequency bounds, then subject the grids to additional IC checks (e.g., make sure 5y24h upper > 5y24h).

If duration equals 60-minutes, calculate the n-minute (5-, 10-, 15- and 30-min) grids by applying the domain-wide 60-min to n-min ratios to the final grid.

Step 2: Development of *first guess grids*. The global linear regression relationship was then applied, using a Geographic Information System (GIS), to the *predictor grid* (e.g., 24-hour mean annual maximum) to establish a *first guess grid* (e.g., 2-year 24-hour) that was not necessarily equivalent to the *actual* estimates which were based on the unique RGF for each region.

Step 3: Development of spatially interpolated *residual grids*. To account for the regional differences, residuals (*actual* estimates minus *predicted* estimates) at each station were calculated. Here, *predicted* estimates (e.g., 2-year 24-hour) were those derived in the *first guess grid*. The residuals were normalized by the mean annual maximum to facilitate the interpolation of residuals to ungauged locations.

The normalized residuals at each station were then spatially interpolated to a grid using a modified version of the Geographic Resources Analysis Support System or GRASS© (GRASS, 2002) GIS inverse-distance-weighting (IDW) algorithm to produce a *normalized residual grid*. To achieve a smoothed result, the spatial resolution was reduced from 30-seconds to 1-minute before spatially interpolating the normalized residuals with the IDW algorithm. Sensitivity tests were conducted to determine the optimum resolution to avoid "over-smoothing" the normalized residuals which would cause the maps to deviate from the quantile estimates achieved through the L-moment analysis. The results were then re-sampled back to a 30-second resolution for the remainder of the process. The IDW method assumes the value at an unsampled point can be estimated as a weighted average of points within a certain distance or from a given number of m closest points; CRAB used the 12 closest points (i.e., m = 12). Weights are inversely proportional to the power of the distance in meters which at an unsampled point r = (x,y) is:

$$F(r) = \frac{\sum_{i=1}^{m} z(r_i) / |r - r_i|^p}{\sum_{j=1}^{m} 1 / |r - r_j|^p} \quad \text{(E.8, Neteler and Mitasova, 2002)}$$

where

F(r) = interpolated precipitation at unsampled grid cell
z = precipitation at sample point
m = 12
p = 2
$r_{i,j}$ = location of sample point
r = location of unsampled grid cell.

The IDW was conducted in a geographic (i.e., latitude-longitude) projection with the distance between *r* and $r_{i,j}$ being computed in true distance (meters) units. IDW was used because by definition it is an exact interpolator and remained faithful to the *normalized residuals* at stations; this is important so that when the *normalized residuals* were converted back to *actual residuals* they were equal to the original *actual residual* at each station. Since there is a great deal of spatial autocorrelation of the *normalized residuals*, i.e. the *normalized residuals* tend to be spatially consistent within the regions, IDW was an adequate and appropriate interpolation scheme (see embedded map of normalized residuals in Figure 4.8.1).

The *normalized residual grid* was de-normalized by multiplying it by the original spatially interpolated mean annual maximum grid to obtain a spatially interpolated grid of *actual residuals* for the entire project area. Figure 4.8.3 shows the relationship between the 100-year 24-hour *actual residuals* and the 24-hour mean annual maximum estimates. Each linear cluster shown on this scatter plot represents stations within the same region that have varying 100-year 24-hour precipitation depths.

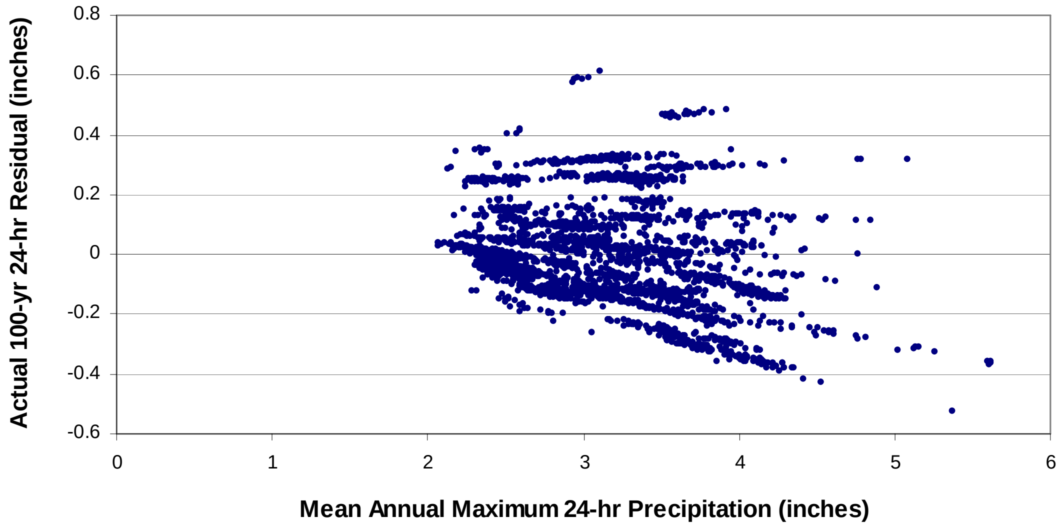


Figure 4.8.3. The relationship between the 100-year 24-hour *actual residuals* and the mean annual maximum precipitation from NOAA Atlas 14 Volume 2.

Step 4: Development of *pre-final grids*. The spatially interpolated grid of *actual residuals* was added to the *first guess grid* to create a spatially interpolated *pre-final* grid (e.g., 2-year 24-hour). To prevent error propagation potentially introduced in the internal consistency adjustment steps (described in Step 5), the *pre-final grid* was archived before being smoothed and became the *predictor grid* for the next precipitation frequency grid derivation. For example, the *pre-final* 2-year 24-hour grid was used as the predictor for the 5-year 24-hour grid rather than the *final* 2-year 24-hour grid to remain faithful to the data and allow patterns to develop without any differences that may be introduced by adjustments and filters.

To remove unnatural variability in the spatially distributed precipitation frequency estimates the *pre-final grid* was smoothed using an advanced spatial smoothing algorithm different than that used in NOAA Atlas 14 Volume 1. The algorithm smoothes estimates in areas with flat terrain, but retains patterns in complex terrain where more variability is expected and appropriate. The degree of spatial smoothing applied to a grid cell is dictated by its surrounding terrain and proximity to a coastline. In areas where terrain or the proximity of the coastline is important in defining patterns of precipitation, less spatial smoothing was applied.

To gauge the effectiveness of terrain to influence the precipitation frequency estimates, PRISM's effective terrain height grid was used. The effective terrain height grid, developed by the Spatial Climate Analysis Service (Daly and Neilson, 1992; Daly et al., 1994; Daly et al., 1997; Daly et al., 2002), is based on a 2.5-minute digital elevation model (DEM) in meters. The effective terrain height grid was prepared by first finding the minimum elevation within a 40-km radius of each grid cell. The minimum elevations were spatially averaged to produce a smooth, base elevation grid. Then, to obtain the effective terrain height grid, the base grid was subtracted from the original DEM grid and filtered to produce a smooth grid, which has units of meters. For more details, please refer to http://www.ocs.orst.edu/pub/prism/docs/effectiveterrain-daly.pdf.

For the CRAB process, the effective terrain height grid was smoothed further to prevent discontinuities at the boundaries of different degrees of spatial smoothing. It was spatially averaged over a 40-km radius of each grid cell. To account for the impact of precipitation frequency estimate patterns as a result of coastal influences, PRISM's coastal proximity grid was used. The coastal proximity grid, also produced by Spatial Climate Analysis Service, is composed of grid cell values denoting a measure of the shortest distance from a cell to the water (Daly and Neilson, 1992; Daly et al., 1994; Daly et al., 1997; Daly et al., 2002). The measure is the distance to the nearest ocean pixel, divided into 10 distance classes. For more details, visit: http://www.ocs.orst.edu/pub/prism/docs/prisguid.pdf.

Based on the effective terrain height and coastal proximity grids, HDSC developed three degrees of initial spatial smoothing: heavy, moderate and none. The map in Figure 4.8.4 indicates the areas receiving the different degrees of smoothing.

1. HEAVY: Flat areas were determined if effective terrain height is less than 100 m (328 ft), and then a 17x17 grid cell (approximately 15 miles by 15 miles), center-weighted filter was used at the longer durations and a 25x25 grid cell (approximately 25 miles by 25 miles) filter at the shorter (<24-hour) durations. The shorter durations were subjected to greater smoothing because the lower station density was prone to cause unnatural variability.

2. MODERATE: Moderately complex terrain areas were determined if effective terrain height was greater than 100 meters (328 feet) and less than 200 meters (656 feet), and then a 11x11 grid cell (approximately 5.5 miles x 5.5 miles), center weighted filter was used for all durations.

3. LIGHT: Complex terrain areas and coastlines were determined if effective terrain height was greater than 200 meters (656 feet) or if the coastal proximity grid (a grid of values indicating distance from coast) was <=5, and then no filter was used at this stage. However, light smoothing was conducted during the next stage.

Once the above filtering was complete, a final 5x5 grid cell (approximately 2.5 mile by 2.5 mile), center-weighted filter was applied to the entire grid to blend the smoothing threshold boundaries, lightly filter the coastlines and complex terrain, remove extraneous "noise" in the spatial interpolation and promote smooth contour lines when interpolated, thus creating the *smoothed pre-final grid*.

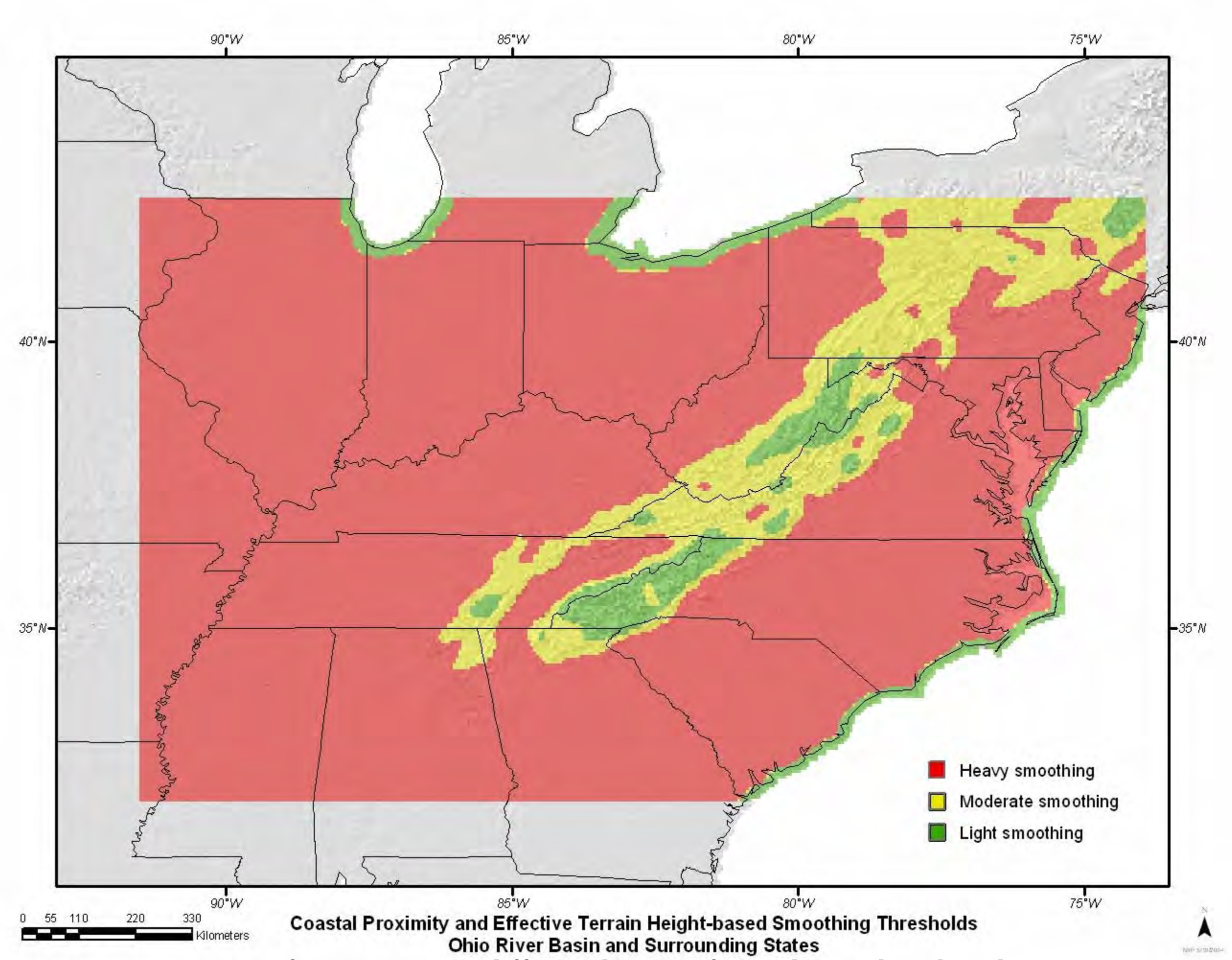


Figure 4.8.4. A map of areas receiving different degrees of spatial smoothing based on PRISM's effective terrain height and coastal proximity grids.

Step 5: Internal consistency check. To ensure internal consistency in the *smoothed pre-final* grid cell values, duration-based and frequency-based internal consistency checks were conducted. Frequency-based internal consistency violations (e.g., 100-year < 50-year) were very rare and when they did exist, they were small violations relative to the precipitation frequency estimates involved. Duration-based internal consistency violations (e.g., 24-hour < 12-hour) were more common, particularly between 120-minute and 3-hour, but again were small violations relative to the magnitude of precipitation frequency estimates. To mitigate internal consistency violations, the longer duration or rarer frequency grid cell value was adjusted by multiplying the shorter duration or lower frequency grid cell value by 1.01 to provide a 1% difference between the grid cells. One percent was chosen over a fixed factor to allow the difference to change according to the grid cell magnitudes while at the same time providing a minimal, but sufficient, adjustment without changing otherwise compliant data in the process. The duration-based check and adjustment was conducted first, resulting in a new pre-final grid, which was then subjected to the frequency-based check and adjustment. The resulting grid became the *final grid* for the particular frequency and duration (e.g., 2-year 24-hour).

Development of n-minute grids. Durations shorter than 60-minute (i.e., n-minute precipitation frequency estimates) were calculated using linear scaling factors applied to *final grids* of spatially interpolated 60-minute precipitation frequency estimates. Because there were so few n-minute stations in the project area, larger regional (northern and southern) ratios of n-minute to 60-minute estimates were used. Unlike Volume 1, each duration, frequency and larger region (north and south) had its own unique n-minute ratio. Tables 4.8.2 and 4.8.3 again show the n-minute ratios for the northern and southern regions, respectively, for all durations and annual exceedance probabilities. Grids for each ratio were generated using a grid that delineates the larger northern and southern regions. At the boundary between the larger regions, the grid cells were subjected to spatial averaging for a distance of approximately 90 miles, thereby providing a wide band of gradually changing ratios from north to south. Then, these grids of ratios were multiplied by the appropriate 60-minute grid to create the *final* n-minute precipitation frequency grids. These ratio grids were also used for both the n-minute upper- and lower- confidence limit grids.

Table 4.8.2. N-minute ratios for the northern region of NOAA Atlas Volume 2: 5-, 10-, 15- and 30-minute to 60-minute. *Note that the 1.58-year was computed to equate the 1-year average recurrence interval (ARI) for partial duration series results (see Section 4.6.2) and the 1.58 year results were not released as annual exceedance probabilities (AEP).

Annual Exceedance Probability	**5-min**	**10-min**	**15-min**	**30-min**
1 in 1.58 (1-year ARI)	0.325	0.505	0.619	0.819
1 in 2	0.319	0.498	0.609	0.815
1 in 5	0.305	0.474	0.582	0.797
1 in 10	0.298	0.460	0.566	0.786
1 in 25	0.289	0.442	0.546	0.771
1 in 50	0.283	0.429	0.531	0.759
1 in 100	0.277	0.417	0.518	0.748
1 in 200	0.272	0.406	0.505	0.737
1 in 500	0.266	0.391	0.488	0.723
1 in 1,000	0.261	0.380	0.475	0.712

Table 4.8.3. N-minute ratios for the southern region of NOAA Atlas Volume 2: 5-, 10-, 15- and 30-minute to 60-minute. *Note that the 1.58-year was computed to equate the 1-year average recurrence interval (ARI) for partial duration series results (see Section 4.6.2) and the 1.58 year results were not released as annual exceedance probabilities (AEP).

Annual Exceedance Probability	5-min	10-min	15-min	30-min
1 in 1.58 (1-year ARI)	0.293	0.468	0.585	0.802
1 in 2	0.287	0.459	0.577	0.797
1 in 5	0.271	0.434	0.549	0.780
1 in 10	0.262	0.419	0.530	0.768
1 in 25	0.251	0.400	0.507	0.751
1 in 50	0.243	0.387	0.490	0.738
1 in 100	0.236	0.375	0.474	0.726
1 in 200	0.229	0.363	0.458	0.713
1 in 500	0.220	0.348	0.438	0.697
1 in 1,000	0.214	0.337	0.423	0.685

Validation. Initial draft mean annual maximum, “index flood”, grids for this Atlas, as well as the CRAB-derived 100-year 24-hour and 100-year 60-minute precipitation frequency grids were subjected to a peer-review (Appendix A.5). After considering and resolving all reviewer comments, final mean annual maximum grids were created by PRISM and the CRAB procedure re-run.

In addition, jackknife cross-validation allowed further, objective evaluation and validation of the precipitation frequency grids. The jackknife cross-validation exercise entailed running the CRAB procedure with a station in the dataset, storing the target grid cell value (at the station), then running CRAB without the station and comparing the target grid cell values. It was cost prohibitive to re-create the PRISM mean annual maximum grids for each cross-validation iteration. For this reason, the cross-validation results reflect the accuracy of the CRAB procedure based on the same mean annual maximum grids. The comparison was used to test the robustness and accuracy of the CRAB interpolation using the 100-year 60-minute estimates since it required the most interpolation to ungauged locations because of the lower number of hourly stations. A perfect validation would result in equal values (0% difference) – with and without the station. For the test, 261 stations, which is half of the hourly stations in the core project area, were selected to get a representative sample of terrain and climate evenly distributed around the core area. 100-year 60-minute results (Figure 4.8.5) indicated that the CRAB process performed well. The primary message that Figure 4.8.5 conveys is the fact that, overall, CRAB did a good job reproducing the values in the absence of station data. The figure also indicates that there was a greater tendency for CRAB to slightly under-predict the precipitation frequency value at a location in a station’s absence.

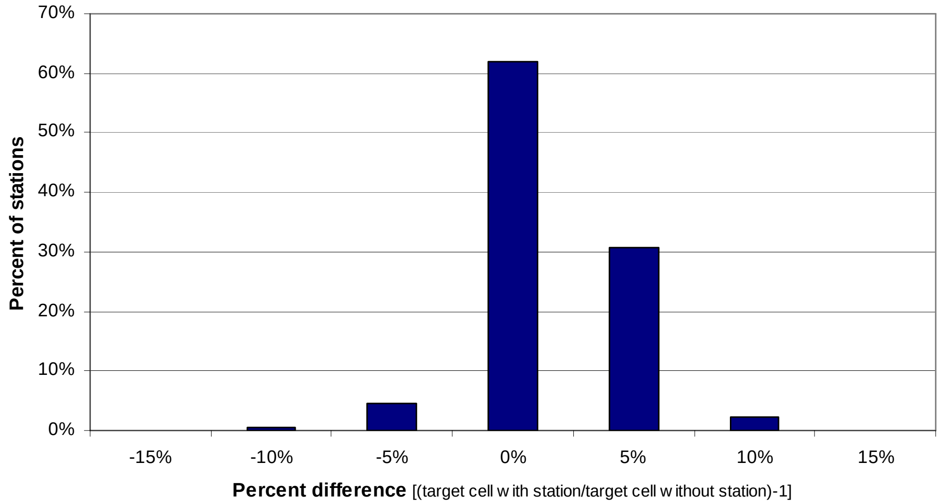


Figure 4.8.5. NOAA Atlas 14 Volume 2 100-year 60-minute jackknife cross-validation results.

Derivation of upper/lower limit precipitation frequency grids

The upper and lower limit precipitation frequency grids were also derived using the CRAB procedure. Testing suggested that the best method by which to derive the upper/lower limit grids was to use the preceding upper (or lower) grid as the *predictor grid* and *normalizing grid* for the upper/lower limit grid being derived, as opposed to using the corresponding mean precipitation frequency grid. Although the upper (lower) limit precipitation frequency estimates were slightly less stable than the mean grids, they still exhibited strong linear relationships with the previous (*predictor*) grid. The appropriate (i.e., same duration) mean annual maximum grid (PRISM-produced "index flood") was used as the initial *predictor grid* for the 2-year upper and lower limit precipitation frequency estimate grids. Figure 4.8.6 shows a scatter plot of the 24-hour mean values versus the 2-year 24-hour upper limit precipitation frequency estimates.

Similar to the precipitation frequency estimate grids, the upper and lower limit grids were evaluated and adjusted for internal consistency. Although very rare, duration-based adjustments were made to ensure the upper (lower) limit grid cell values were larger (smaller) than the mean values. In the event of a violation (e.g., 100-year 60-minute < 100-year 60-minute lower limit) the upper (lower) limit grid was adjusted up (down) by 1% of the mean grid. Like the precipitation grids, frequency-based or duration-based adjustments were made when needed. To mitigate any internal consistency violations, the longer duration or rarer frequency grid cell value was adjusted by multiplying the shorter duration or lower frequency grid cell value by 1.01 to provide a 1% difference between the grid cells.

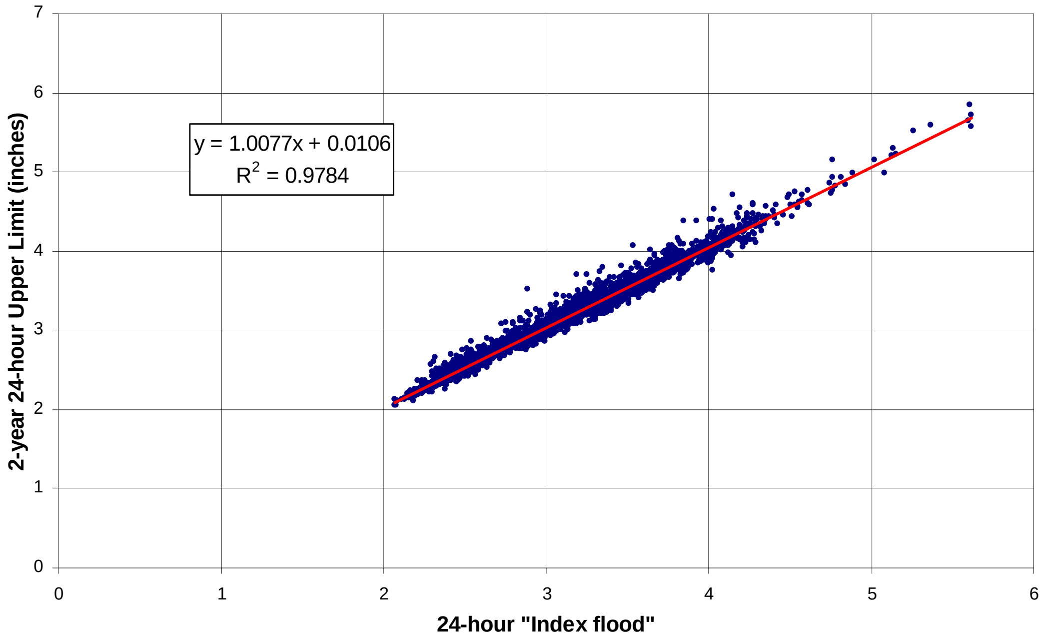


Figure 4.8.6. Scatter plot of the 24-hour mean precipitation frequency estimates vs. the 2-year 24-hour upper limit showing a coefficient of determination of 0.9784 in NOAA Atlas 14 Volume 2.

4.8.3. Pseudo data

Since each duration was computed independently, it was possible for inconsistencies from duration to duration at a given location to occur. In the spatial interpolation, this was a particular concern at hourly-only and daily-only station locations. However, such inconsistencies were rare.

At hourly-only station locations, inconsistencies could occur because calculated 60-minute through 48-hour estimates anchored the interpolation while 4-day through 60-day estimates at those locations were computed during the spatial interpolation process that was based on estimates at nearby daily stations. During the evaluation phase of the grids, HDSC evaluated the results for inconsistencies in the precipitation frequency estimates from 48-hour to 4-day, but none were found. Such inconsistencies occurred in NOAA Atlas 14 Volume 1 due to unreliable 48-hour data derived from accumulated hourly observations. The practical adjustments applied in this project compensated for any such inconsistencies.

Likewise, there were 21 cases where inconsistencies arose at daily-only station locations because calculated 24-hour through 60-day estimates anchored the interpolation while 60-minute through 12-hour estimates at those locations were computed during the spatial interpolation process that was based on estimates at nearby hourly stations. In these 21 cases, the ≤ 12-hour interpolated precipitation frequency estimates were considerably lower and inconsistent with the surrounding calculated ≥ 24-hour precipitation frequency estimates. This caused unreasonable changes in the precipitation frequency estimates from 12-hours to 24-hours at those locations.

These cases were objectively identified using grids that indicated the difference between the 100-year 12-hour and 100-year 24-hour precipitation frequency estimates. By using these grids, spatial artifacts were differentiated from climatologically-driven patterns. In general, if the difference between the 100-year 12-hour and 100-year 24-hour grid cell value was ≥ 1.40", the daily-only stations in that area were scrutinized. The 21 locations with such inconsistencies were identified and verified for data accuracy.

Table 4.8.4. Hourly pseudo stations used in the preparation of NOAA Atlas 14 Volume 2.

Station ID	Station Name	State
11-0338	AURORA COLLEGE	IL
11-2223	DE KALB	IL
11-4530	JOLIET BRANDON RD DAM	IL
11-4535	JOLIET	IL
11-7354	ROCHELLE	IL
11-9221	WHEATON 3 SE	IL
12-4662	KOKOMO POST OFFICE	IN
12-5174	LOWELL	IN
18-6620	OAKLAND 1 SE	MD
28-0690	BELLEPLAIN	NJ
31-0184	ANDREWS	NC
31-0241	ARCOLA	NC
31-6031	NANTAHALA	NC
31-6044	NASHVILLE	NC
31-6135	NEW HOLLAND	NC
38-0972	BRANCHVILLE 6 S	SC
38-5628	MCCLELLANVILLE	SC
38-7313	RIMINI	SC
44-0385	BACK BAY WILDLIFE REFUGE	VA
44-0993	BREMO BLUFF PWR	VA
44-6456	OYSTER 1 W	VA

So-called pseudo data were used to mitigate the inconsistencies at these 21 locations. Table 4.8.4 lists the hourly pseudo stations generated for this Atlas. The creation of pseudo hourly precipitation frequency estimates was similar to the approach used to alleviate 12-hour to 24-hour inconsistencies at co-located stations (Section 4.6.3). The pseudo precipitation frequency estimates were generated by applying a ratio of x-hour estimates to 24-hour estimates that was spatially interpolated using GRASS©'s inverse-distance-weighting algorithm (GRASS, 2002), which is shown in Section 4.8.2, based on only co-located daily/hourly stations. The ratio at each co-located station was calculated using the station's 24-hour precipitation frequency estimate to its x-hour precipitation frequency estimate. The interpolated ratio was then applied to the daily-only 24-hour precipitation frequency estimates to generate the pseudo hourly data at that station location. The mitigation provided a smoother, more meteorologically-sound transition from hourly to daily precipitation frequency estimates.

Tests showed that creating pseudo hourly data for daily-only stations that did not exhibit a large difference from 12-hour to 24-hour resulted in nearly identical precipitation frequency estimates before and after the inclusion of pseudo data. Pseudo data were not added to stations that did not need it or at ungauged locations. Locations where an inconsistency between 12-hour and 24-hour estimates could not be expressly proved were assumed accurate based on climate and not mitigated. Pseudo data were used only where deemed absolutely necessary to produce consistent results.

4.8.4. Derivation of isohyetals of precipitation frequency estimates

Isohyetal (contour) GIS files were created from the grids of partial duration series based precipitation frequency estimates for users with geographical information systems (GISs). The isohyetals are provided as Environmental Systems Research Institute, Inc. line shapefiles (ESRI, 2003). The isohyetals were created by contouring the grid files with GRASS©'s r.contour command (GRASS, 2002). The resulting files were when exported as shapefiles with GRASS©'s v.out.shapefile command (GRASS, 2002). In order to keep the isohyets and grids consistent, no line generalization or smoothing was conducted. The precision and resolution of the grids were sufficiently high to result in smooth contour lines.

The choice of contour intervals was determined by an algorithm which used the maximum, minimum and range of grid cell values. The number of individual contour intervals was constrained between 10 and 30; however, some of the n-minute grids did not exhibit the range necessary to meet the 10 interval threshold and therefore have fewer than 10. All of the intervals are evenly divisible by 0.10 inches – the finest interval. A script that computed the appropriate contour intervals and shapefiles also generated Federal Geographic Data Committee compliant metadata for the shapefiles and a “fact” file. The HTML-formatted fact file provides details of the shapefile and also includes a list of the contour intervals. To simplify the downloading of the isohyetal shapefiles from the Precipitation Frequency Data Server (PFDS), all of the shapefile components (*.shp, *.dbf, and *.shx, *.prj), metadata and fact file were compiled and compressed into a single archive file containing many files (*.tar). For projection, resolution and other details of the shapefiles, please refer to the metadata and/or fact file.

The isohyetal shapefiles were created to serve as visual aids and are not recommended for interpolating final point or area precipitation frequency estimates for design criteria. Users are urged to take advantage of the grids or the Precipitation Frequency Data Server user interface for accessing final estimates.

4.8.5. Creation of color cartographic maps

The isohyetal shapefiles were used to create color cartographic maps of the partial duration series-based precipitation frequency grids. The maps were created using Environmental Systems Research Institute, ArcGIS© 8.3 software, in particular ArcMap© (ESRI, 2003). Although in appearance the cartographic maps look to be comprised of polygons, enclosed two-dimensional cells, they are not. Instead, color shading of the grids combined with the line shapefiles provides the clean look of polygons. The cartographic maps are provided in an Adobe Portable Document format (PDF) format for easy viewing and printing. The scale of the maps is 1:2,000,000 when printed in their native size, 17” x 22” (ANSI C), however the maps can be printed at any size. Users should be mindful that future maps and/or other projects may be in different scales or print sizes.

The color cartographic maps were created to serve as visual aids and, unlike Technical Paper 40, are not recommended for interpolating final point or area precipitation frequency estimates for design criteria. Users are urged to take advantage of the Precipitation Frequency Data Server user interface for accessing estimates.

5. Precipitation Frequency Data Server

5.1. Introduction

NWS precipitation frequency estimates have traditionally been delivered in the form of Weather Bureau Technical Papers and Memoranda as well as NOAA Atlases. These are hard copy (i.e., paper) documents.

NOAA Atlas 14 precipitation frequency estimates are now delivered entirely in digital form rather than hard copy form in order to make the estimates more widely available and to provide the data in a broader and more accessible range of formats. The National Weather Service specifically developed the Precipitation Frequency Data Server (PFDS) as the primary web portal for precipitation frequency estimates and associated information (Parzybok and Yekta, 2003). The PFDS is an easy to use, point-and-click interface for official NOAA/NWS precipitation frequency estimates and intensities. It is based on work done for the Alabama Rainfall Atlas (Durrans and Brown, 2002). The PFDS can be found at http://hdsc.nws.noaa.gov/hdsc/pfds/.

5.2. Underlying data

The PFDS operates from a large set of ASCII grids of precipitation frequency estimates. There are a total of 540 grids for NOAA Atlas 14 Volume 2: 180 for the precipitation frequency estimates and 180 each for the lower and upper bounds of the 90% confidence limits of the estimates. Table 5.2.1 shows the complete table of average recurrence intervals (1-year to 1,000-year) and durations (5-minutes to 60-days) available from the PFDS for any particular location.

Table 5.2.1. Average recurrence intervals (ARI) (1-year to 1,000-year) and durations (5-minutes to 60-days) available from the PFDS for any particular location for estimated precipitation frequency estimates as well as upper (and lower) limit precipitation frequency estimates.

Duration \ ARI	1-yr	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	200-yr	500-yr	1,000-yr
5-minute	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
10-minute	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
15-minute	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
30-minute	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
60-minute	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
120-minute	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3-hour	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6-hour	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
12-hour	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
24-hour	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
48-hour	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4-day	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7-day	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
10-day	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
20-day	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
30-day	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
45-day	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
60-day	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

The PFDS operates directly from ArcInfo© (ESRI, 2003) ASCII Grids. The same grids can be downloaded from the website and imported into a Geographical Information System (GIS). The

ASCII grids, which represent the official precipitation frequency estimates, have the following pertinent metadata:

- Resolution: 30-seconds (about 0.5 mile x 0.5 mile)
- Units: inches*1000 (integer)
- Projection: Geographic (longitude/latitude)
- Datum: WGS 1972
- No data value: -9999

The PFDS operates with conventional web-tools, including cgi-bin (Perl) scripts, JAVAScript and one C program. The main cgi-bin script is activated when a user selects a location, either by manually entering a longitude/latitude coordinates, selecting a station, or clicking a location on the state map. The cgi-bin script develops a comprehensive output web page on the fly.

5.3. Methods (point and areal)

Since the PFDS is not an Internet Map Server (IMS), a so-called "information" function had to be coded so that when provided a longitude/latitude coordinate, the PFDS could return the appropriate precipitation frequency estimates. "Getcell," a fast-running, C-compiled program, was written to accomplish this simple, yet crucial function. "Getcell" uses the header information provided in the ArcInfo© ASCII Grid and the supplied longitude-latitude coordinate to calculate the x and y location of the desired grid cell within the grid matrix. The output is the grid cell value.

The 30-second (about 0.5 mile by 0.5 mile) resolution of the underlying grids is more than adequate to provide accurate point estimates. Using the PFDS, a point can be selected by a number of ways:

- Clicking on the map
- Manually entering a longitude/latitude coordinate
- Selecting a station from a pull-down list
- Entering an area.

"Getcell" also has the capability of calculating the mean, maximum, and minimum of a set of grid cells (i.e., area) represented by a list of user-input longitude/latitude coordinates. This powerful capability makes it possible for the PFDS to provide areal precipitation frequency estimates. In order to obtain areal precipitation frequency estimates from the PFDS, the user must enter at least 3 and as many as 12 longitude/latitude coordinates that represent the perimeter of the area of interest. The PFDS then determines which grid cells fall within the area and calculates an arithmetic mean of the grid cells. The mean is then subjected to an areal-reduction factor to compute the areal precipitation frequency estimate for each frequency. At the time of this publication, there is a companion project to update previously developed areal reduction factors. Areal estimates will be available for:

- Areas of 10 to 500 square-miles, and
- Durations of 1-hour through 24-hours.

5.4. Output

After the web server has successfully extracted all 486 precipitation frequency and confidence limit estimates from the underlying grids, an output web page is built and displayed on-the-fly. There are two basic types of output: Depth-Duration-Frequency (DDF) and the Intensity-Duration-Frequency (IDF). Both outputs are based on the same data, but presented differently. The PFDS provides DDF graphs in two formats to provide a complete perspective of the data (Figure 5.4.1, 5.4.2). An example of the classic IDF graph, which is widely used in engineering applications, is shown in Figure 5.4.3.

The output pages also consist of data tables of the precipitation frequency depths (or intensities) and tables of the lower and upper bounds of the 90% confidence limits. These can also be downloaded as text via a button on the output page. In addition, location maps and helpful links are provided. Embedded maps on the output page are provided by a hyperlink to the U.S. Census Bureau Mapping and Cartographic Resources Tiger Map Server (http://tiger.census.gov/cgi-bin/mapbrowse-tbl). The graphs (portable network graphics or ".png" format) are produced using gnuplot (http://www.gnuplot.info), while the remainder of the page is basic HTML.

Additionally, seasonal exceedance graphs are provided via a button on the output page. Exceedance graphs indicate the percentage of events exceeding the corresponding annual exceedance probability for the specified duration (Appendix A.2). The purpose of the graphs is to portray the monthly seasonality of extreme precipitation events. See Figure 5.4.4 for an example. The percentages are based on regional statistics and the seasonal graphs are unique for each region. The number of stations and cumulative years of record are provided in the graph title to provide the user a sense of the amount of data used and therefore the reliability of the results. Durations include:

- 60-minute
- 24-hour
- 48-hour
- 10-day

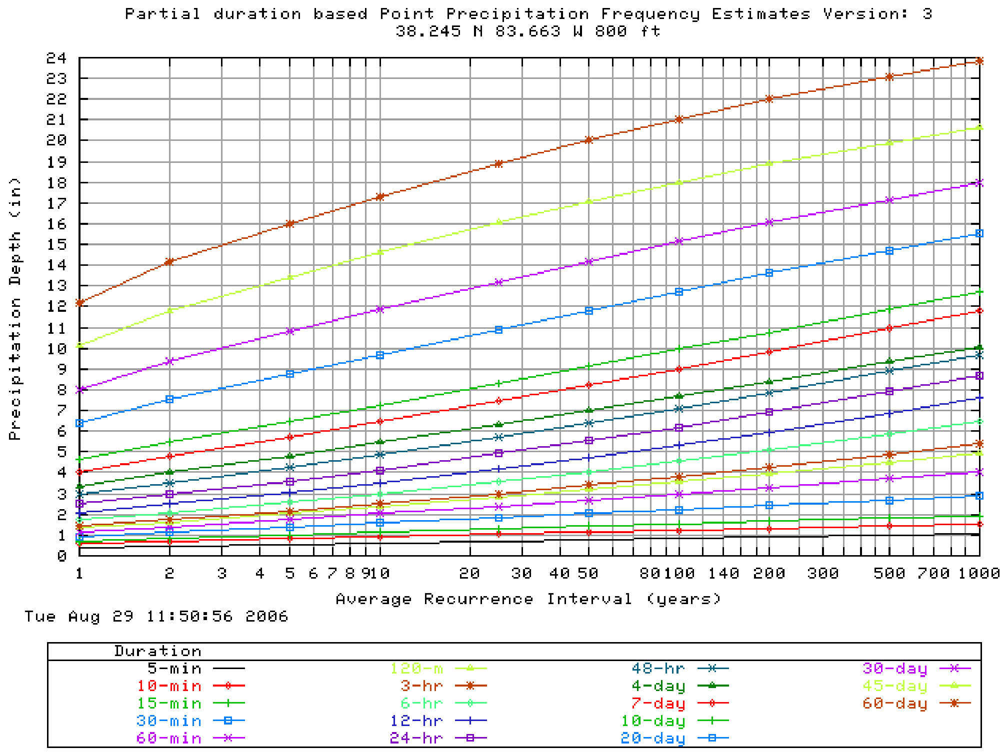


Figure 5.4.1. Sample depth-duration frequency plot with average recurrence interval on the x-axis.

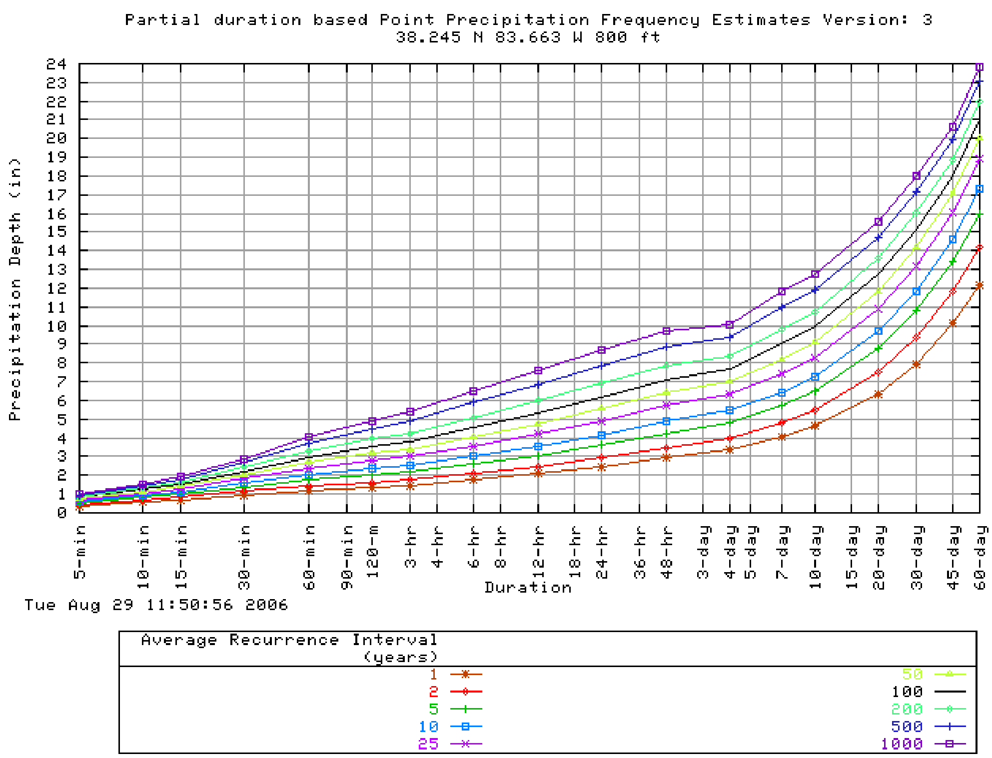


Figure 5.4.2. Sample depth-duration frequency plot with duration on the x-axis.

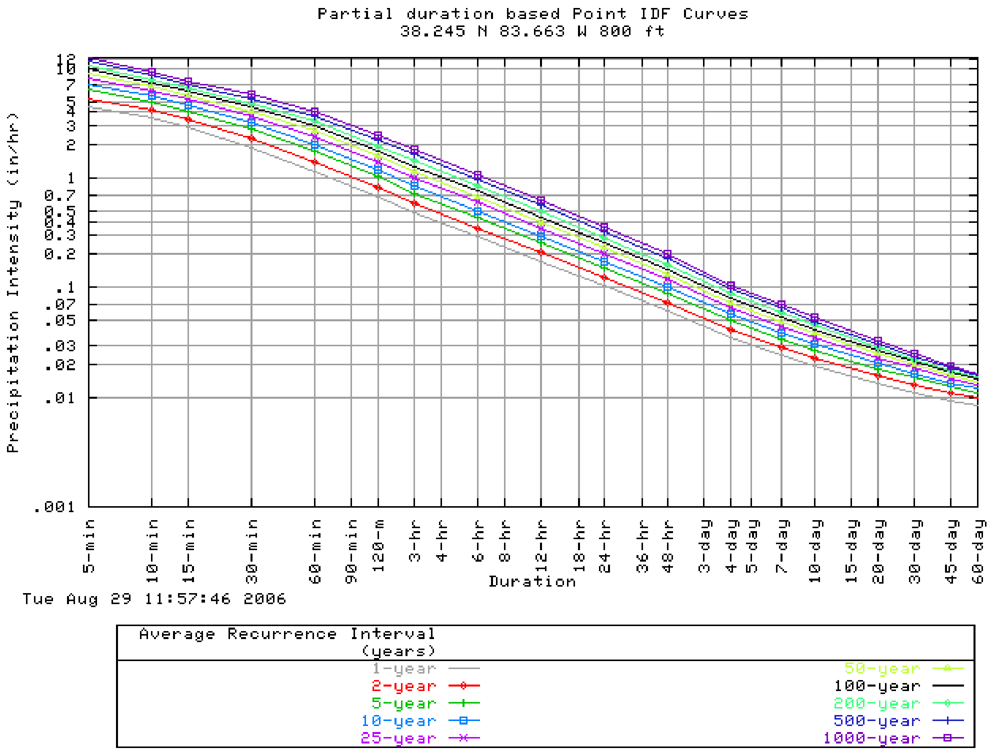


Figure 5.4.3. Sample intensity-duration-frequency (IDF) plot.

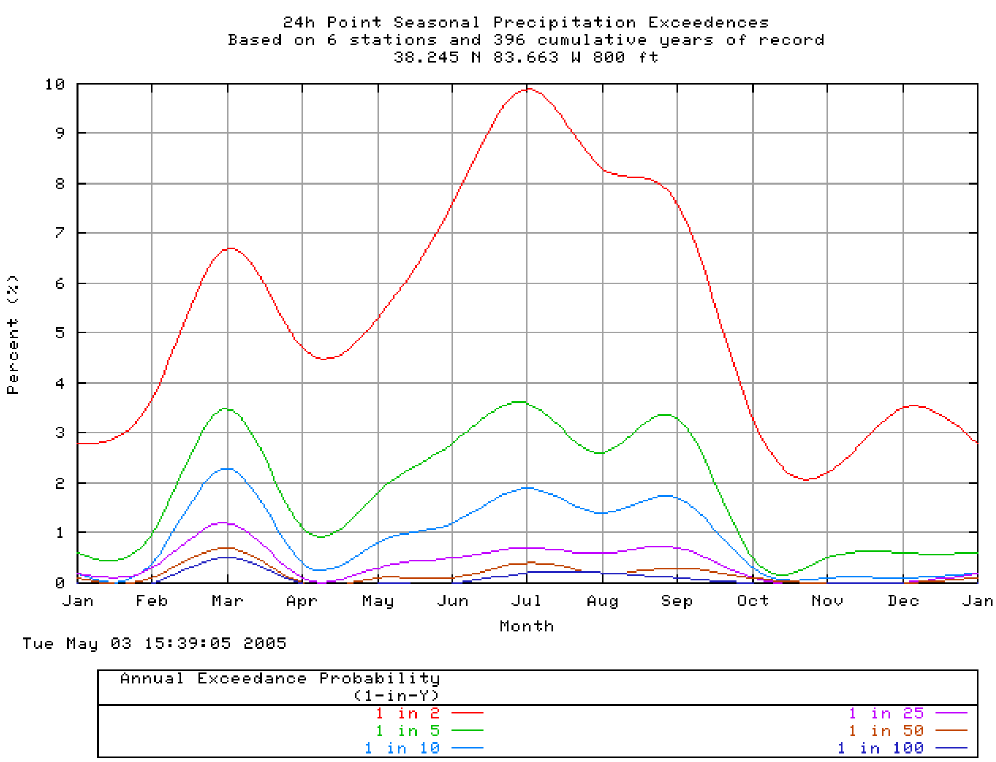


Figure 5.4.4. Sample 24-hour seasonal exceedance graph.

5.5. Using the Precipitation Frequency Data Server

The PFDS homepage (http://hdsc.nws.noaa.gov/hdsc/pfds/) has a clickable map of the United States. States with available precipitation frequency updates are indicated. Upon clicking on a state, a state-specific web page appears. From this page the user selects the desired location, units, and output via a web form.

The PFDS is also the portal for all NOAA Atlas 14 data formats, including:

- **Cartographic maps**
  These color maps were created to serve as visual aids and are not recommended for interpolating final point or area precipitation frequency estimates for design criteria. It is strongly recommended that point and areal values be obtained from the PFDS interface which accesses its data directly from the grids. These maps were based on contour lines (available as shapefiles from the PFDS) created from the final precipitation frequency estimate grids (Section 4.8.5). Figure 5.5.1 shows an excerpt from a cartographic map.

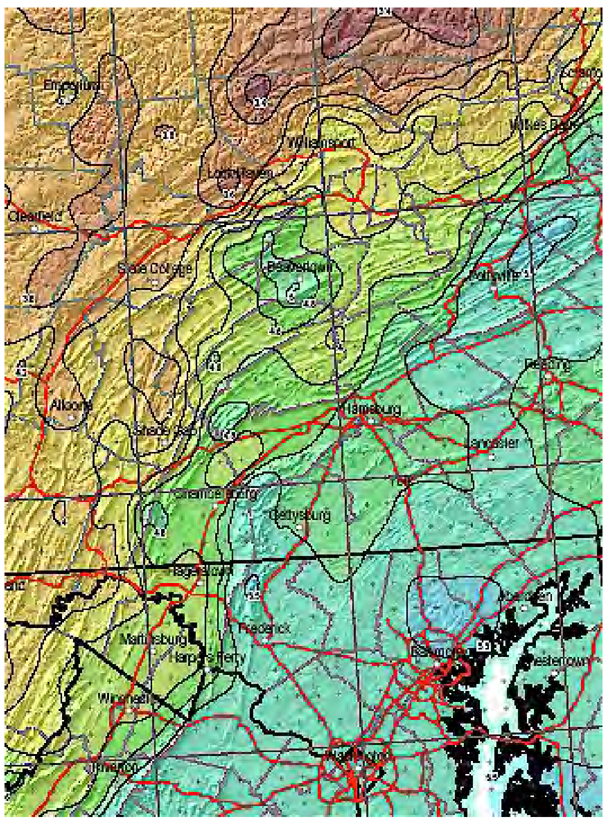


Figure 5.5.1. An excerpt of a cartographic map available from the PFDS.

- **GIS data**
  - Shapefiles (lines, vectors)
    These are the same files used to create the cartographic maps and are recommended for visual aids only.

- ArcInfo© ASCII grids
  These grids represent the highest resolution precipitation frequency estimates from which all other formats are derived.

- **Time Series (annual maximum and partial duration series)**
  The final high quality annual maximum series (AMS) and partial duration series (PDS) datasets used in the preparation of NOAA Atlas 14 Volume 2 are available at http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_series.html. Information regarding their extraction can be found in Section 4.1.3.

- **Temporal distributions of heavy rainfall**
  This report is available via a link (http://hdsc.nws.noaa.gov/hdsc/pfds/docs/NA14Vol2_A1.pdf) on the PFDS web site and in Appendix A.1 of this document. The report provides information about the temporal distribution of heavy precipitation for use with precipitation frequency estimates in NOAA Atlas 14 Volume 2. Temporal distributions for 6-, 12-, 24- and 96-hour durations are available.

- **Documentation**
  The complete NOAA Atlas 14 Volume 2 documentation is available via links on the PFDS web site.

It is strongly advised that users review the Federal Geographic Data Committee (FGDC) compliant metadata before using any of the GIS datasets. On-line help and frequently-asked questions (FAQ) are also available via links on the PFDS web site.

Questions regarding the use of the PFDS or its data can be addressed by emailing HDSC.Questions@noaa.gov or visiting the inquiry web site, http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_contact.html.

6. Peer Review

A peer review was conducted for the preliminary point precipitation frequency estimates and preliminary spatially interpolated estimates. Nearly 200 users, project sponsors and other interested parties were contacted via email for the review, which occurred from August 15, 2003 through September 14, 2003. The reviews provided critical feedback that HDSC used to create a better product.

The point precipitation frequency estimates and spatial distribution, which focused on a subset of maps, were reviewed during a one month period. For review purposes, draft 60-minute and 24-hour mean annual maximum grids were produced using PRISM. CRAB was then used to derive 100-year 60-minute and 100-year 24-hour grids from the PRISM grids. Both sets of grids were converted into cartographic maps in a PDF format for review.

HDSC received responses from 27 individuals or groups that were divided into 82 separate comments. Similar reviewer issues/comments were grouped together and addressed in a single HDSC response. There were 53 unique comments. Reviewer comments and HDSC responses can be found in Appendix A.5. Reviewers were asked to address comparisons to current design thresholds, cartographic elements, reasonableness of estimates and patterns when compared to local or regional knowledge, station locations, confidence limits, and potentially bad data. Further investigation and modification occurred subsequent to the initial HDSC responses.

Reviewer comments regarding data quality and expected spatial patterns generated further verification and/or modification of various geographic areas, such as northern Illinois. The most significant issue addressed as a result of the peer review pertained to the many comments regarding spatial “islands” or “bull’s eyes” in the 100-year maps. One particular unnatural low bull’s eye in the Chesapeake Bay area required further remediation in the mean annual precipitation map by increasing values at point locations by 10% to create spatial consistency (Appendix A.4). In addition, inconsistencies were noticed in some graphs of precipitation frequencies at the 60-minute and 24-hour durations relative to other durations. To resolve these concerns HDSC preliminarily investigated a total of 46 major and minor bull’s eyes in the 100-year 60-minute maps. As an end result, HDSC investigated consistency issues related to hourly-only stations and co-located daily/hourly stations. This ultimately led to modification of practical consistency adjustment procedures (Section 4.6.3), new increased spatial smoothing techniques (Section 4.8.4), and a slight modification in the PRISM process (Appendix A.4) to produce more spatially and temporally consistent results.

7. Interpretation

Point and areal estimates. The precipitation frequency estimates in this Atlas are point estimates, that is, estimates of precipitation frequency at a point location, not for an area. The conversion of point to areal estimates must take into account that, all other things being equal, as the area increases, the intensity decreases. This is done by applying an areal reduction factor (ARF) to the point estimates that are provided in this Atlas. Precipitation frequency estimates for areas can be computed by obtaining an average of the point values at all locations within the subject area and then multiplying that average by the appropriate areal reduction factor. Areal reduction factors have been published in previous publications: Technical Report 24 (Meyers and Zehr, 1980), Technical Memorandum HYDRO-40 (Zehr and Meyers, 1984), NOAA Atlas 2 (Miller et al., 1973), etc. At the time of this publication there is a companion project to update previously developed areal reduction factors.

Independence. Precipitation is highly variable both spatially and temporally, however within any particular storm event, point observations have a degree of correlation. The methods used to develop the point precipitation frequency estimates for this Atlas assume independence between the annual maxima analyzed and so the individual estimates in this Atlas express independent, point probabilities. That a point within a particular watershed may receive an amount equal to or greater than its 1 in 50 or 1 in 100 values at a particular time does not affect probabilities for any other point within that watershed.

Annual Exceedance Probability (AEP) and Average Recurrence Interval (ARI). As discussed in Section 3.2 and throughout this document, AEP is the probability that a particular level of rainfall will be exceeded in any particular year (at a particular location and duration) and is derived using the annual maximum series. An AEP depth or intensity may be exceeded once or more than once in a year. ARI is the average period between each exceedance and is derived for the partial duration series. As a result, the inverse of AEP is not ARI as is commonly assumed. Rather, the inverse of AEP is the average period between years with exceedances (Laurenson, 1987). One can convert between annual maximum and partial duration series results by using the ratio between partial duration and annual maximum results discussed in Section 4.6.4. This ratio approaches 1.0 for ARIs greater than about 25 years and so becomes significant only for values with ARIs less than about 25 years.

Exceedances. A certain number of exceedances can be statistically expected at a given station. For example, a rainfall with an AEP of 1 in 100 has a 1% chance of being exceeded approximately once in any given year at a particular station. When considering multiple stations that are sufficiently far apart to satisfy independence, the chance of observing such an event is directly proportional to the number of stations. For example, in the case of the 1 in 100 rainfall one can expect to observe approximately 10 such events each year in a network of 1,000 independent observing stations.

Use of confidence limits. Confidence limits provide users with an estimate of the uncertainty or potential error associated the precipitation frequency estimates. The error bounds about the precipitation frequency estimates and the probabilistic temporal distributions (Appendix A.1) enable designers to include estimations of error in the calculations by using Monte Carlo based ensemble modeling to estimate flow, rather than just applying a single value estimate.

Spatially interpolated confidence limits are provided with this Atlas. They were derived using the CRAB spatial derivation procedure (Section 4.8.2). The confidence limits are a function only of the error associated with the point precipitation frequency estimation and do not include error that may be associated with the spatial interpolation process.

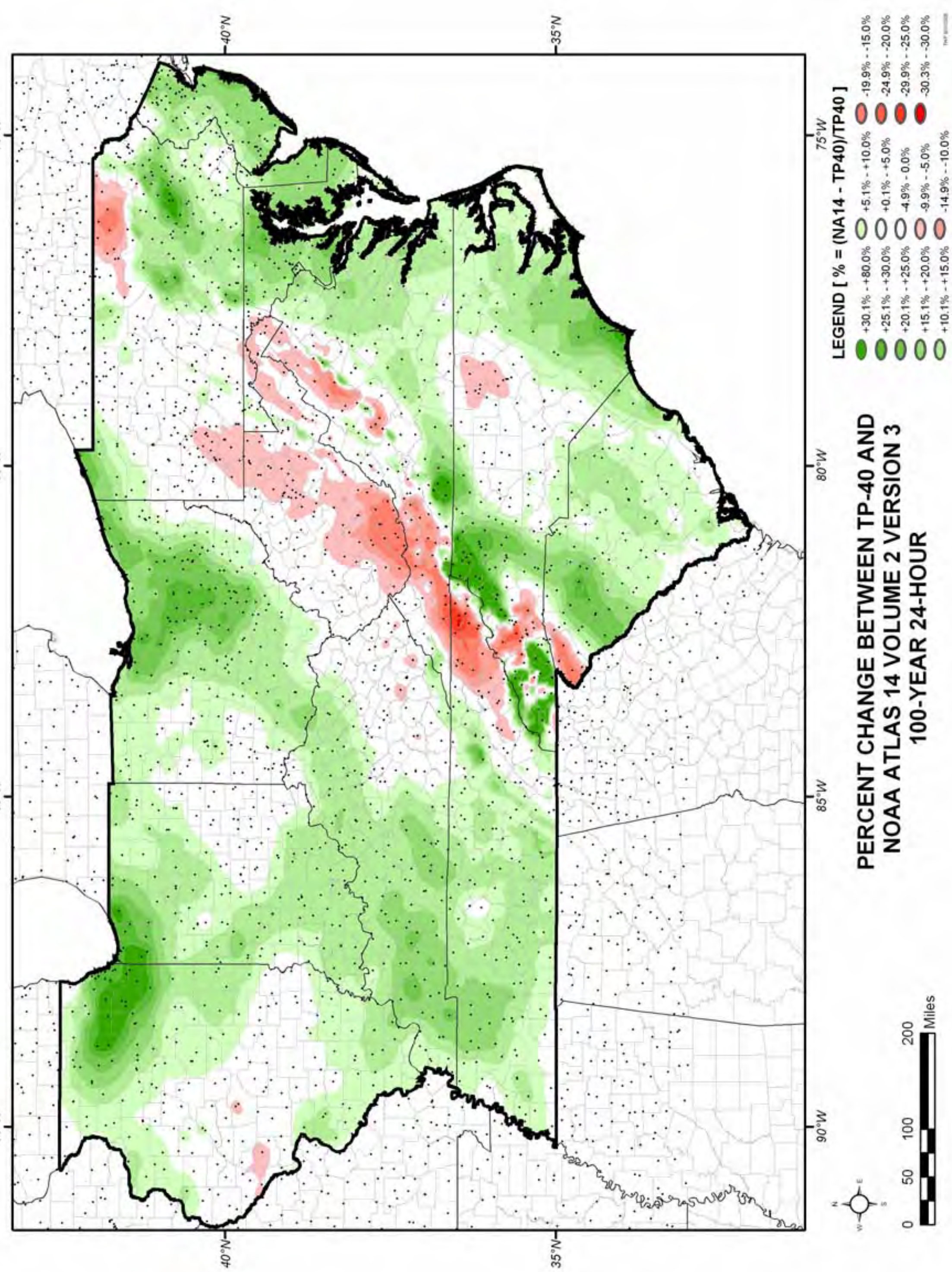
Climate change. The current practice of precipitation (and river height and flow) frequency analysis makes the implicit assumption that past is prologue for the future. Rainfall frequency distribution characteristics are extracted from the historical record and the estimates are applied in the design of future projects assuming the climate will remain the same as it was during the period of the analyzed record. If the climate changed in the past, then the characteristics extracted are an "average" for the analyzed period, not specifically representing the period before the change or after the change. Furthermore, if the climate changes in the future, there is no guarantee that the characteristics extracted are suitable for representing climate during the future lifecycle of projects being designed. There has been considerable research done regarding climate change and precipitation. NOAA's National Weather Service conducted an analysis of shifts and trends in the NOAA Atlas 14 Volume 2 1-day annual maximum series data (Appendix A.3). Results suggested little consistent observable effects of climate change on the annual maximum series and therefore on parameters used for this Atlas. As such, NOAA's National Weather Service has assumed that the full period of the available historical record derived from rain gauges was suitable for use in this analysis even though there were some local instances of linear trends and shifts in mean in the data.

Comparison with Technical Paper 40. In general, reasons for differences between the NOAA Atlas 14 precipitation frequency estimates and Technical Paper 40 estimates include longer records of data, more stations and greater effectiveness of new statistical procedures, including an objective spatial analysis. Figure 7.1 shows the percent differences between NOAA Atlas 14 and Technical Paper 40 for 100-year 24-hour estimates.

Differences between NOAA Atlas 14 Volume 2 and Technical Paper 40 results have been carefully considered. Areas of difference that were greater than 30% were investigated and found justified by the increased data availability, sound regionalization, more robust statistical procedures used in the current analysis and more advanced spatial interpolation process including higher resolution. “Differences” in this context refers to differences in the mean of the estimates. Because NOAA Atlas 14 is the first NWS publication to include confidence limits, a comparison of the confidence limits with previous publications was not possible. It should be noted from the width of the confidence limits that the errors associated with the estimates are not insignificant. It should also be noted that the confidence limits associated with NOAA Atlas 14 estimates are likely much narrower than in previous publications because of improvements in estimating techniques. In many cases, the mean estimates from previous publications, while different from NOAA Atlas 14, still fall within the confidence limits of NOAA Atlas 14.

Estimates were peer reviewed and careful consideration was given to reviewer comments. Often the analysis was modified to accommodate reviewer suggestions or additionally provided data. Appendix A.5 provides reviewer comments and NWS initial responses to those comments. Further investigation was conducted subsequent to the initial responses to satisfactorily resolve reviewer concerns.

Figure 7.1. Differences between NOAA Atlas 14 Volume 2 and Technical Paper 40 estimates.



Appendix A.1. Temporal distributions of heavy precipitation associated with NOAA Atlas 14 Volume 2

1. Introduction

Temporal distributions of heavy precipitation are provided for use with precipitation frequency estimates from NOAA Atlas 14 Volume 2 for 6-, 12-, 24- and 96-hour durations covering the Ohio River basin and surrounding states. The temporal distributions are expressed in probabilistic terms as cumulative percentages of precipitation and duration at various percentiles. The starting time of precipitation accumulation was defined in the same fashion as it was for precipitation frequency estimates for consistency.

Temporal distributions for each duration are presented in Figure A.1.1. The data were also subdivided into quartiles based on where in the distribution the most precipitation occurred in order to provide more specific information on the varying distributions that were observed. Figures A.1.2 through A.1.5 depict temporal distributions for each quartile for the four durations. Digital data to generate the temporal distributions are available at http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_temporal.html. Table A.1.1 lists the number and proportion of cases in each quartile for each duration.

2. Methodology

This project largely followed the methodology used by the Illinois State Water Survey (Huff, 1990) except in the definition of the precipitation accumulation. This project computed precipitation accumulations for specific (6-, 12-, 24- and 96-hour) time periods as opposed to single events or storms in order to be consistent with the way duration was defined in the associated precipitation frequency project. As a result, the accumulation cases may contain parts of one, or more than one precipitation event. Accumulation computations were made moving from earlier to later in time resulting in an expected bias towards front loaded distributions when compared with distributions for single storm events.

For every precipitation observing station in the project area that recorded precipitation at least once an hour, the three largest precipitation accumulations were selected for each month in the entire period of record and for each of the four durations. A minimum threshold was applied to make sure only heavier precipitation cases were being captured. The precipitation with an average recurrence interval (ARI) of 2 years at each observing station for each duration was used as the minimum threshold at that station.

A minimum threshold of 25-year ARI was tested. It was found to produce results similar to using a 2-year ARI minimum threshold. The 25-year ARI threshold was rejected because it reduced the number of samples sufficiently to cause concern for the stability of the estimates.

To determine whether distributions varied appreciably across the project area, temporal distributions based on data only from the Southeast coast and the extreme Northwest portion of the project area were computed separately, and compared to the distributions computed for the project area as a whole. The distributions were nearly identical. As a result the temporal distributions presented here were based on the entire project area because of the larger sample size and because the distributions varied so little by region.

Each of the accumulations was converted into a ratio of the cumulative hourly precipitation to the total precipitation for that duration, and a ratio of the cumulative time to the total time. Thus, the last value of the summation ratios always had a value of 100%. The data were combined, cumulative deciles of precipitation were computed at each time step, and then results were plotted to provide the graphs presented in Figure A.1.1. The data were also separated into categories by the quartile in which the greatest percentage of the total precipitation occurred and the procedure was repeated for each quartile category to produce the graphs shown in Figures A.1.2 through A.1.5. A moving window weighted average smoothing technique was performed on each curve.

3. Interpreting the Results

Figure A.1.1 presents cumulative probability plots of temporal distributions for the 6-, 12-, 24- and 96-hour durations for the project area. Figures A.1.2 through A.1.5 present the same information but for categories based on the quartile of most precipitation. The x-axis is the cumulative percentage of the time period. The y-axis is the cumulative percentage of total precipitation.

The data on the graph represent the average of many events illustrating the cumulative probability of occurrence at 10% increments. For example, the 30% of cases in which precipitation is concentrated closest to the beginning of the time period will have distributions that fall above and to the left of the 30% curve. At the other end of the spectrum, only 10% of cases are likely to have a temporal distribution falling to the right and below the 90% curve. In these latter cases the bulk of the precipitation falls toward the end of the time period. The 50% curve represents the median temporal distribution on each graph.

First-quartile graphs consist of cases where the greatest percentage of the total precipitation fell during the first quarter of the time period, i.e., the first 1.5 hours of a 6-hour period, the first 3 hours of a 12-hour period, etc. The second, third and fourth quartile plots, similarly are for cases where the most precipitation fell in the second, third or fourth quarter of the time period.

The time distributions consistently show a greater spread, and therefore greater variation, between the 10% and 90% probabilities as the duration increases. Longer durations are more likely to have captured more than one event separated by drier periods; however, this has not been objectively tested as the cause of the greater variation at longer durations. The median of the distributions gradually becomes steeper at longer durations.

The following is an example of how to interpret the results using Figure A.1.4a and Table A.1.1. Of the 18,453 cases of the 24-hour duration, 6,675 of them were first-quartile events:

- In 10% of these cases, 50% of the total rainfall (y-axis) fell in the first 1.8 hours of event time (7.5% on the x-axis). By the 11th hour (46% on the x-axis), all of the precipitation (100% on the y-axis) had fallen and it was dry for the rest of the 24-hour period.
- A median case of this type will drop half of its total rain (50% on the y-axis) in 4.6 hours (19% on the x-axis).
- In 90 percent of these cases, 50% of the total precipitation fell by 9.4 hours (39% on the x-axis).

4. Application of Results

Care should be taken in the use of these data. The data are presented in order to show the range of possibilities and to show that the range can be broad. The data should be used in a way that reflects the goals of the user. For example while all cases represented in the data will preserve volume, there will be a broad range of peak flow that could be computed. In those instances where peak flow is a critical design criterion, users should consider temporal distributions likely to produce higher peaks rather than the 50^{th} percentile or median cases, for example. In addition, users should consider whether using results from one of the quartiles rather than from the "all cases" sample might achieve more appropriate results for their situation.

5. Summary and General Findings

The results presented here can be used for determining temporal distributions of heavy precipitation at particular durations and amounts and at particular levels of probability. The results are designed for use with precipitation frequency estimates and may not be the same as the temporal distributions of single storms or single precipitation events. The time distributions show a greater spread between the percentiles with increasing duration. The median of the distributions becomes steeper with increasing duration. A majority of the cases analyzed were first-quartile regardless of duration (Table A.1.1). Fewer cases fell into each of the subsequent quartile categories with the fourth quartile containing the fewest number of cases at all durations.

Table A.1.1. Numbers and proportion of cases in each quartile for each duration and temporal distribution associated with NOAA Atlas 14 Volume 2.

	1st Quartile	**2nd Quartile**	**3rd Quartile**	**4th Quartile**	**Total number of cases**
6-hour	5,803 (34%)	5,164 (30%)	3,916 (23%)	2,195 (13%)	17,078
12-hour	6,412 (35%)	4,823 (27%)	4,099 (23%)	2,757 (15%)	18,101
24-hour	6,675 (36%)	4,821 (26%)	4,139 (23%)	2,818 (15%)	18,453
96-hour	8,242 (43%)	3,947 (21%)	3,595 (19%)	3,324 (17%)	19,108

FIGURE A.1.1
TEMPORAL DISTRIBUTION: ALL CASES

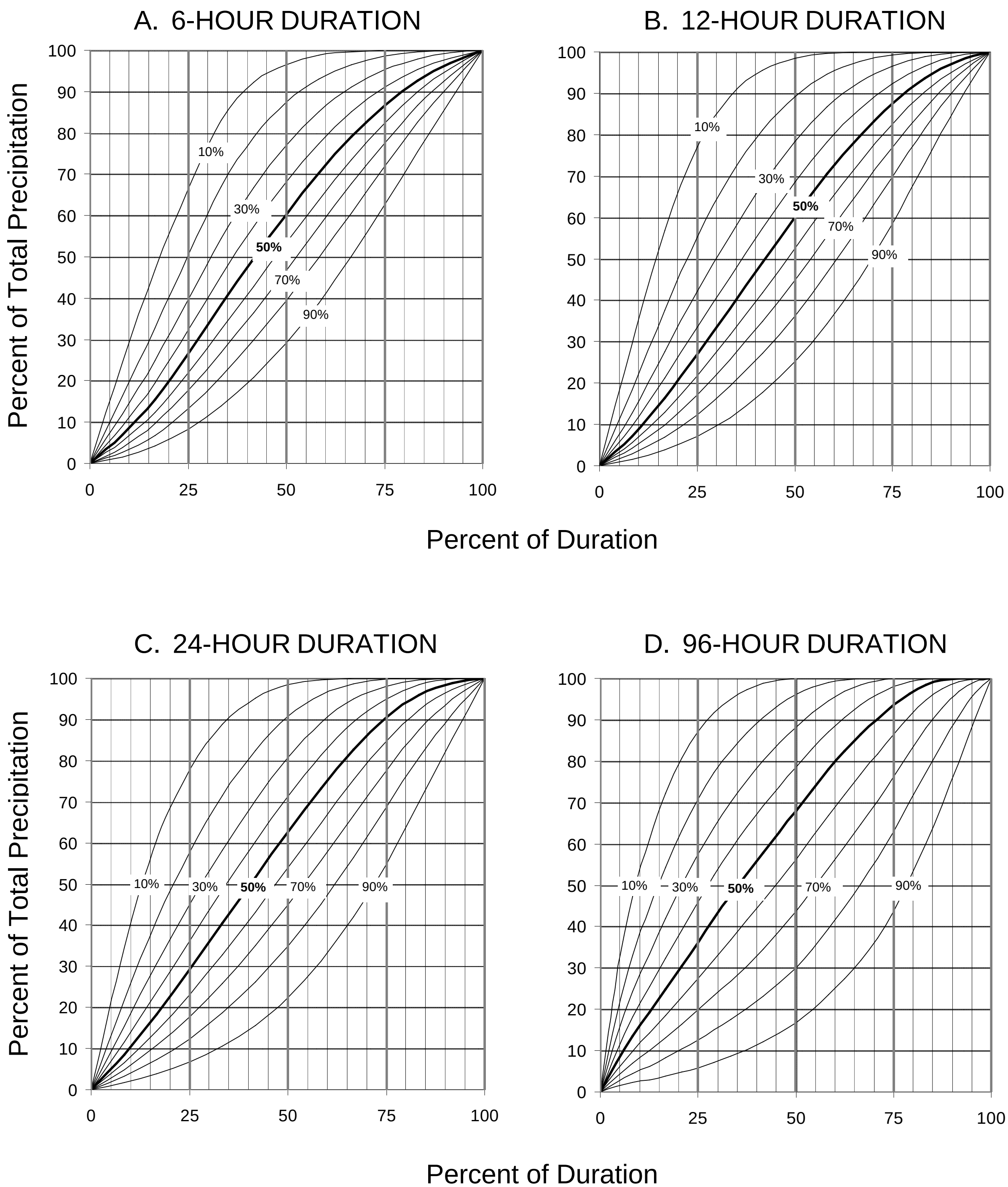


FIGURE A.1.2
TEMPORAL DISTRIBUTION: 6-HOUR DURATION

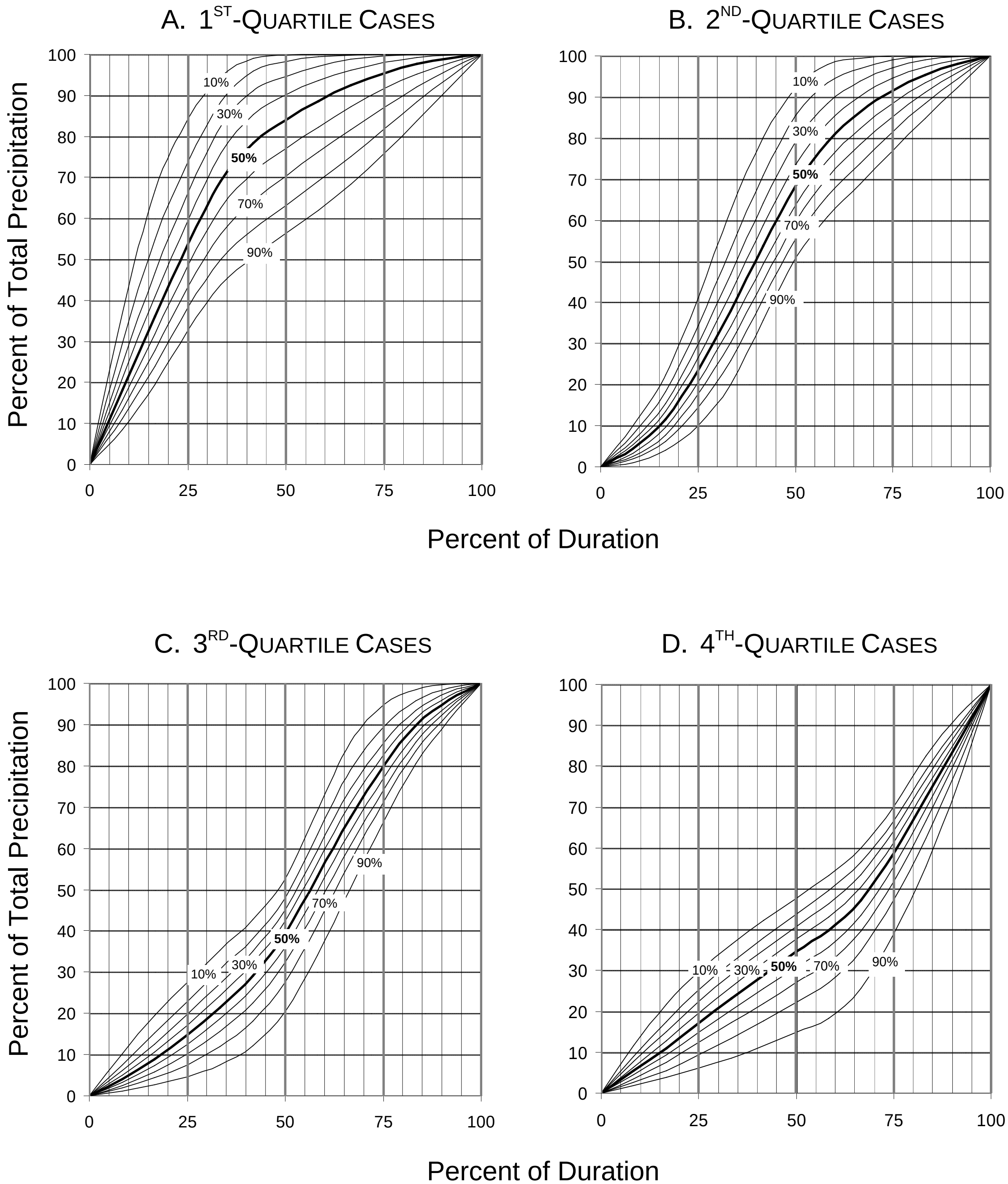


FIGURE A.1.3
TEMPORAL DISTRIBUTION: 12-HOUR DURATION

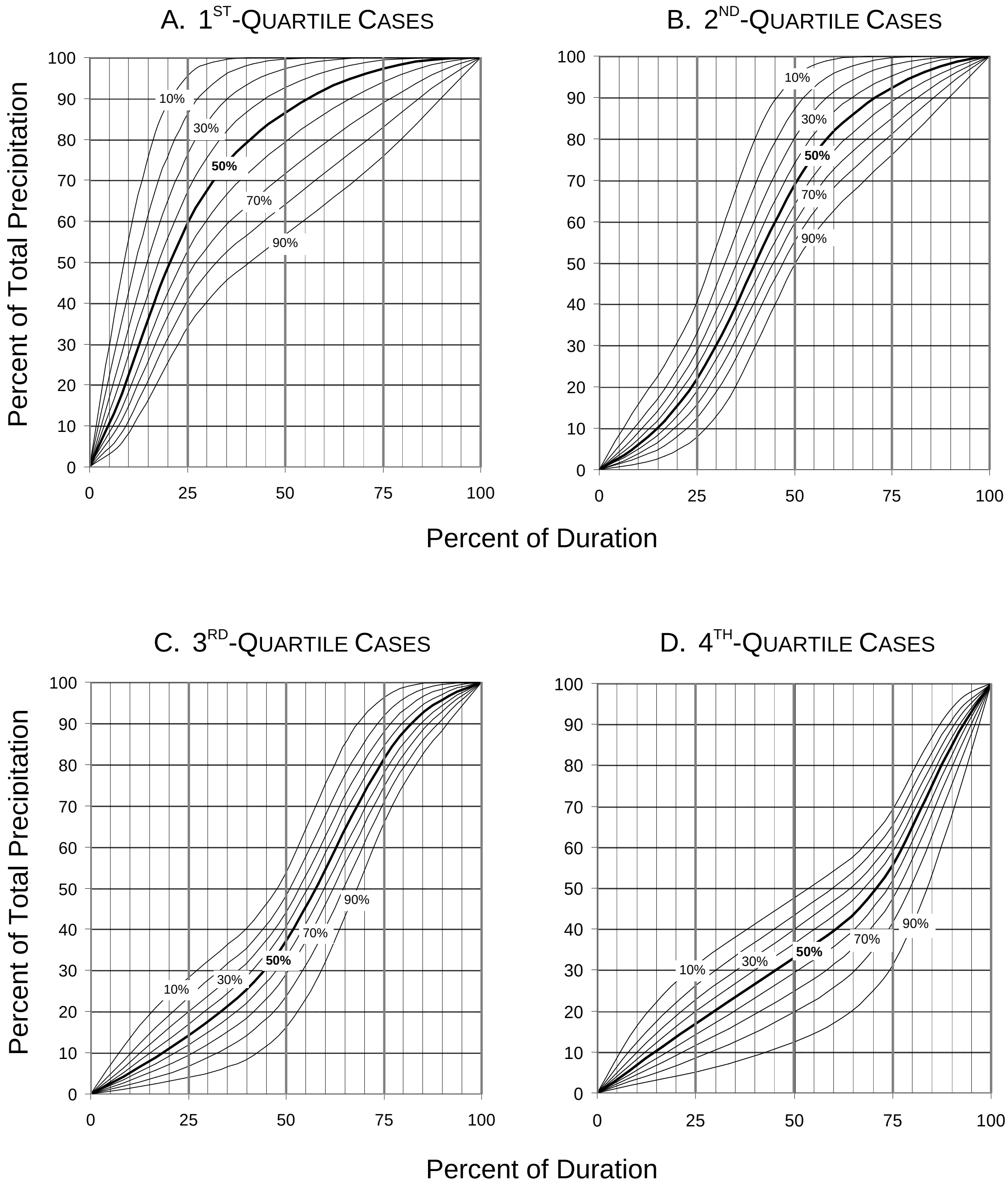


FIGURE A.1.4
TEMPORAL DISTRIBUTION: 24-HOUR DURATION

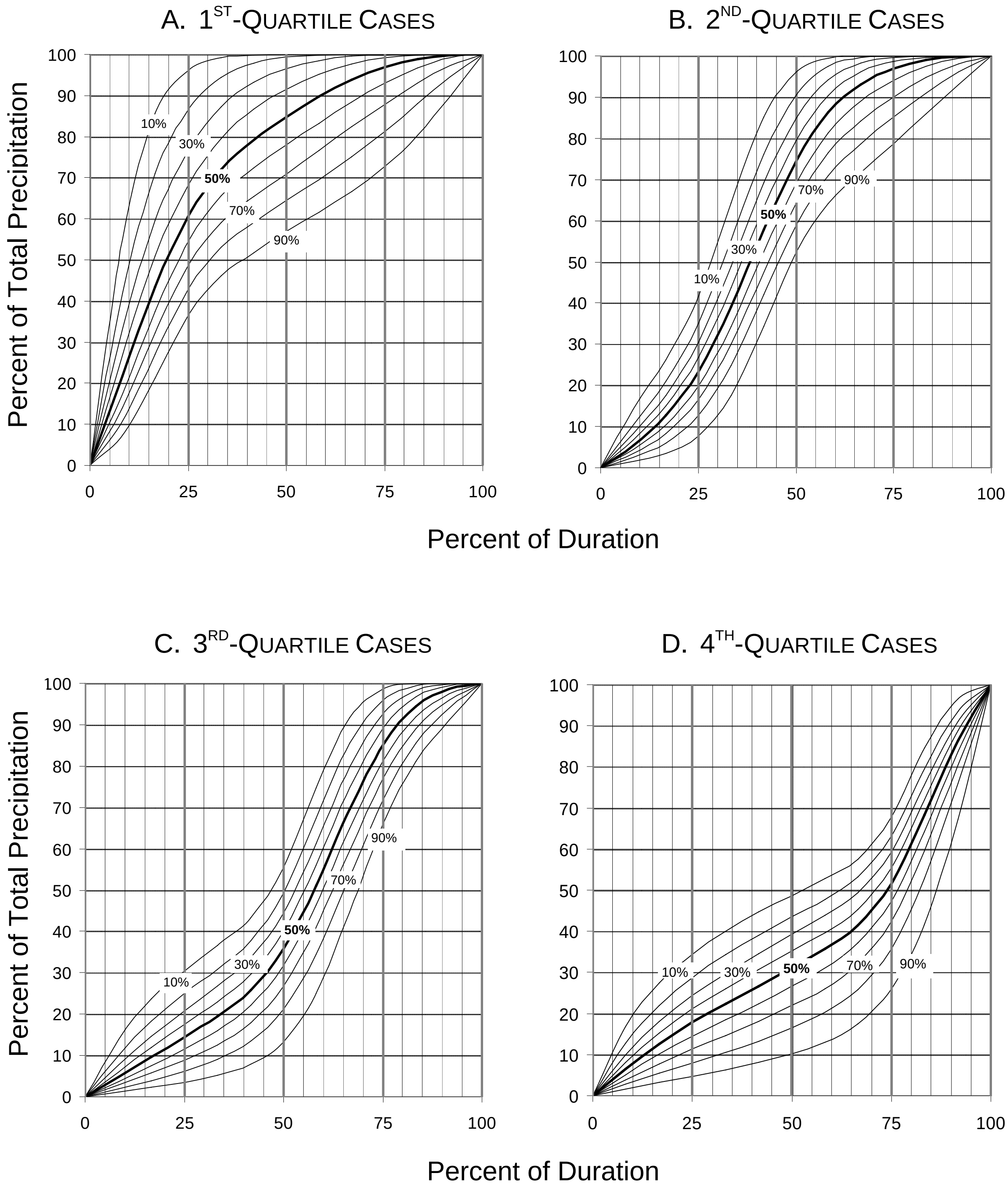
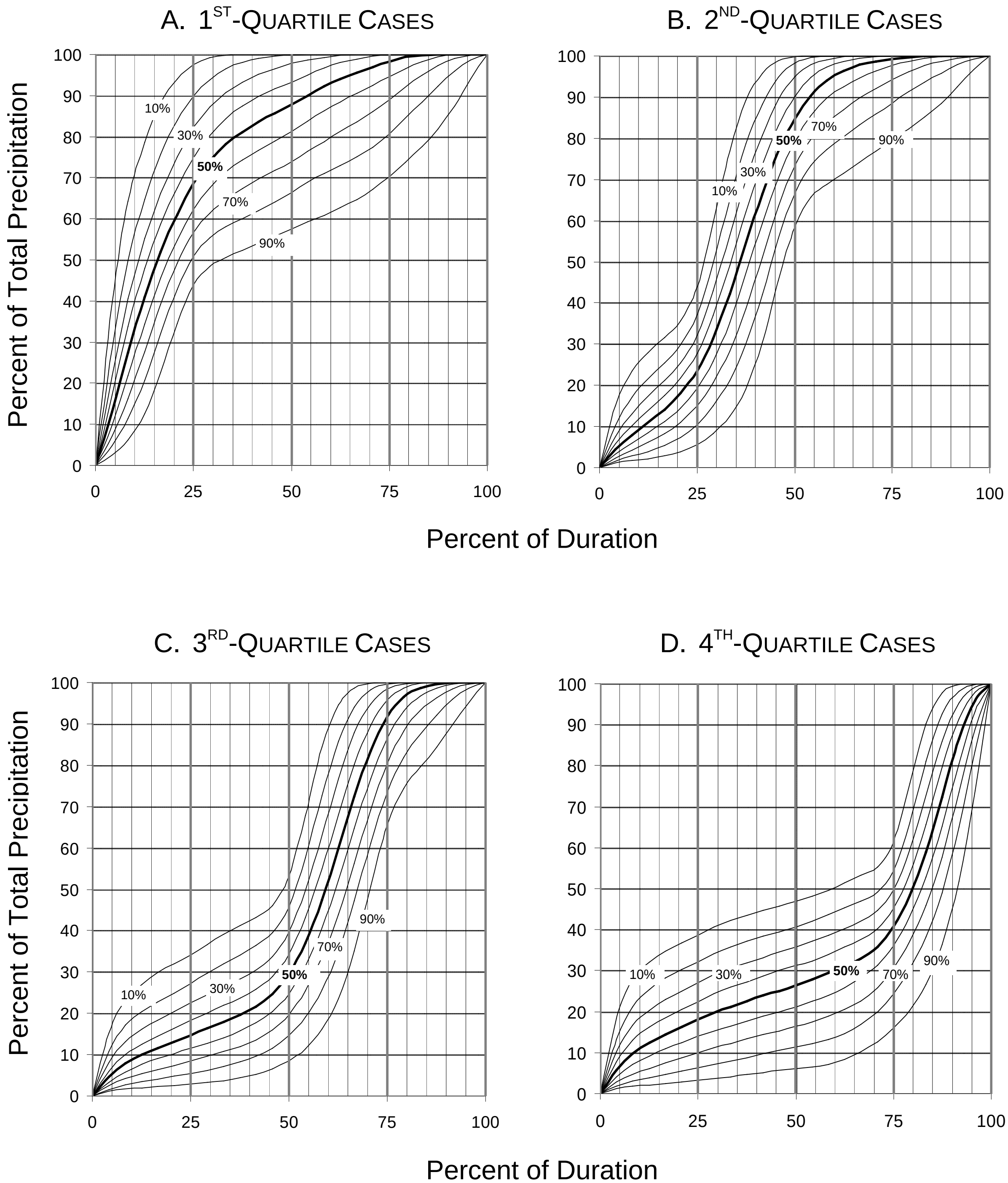


FIGURE A.1.5
TEMPORAL DISTRIBUTION: 96-HOUR DURATION



Appendix A.2. Seasonality

1. Introduction

Extreme precipitation over the Ohio River basin and surrounding states project area varies seasonally and regionally. Rainfall from tropical storms produce much of the extreme precipitation across the southeast Atlantic coastal states in the late summer and early fall. Further north, these tropical storms interact with frontal systems and produce extreme precipitation in the Mid-Atlantic and Central Appalachians. Thunderstorms, especially in the western and northwestern portions of the Ohio River basin and surrounding states project area occur mainly in the warm season (April to October) and produce short to medium (5-minute to 48-hour) annual maximum precipitation. These mechanisms include localized heavy thunderstorms as well as mesoscale convective complexes and systems. Fronts and mid-latitude weather systems in the north produce cool season extreme precipitation and long duration (>24-hour) annual maximum precipitation. Orographic influences in the Appalachian Mountains enhance precipitation on the upslope side and decrease precipitation on the downslope side. Sea breeze and lake breeze boundaries influence precipitation on the Atlantic coast and near the Great Lakes in the summer while coastal fronts enhance precipitation in the winter.

To portray the seasonality of extreme precipitation throughout the project area, precipitation observations that exceeded given annual exceedance probabilities were examined for each region used in the analysis (Figures 4.4.1 and 4.4.2). Exceedance graphs showing this information on a monthly basis are provided as part of the Precipitation Frequency Data Server (PFDS).

2. Method

Exceedance graphs were prepared showing the percentage of events that exceeded selected annual exceedance probabilities (AEPs) in each month for each region. The quantiles were derived from annual maximum series at each station in the region as described in Section 4.2, Regional approach based on L-moments. Each graph shows the exceedances of the 1 in 2, 5, 10, 25, 50 and 100 AEPs.

Results for the 60-minute, 24-hour, 48-hour and 10-day durations are each provided in separate graphs. The results were compiled for each hourly region for the 60-minute (Figure 4.4.2) and each daily region for the 24-hour, 48-hour and 10-day (Figure 4.4.1).

To prepare the graphs, the number of events exceeding the precipitation frequency estimate at a station for a given AEP was tabulated for the selected durations. Cases were extracted in the same manner as for the generation of the annual maximum series (Section 4.1.3). The output for all stations in a given region was then combined, sorted by month, normalized by the total number of data years in the region and plotted via the PFDS.

3. Results

Seasonal exceedance graphs are available via the PFDS (http://hdsc.nws.noaa.gov/hdsc/pfds/). When a point is selected, a user can view the seasonal exceedance graphs by clicking the “Seasonality” button. The exceedance graphs (see Figure A.2.1 for an example) indicate a measure of events exceeding the corresponding AEP for the specified duration. The percentages are based on regional statistics. The total number of stations and the total number of cumulative data years for a given region are provided in the graph title.

The AEPs represent the probability of an event occurring that exceeds the quantile in any given year (i.e., 1 in 100 or 0.01 probability). Theoretically, 50% of the total number of events could exceed the 1 in 2 AEP, 4% could exceed the 1 in 25 AEP, 2% could exceed the 1 in 50 AEP and only 1% could exceed the 1 in 100 AEP. In other words, the sum of the 1 in 2 AEP percentages for each month in the graph roughly equals 50%.

The graphs also show how the seasonality of precipitation may differ between shorter duration and longer duration events in a region.

Seasonal precipitation frequency estimates cannot be derived from the graphs.

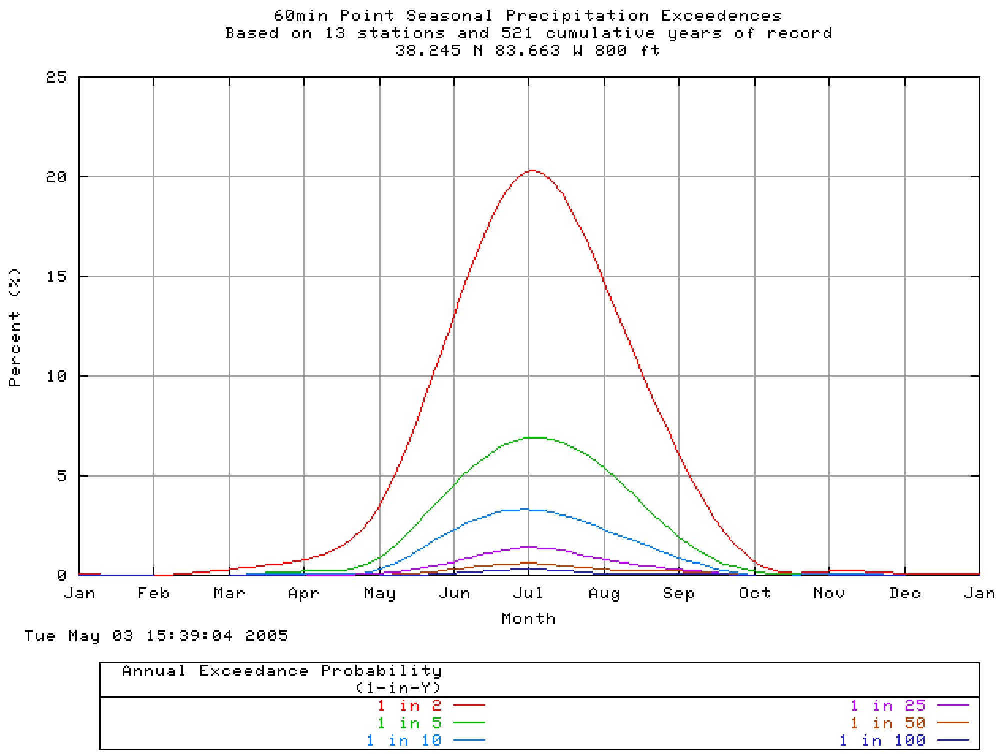


Figure A.2.1. Example of seasonal exceedance graph for the 60-minute duration.

Appendix A.3. Time series trend analysis associated with NOAA Atlas 14 Volume 2

1. Introduction

Precipitation frequency studies make the implicit assumption that the past is prologue for the future, i.e. that climate is stationary. Tests for linear trends in means and variance and shifts in mean were conducted on the 1-day annual maximum time series to verify the suitability of the data for this Atlas. The results of each test are provided and two specific examples of stations with linear trends and shifts are presented here. It was concluded that while there are some local instances of linear trends and shifts in mean in the data, it could be assumed that there was no consistent observed impact of climate change on the annual maximum series used for this Atlas. In particular, the impact upon the L-moment statistics and results of this Atlas would be small. Therefore, since it is beneficial to retain as much data as possible and thereby increase the robustness of the results, the entire period of record was used.

2. Linear Trend Tests

2.1. Methods

Linear trend tests were conducted to determine if there were any general increasing or decreasing patterns in the 1-day annual maximum series at a station through time. Data were tested for a linear trend in annual maximum series using the linear regression model and t-test of the correlation coefficient (Maidment, 1993, p17.30) at the 90% confidence level. Linear trends in variance were also tested by constructing a variance-related variable, an index of the square of deviation, or $v_i = (x_i - \overline{x})^2$ where, x_i is the annual maximum series data for i = 1, 2, …, n - the data year at a station, and $\overline{x}$ is the mean of the data. The index was then applied as a simple variable in the linear trend model. It was necessary for there to be a continuous time series to be eligible for the linear trend test. A minimum length of 50 years was chosen because it was sufficient to give reliable results and was close to the average data length of available stations.

Stations with gaps in the data record (i.e., sequential years of missing data) were evaluated and additional criteria were applied to maximize the use of limited data while still maintaining the integrity of the time series for the tests.

- Stations with gaps greater than or equal to 10 years were not used.
- Stations with a 5-9 year gap but with at least 6 years of data on both sides of the gap were retained.
- Stations were truncated where appropriate to eliminate gaps and still retain a record of 50 years or more. For instance, stations with a 5-9 year gap and less than 6 years of data at the beginning or end of a time series were truncated.

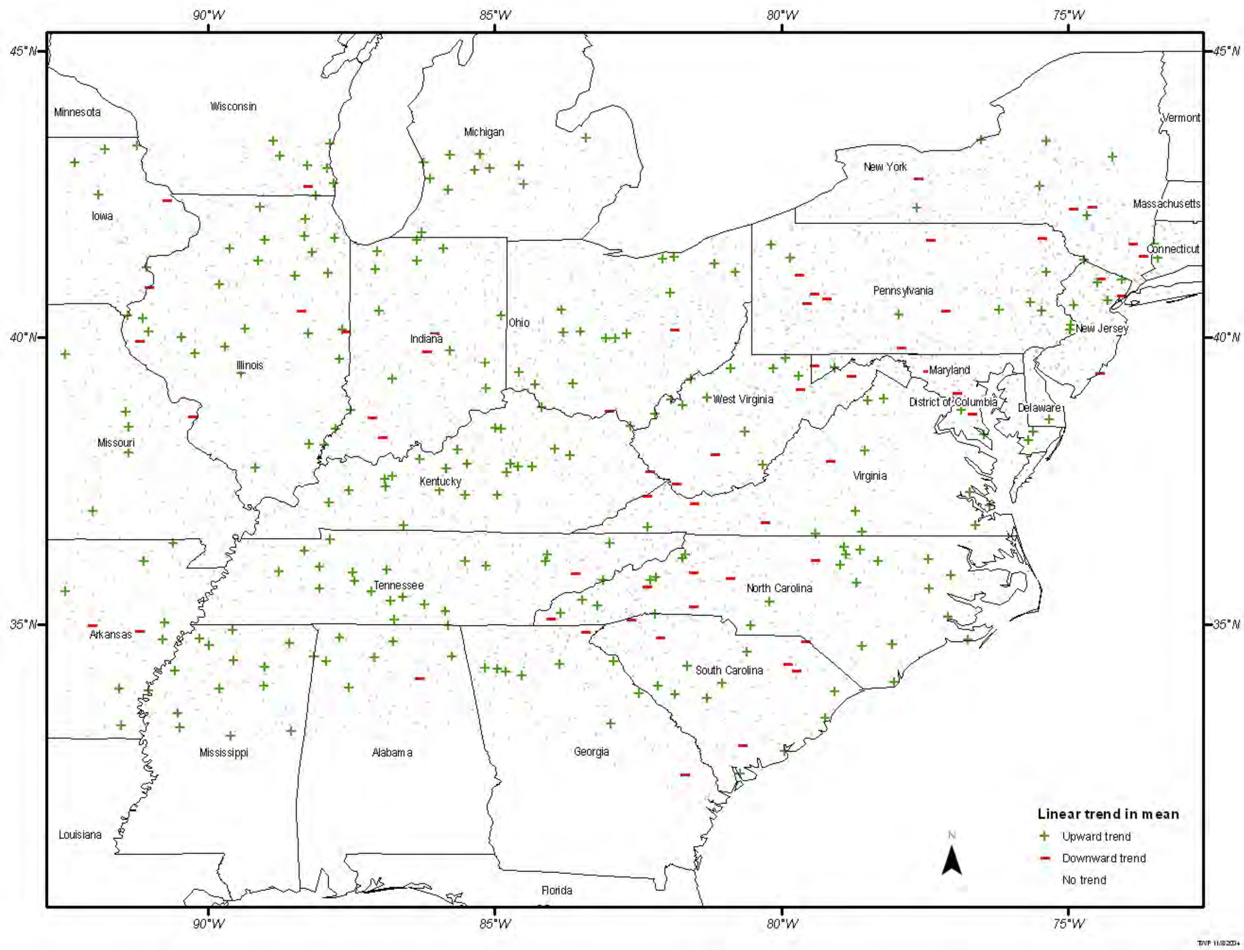
2.2. Linear Trend Results

Of 2,846 stations in the project area, 1,865 (or 65.5%) were eligible for the test. Of those tested stations, 16.4% exhibited a linear trend in their annual maximum series (13.1% in a positive direction, 3.3% in a negative direction). Table A.3.1 lists the linear trend results by state in the project area including the border areas. Figure A.3.1 shows the spatial distribution of stations with linear trends.

Table A.3.1. Number of stations tested and linear trend test results by state.

State	# Tested	# No Trend	# Trend	# Pos. Trend	# Neg. Trend	% Tested with Trend
Alabama	49	40	9	8	1	18.4
Arkansas	53	44	9	7	2	17.0
Connecticut	14	10	4	3	1	28.6
Delaware	11	10	1	1	0	9.1
Georgia	73	63	10	8	2	13.7
Illinois	157	128	29	25	4	18.5
Indiana	109	92	17	13	4	15.6
Iowa	53	46	7	6	1	13.2
Kentucky	100	78	22	22	0	22.0
Maryland	49	39	10	5	5	20.4
Michigan	52	41	11	11	0	21.2
Mississippi	61	47	14	14	0	23.0
Missouri	80	74	6	5	1	7.5
New Jersey	54	47	7	4	3	13.0
New York	113	102	11	6	5	9.7
North Carolina	140	110	30	24	6	21.4
Ohio	138	121	17	15	2	12.3
Pennsylvania	168	150	18	10	8	10.7
South Carolina	80	63	17	11	6	21.3
Tennessee	93	73	20	19	1	21.5
Virginia	92	78	14	10	4	15.2
West Virginia	87	71	16	11	5	18.4
Wisconsin	37	30	7	6	1	18.9
76-	2	2	0			0.0
Total	**1865**	**1559**	**306**	**244**	**62**	**16.4**

Figure A.3.1. Spatial distribution of linear trend results, where "+" indicates a station with a positive trend and "-" indicates a negative trend.



Geographically, there were more downward trending stations in the east and southeast, with a small cluster occurring near the southeast side of the Appalachian Mountains. There were 2 fairly large groups of upward trending stations: one in Ohio, Kentucky, Tennessee and Mississippi, and one in northern Illinois and western Michigan. However, the majority of stations exhibited no trend.

Overall, there appeared to be no definitive linear trend in the tested annual maximum time series and no obvious preference for geographic location.

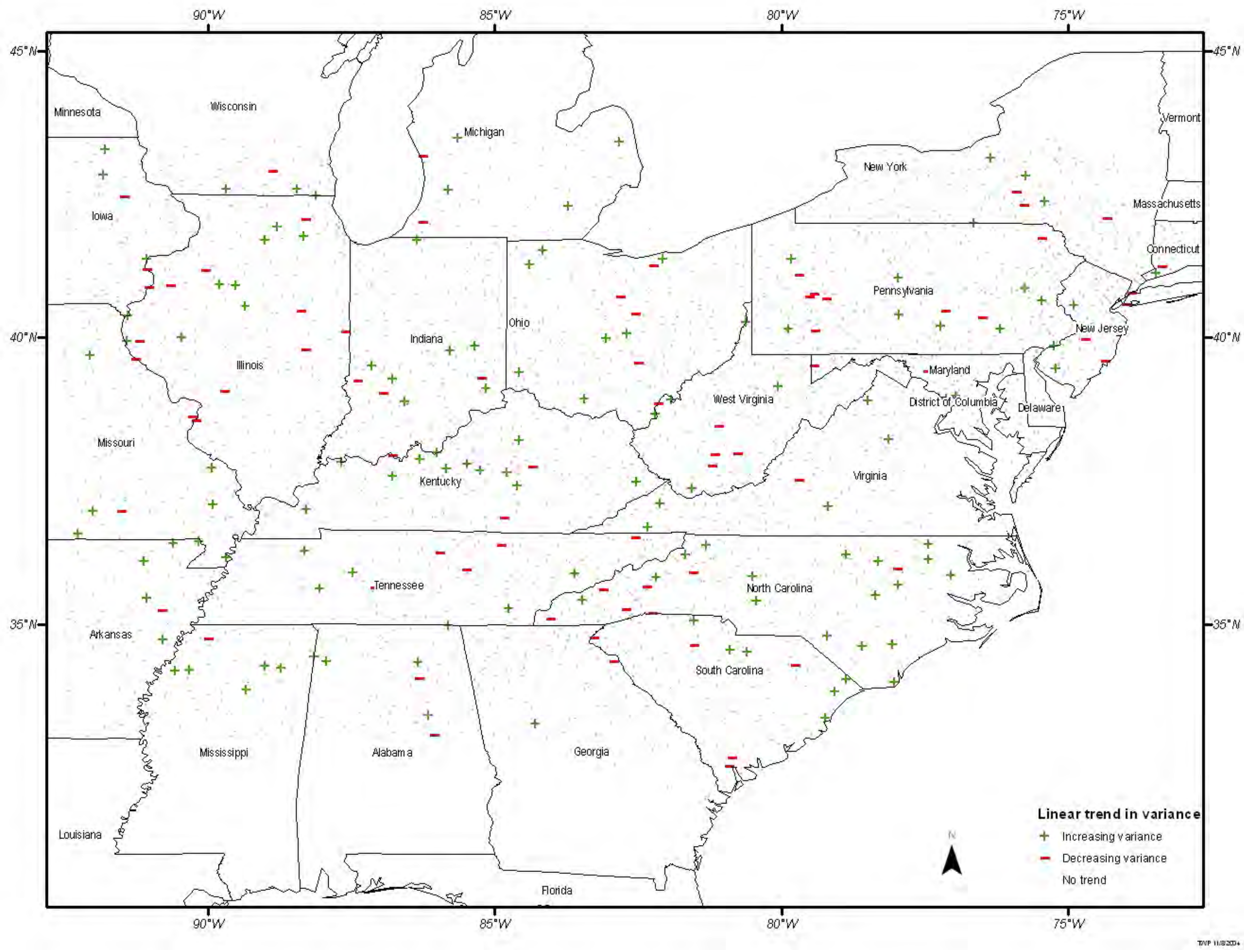
2.3. Linear Trend in Variance Results

Of the 1,865 stations tested, 10.7% exhibited a trend in the variance of annual maximums (6.7% in a positive direction, 4.0% in a negative direction). In other words, 6.7% of the stations that exhibited such a trend showed an increase in variance. Table A.3.2 lists the trend in variance results by state in the project area. Figure A.3.2 shows the spatial distribution of those stations that had a trend in variance.

Table A.3.2. Number of stations tested and linear trend in variance test results by state.

State	# Tested	# No Trend	# Trend	# Pos. Trend	# Neg. Trend	% Tested with Trend
Alabama	49	42	7	5	2	14.3
Arkansas	53	47	6	5	1	11.3
Connecticut	14	12	2	1	1	14.3
Delaware	11	11	0	0	0	0.0
Georgia	73	71	2	1	1	2.7
Illinois	157	137	20	9	11	12.7
Indiana	109	96	13	9	4	11.9
Iowa	53	48	5	4	1	9.4
Kentucky	100	88	12	10	2	12.0
Maryland	49	45	4	2	2	8.2
Michigan	52	46	6	4	2	11.5
Mississippi	61	55	6	5	1	9.8
Missouri	80	71	9	6	3	11.3
New Jersey	54	50	4	2	2	7.4
New York	113	104	9	4	5	8.0
North Carolina	140	116	24	17	7	17.1
Ohio	138	126	12	8	4	8.7
Pennsylvania	168	151	17	9	8	10.1
South Carolina	80	68	12	6	6	15.0
Tennessee	93	83	10	5	5	10.8
Virginia	92	86	6	5	1	6.5
West Virginia	87	77	10	5	5	11.5
Wisconsin	37	34	3	2	1	8.1
76-	2	2	0			0.0
Total	**1865**	**1666**	**199**	**124**	**75**	**10.7**

Figure A.3.2. Spatial distribution of trend in variance results, where "+" indicates a station with a positive trend and "-" indicates a negative trend.



There was some indication that there are more stations with increasing variance in eastern North Carolina when compared to inland. But primarily, there was no well-defined geographic pattern among the upward and downward trending stations. The majority of stations exhibited no trend.

Overall, there appeared to be no definitive linear trend in variance in the tested annual maximum time series and no obvious preference for geographic location.

3. Shift in Mean Tests

3.1. Methods

A shift test was conducted to compare the means of 1-day annual maximum series for two consecutive time periods at a station. The data were tested for shifts in mean using Mann Whitney non-parametric test (Newbold, 1988, p403) and the t-test (Lin, 1980, p160) at the 90% confidence levels. The Mann Whitney is a qualitative test that indicated if a shift occurred but not the direction of the shift. The t-test provided a quantitative measurement of the percentage that the mean shifted from one time period to the next. Both tests give consistent results suggesting that the parametric t-test results can be used with assurance to assign quantitative values to observed shifts. A division of 1958 was tested because 1958 was the final year for which Technical Paper 40 (Hershfield, 1961) had data. The results would indicate whether a shift has occurred since the publication of earlier precipitation frequency estimates. A minimum of 30 years of data in each data segment were required at a station to test for shifts in mean.

Since the Mann Whitney test uses ranks, it was better to have similar sizes between the two subsamples. A threshold of 30 years difference was set based on testing and used to screen the stations eligible for that test. However, since the t-test is a parametric test following the t-distribution or Normal distribution, the test is less sensitive to the difference between the sample sizes. In this project, there were 20 stations that were screened out (not eligible) for the Mann Whitney test that were included for the t-test.

3.2. Shift in mean results

The results when using 1958 as the division were:

- T-test: 632 of 2,846 (22.2%) were eligible. 17.9% of those tested had a shift in mean (16.1% increased in mean, 1.7% decreased in mean).
- Mann Whitney test: 612 of 2,846 (21.5%) were eligible. 19.9% of those tested had a shift in mean.

Table A.3.3 lists the shift in mean results comparing pre-1958 data and post-1958 data by state in the project area including the border areas. The last column in the table shows the average percent change in mean for each state. Overall, the majority of stations tested did not exhibit a shift in mean. Where shifts did occur, the shifts in mean showed a preference toward increasing shifts.

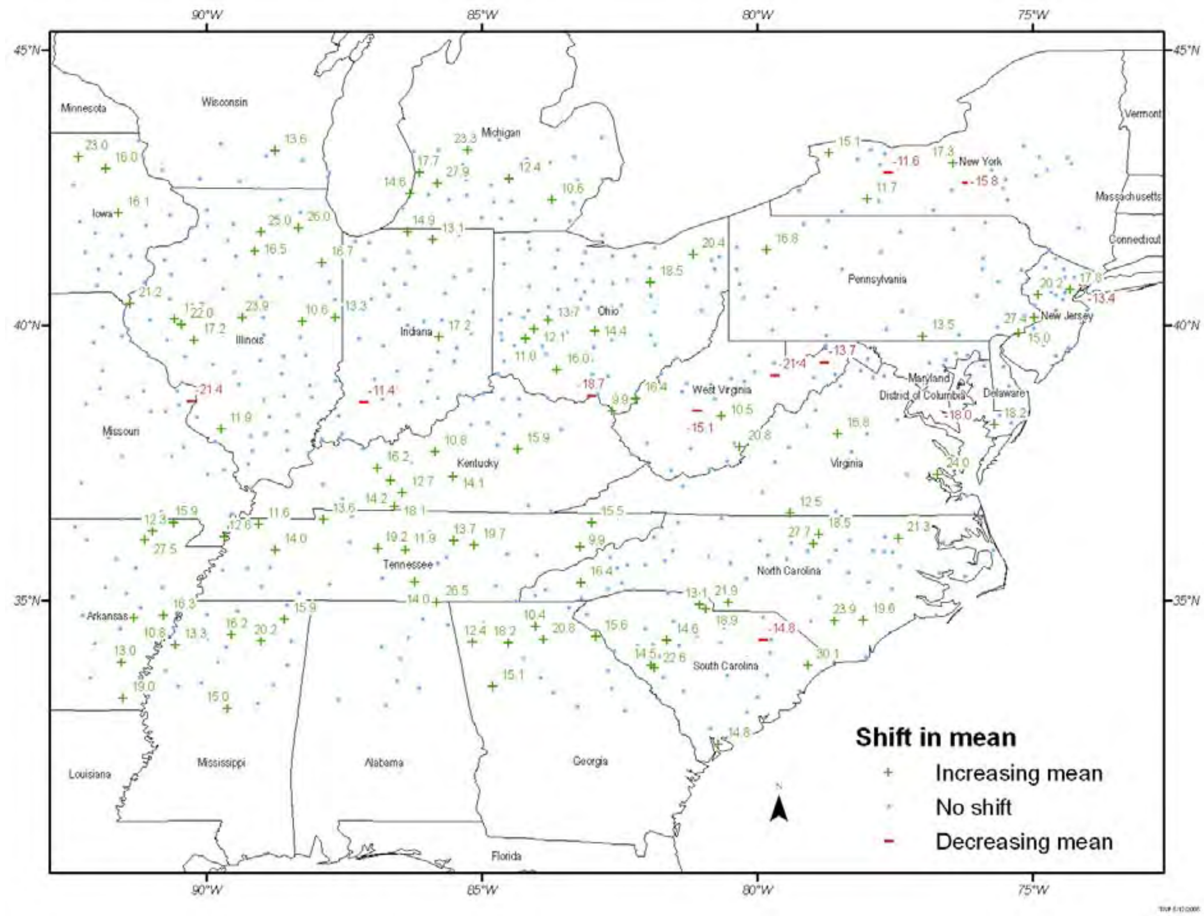
Table A.3.3. Number of stations tested and test for shift in mean results (1958 split) by state.

State	# Tested	# No Shift	# Shift	# Pos. Shift	# Neg. Shift	% Change in Mean
Alabama	10	9	1	1	0	26.5
Arkansas	24	17	7	7	0	16.4
Connecticut	1	1	0	0	0	N/A
Delaware	2	2	0	0	0	N/A
Georgia	20	14	6	6	0	15.4
Illinois	68	57	11	11	0	17.7
Indiana	44	40	4	3	1	8.5
Iowa	20	16	4	4	0	19.1
Kentucky	28	20	8	8	0	14
Maryland	15	13	2	1	1	0.1
Michigan	29	23	6	6	0	17.7
Mississippi	21	15	6	6	0	16.8
Missouri	26	24	2	1	1	-4.4
New Jersey	23	20	3	2	1	8.2
New York	31	26	5	3	2	3.4
North Carolina	52	45	7	7	0	21.3
Ohio	66	58	8	7	1	10.9
Pennsylvania	35	31	4	4	0	18.2
South Carolina	32	24	8	7	1	14.2
Tennessee	28	18	10	10	0	14.3
Virginia	21	18	3	3	0	17.8
West Virginia	25	19	6	3	3	-0.43
Wisconsin	11	9	2	2	0	16
Total	**632**	**519**	**113**	**102**	**11**	**13.6 (avg)**

Figure A.3.3 shows the spatial distribution of the stations that have a shift in mean. The numbers plotted above the station location indicate the percentage of change in mean at each station. The shift in mean was dominantly upward except for a narrow east-west band at a latitude of about 38° north. However, the majority of the stations exhibited no trend.

In general, the results are consistent with the results of the linear trend results.

Figure A.3.3. Spatial distribution of shift in mean results, where "+" indicates a station with a positive trend, "-" indicates a negative trend and the number indicates the percentage of change (1958 split).



4. Specific Examples

In many cases, stations that showed a linear increase or decrease had a similar shift in mean. Figure A.3.4 shows a combined upward linear trend with an upward shift in mean (where the subsamples are divided at the year 1958) at Beardstown, IL (11-0492). The time series for the station (1903 - 2000) is plotted and a solid straight line represents the linear trend. There was an accompanying increasing shift in mean (+22.0%) from the 1903 -1958 time period (2.30") to the 1959-2000 time period (2.80"). The means of each time period are represented as separate horizontal lines. The linear trend in variance was also increasing through time. This indicates that there were more extreme events with time. The increase in variance is shown in the Figure by the dashed lines outward of the linear trend line.

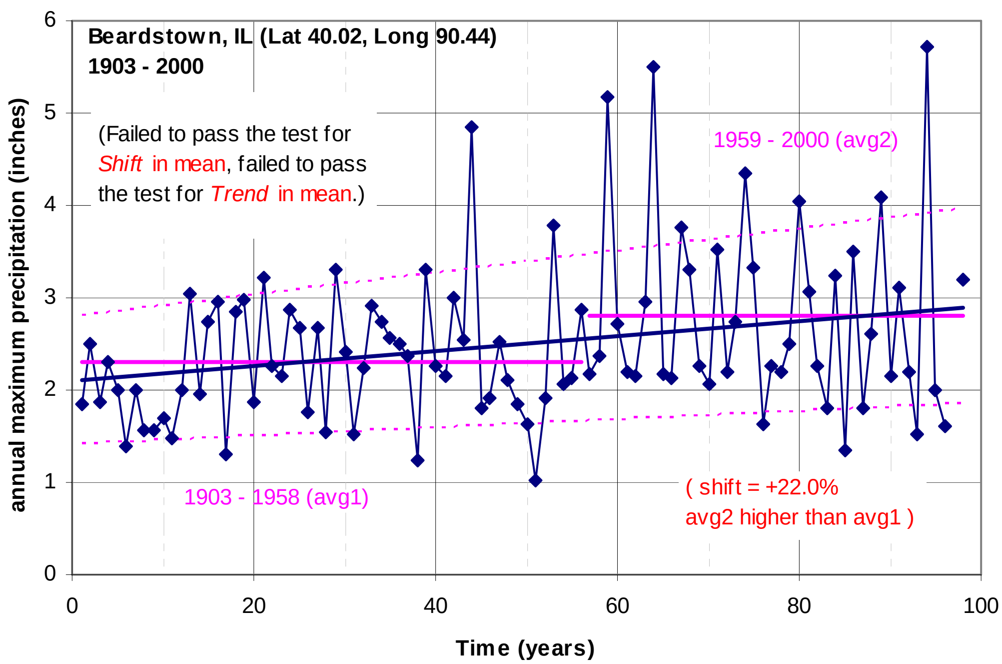


Figure A.3.4. Plot of increasing linear trend and shift tests and increasing linear variance for annual maximum time series at Beardstown, IL (11-0492).

Figure A.3.5 shows a combined downward linear trend with a downward shift in mean at Romney, WV (46-7730). The data record runs from 1897 - 2000. A decreasing linear trend and a decreasing shift in mean before and after 1958 were observed. The 1897-1958 mean, 2.27", decreased by 13.7% to 1.96" in 1959-2000. This station did not exhibit a linear trend in the variance of the mean.

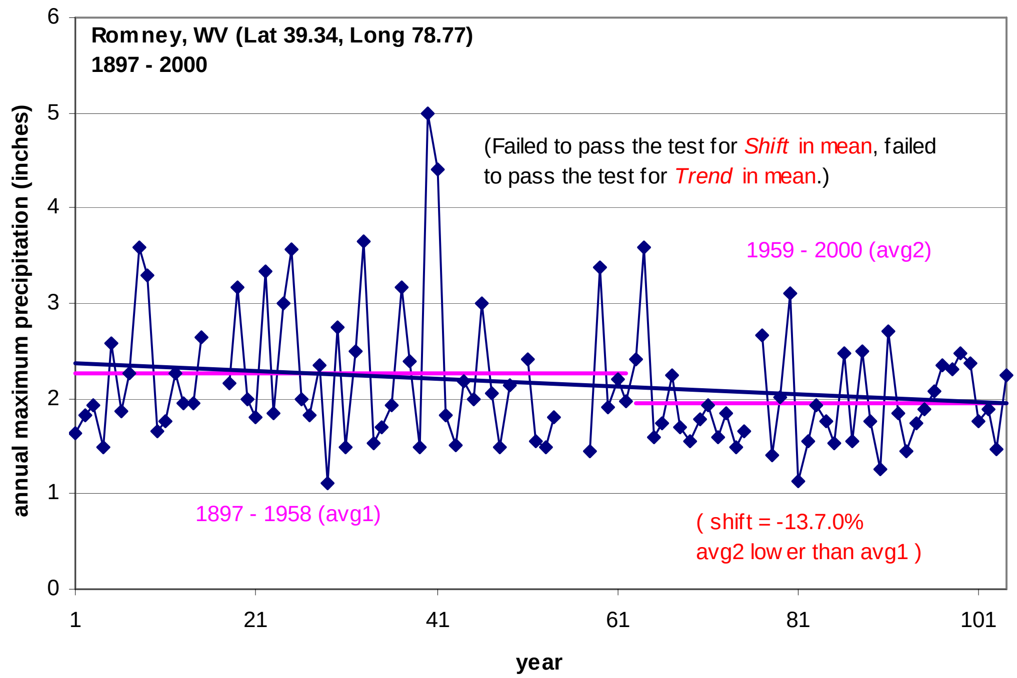


Figure A.3.5. Plot of decreasing linear trend and shift tests for annual maximum time series at Romney, WV (46-7730).

5. Conclusions

1-day precipitation annual maximum series for stations used in NOAA Atlas 14 Volume 2 were examined for linear trends, linear trends in variance, and shifts in mean. The following conclusions about the stations tested can be made:

1. Overall, the 1-day annual maximum time series were free from linear trends and from shifts in mean for most of the stations in the project area.
2. Aside from 2 possible clusters, there appeared to be no definite preference in geographical location for stations exhibiting trends or shifts for those stations tested.

Therefore, since the results showed little observable or geographically consistent impact of change in the statistics used to estimate precipitation frequency, the entire historical time series was used in this Atlas.

Appendix A.4 (report was formatted by HDSC)

Final Report

Production of Rainfall Frequency Grids for the Semiarid Southwest And Ohio River Basin Using an Optimized PRISM System

Prepared for
National Weather Service, Hydrologic Design Service Center
Silver Spring, Maryland

Prepared by
Christopher Daly and George Taylor
Spatial Climate Analysis Service
Oregon State University
Corvallis, Oregon

July 2004

Overall Project Goal

The contractor, Spatial Climate Analysis Service (SCAS) at Oregon State University (OSU), will produce a series of grids for rainfall frequency estimation using an optimized system based on the Parameter-elevation Regressions on Independent Slopes Model (PRISM) and HDSC-calculated point estimates for the Semiarid Southwest (SA) and Ohio River Basin (ORB) study domains. It is anticipated that successful progress on this task will lead to additional work of the same nature for the remainder of the United States including Puerto Rico and the Virgin Islands.

This Report

This report describes work performed to produce final index flood grids for 14 precipitation durations, ranging from 60 minutes to 60 days, for the SA and ORB regions.

Adapting the PRISM system

The PRISM modeling system was adapted for use in this project after an investigation was performed for the SA region. The same PRISM system was applied to the ORB region.

PRISM (Parameter-elevation Regressions on Independent Slopes Model) is a knowledge-based system that uses point data, a digital elevation model (DEM), and many other geographic data sets to generate gridded estimates of climatic parameters (Daly et al. ,1994; Daly et al., 2001; Daly et al., 2002) at monthly to daily time scales. Originally developed for precipitation estimation, PRISM has been generalized and applied successfully to temperature, among other parameters. PRISM has been used extensively to map precipitation, dew point, and minimum and maximum temperature over the

United States, Canada, China, and other countries. Details on PRISM formulation can be found in Daly et al. (2002) and Daly (2002).

Examples of PRISM products already produced for the United States include: (1) a new US climate atlas that includes monthly and annual average climate maps for precipitation, temperature, snowfall, degree days, and other parameters for the 1961-1990 period (Plantico et al., 2000); (2) sequential monthly maps for precipitation and mean maximum and minimum temperature for the period 1895-1997 (Daly et al., 2001); (3) peer-reviewed 1961-1990 mean monthly precipitation maps, certified as the official maps of the USDA (USDA-NRCS, 1998; Daly and Johnson, 1999); and (4) an update of the 1961-1990 maps to the 1971-2000 climatological period.

Adapting the PRISM system for mapping precipitation frequencies required an approach slightly different than the standard modeling procedure. The amount of station data available to HDSC for precipitation frequency was much less than that available for high-quality precipitation maps, such as the peer-reviewed PRISM 1961-1990 mean precipitation maps (USDA-NRCS, 1998). Data sources suitable for long-term mean precipitation but not for precipitation frequency included snow courses, short-term COOP stations, remote storage gauges, and others. In addition, data for precipitation durations of less than 24 hours are available from hourly rainfall stations only. This meant that mapping precipitation frequency using HDSC stations would sacrifice a significant amount of the spatial detail present in the 1961-1990 mean precipitation maps.

A pilot project to identify ways of capturing more spatial detail in the precipitation frequency maps was undertaken. Early tests showed that mean annual precipitation (MAP) was an excellent predictor of precipitation frequency in a local area, much better than elevation, which is typically used as the underlying, gridded predictor variable in PRISM applications. In these tests, the DEM, the predictor grid in PRISM, was replaced by the official USDA digital map of MAP for the lower 48 states (USDA-NRCS, 1998; Daly et al., 2001; Figure 1). Detailed information on the creation of the USDA PRISM precipitation grids is available from Daly and Johnson (1999). Figures 2 and 3 illustrate the superior predictive capability of MAP over the DEM for locations in the southwestern US. The relationships between MAP and precipitation frequency were strong because much of the incorporation of the effects of various physiographic features on mean precipitation patterns had already been accomplished with the creation of the MAP grid from PRISM. Now, it was only a matter of relating precipitation frequency to mean total precipitation. Preliminary PRISM maps of 2-year and 100-year, 24-hour precipitation were made for the Semiarid Southwest and compared to hand-drawn HDSC maps of the same statistics. Differences were minimal, and mostly related to differences in station data used.

Further investigation found that the square-root transformation of MAP produced somewhat more linear, tighter and cleaner regression functions, and hence, more stable predictions, than the untransformed values; this transformation was incorporated into subsequent model applications. Square-root MAP was a good local predictor of not only for longer-duration precipitation frequency statistics, but for short-duration statistics, as well (Figures 4 and 5). Therefore, it was determined that a modified PRISM system that used square-root MAP as the predictive grid was suitable for producing high-quality precipitation frequency maps for this project.

PRISM Configuration and Operation

For application to the SA and ORB regions, PRISM consisted of a local moving-window, index flood vs. MAP regression function that interacts with an encoded knowledge base and inference engine (Daly et al., 2002). This knowledge base/inference engine is a series of rules, decisions and calculations that set weights for the station data points entering the regression function. In general, a weighting function contains knowledge about an important relationship between the climate field and a geographic or meteorological factor. The inference engine sets values for input parameters by using default values, or it may use the regression function to infer grid cell-specific parameter settings for the situation at hand. PRISM acquires knowledge through assimilation of station data, spatial data sets such as MAP and others, and a control file containing parameter settings.

The other center of knowledge and inference is that of the user. The user accesses literature, previously published maps, spatial data sets, and a graphical user interface to guide the model application. One of the most important roles of the user is to form expectations for the modeled climatic patterns, i.e., what is deemed "reasonable." Based on knowledgeable expectations, the user selects the station weighting algorithms to be used and determines whether any parameters should be changed from their default values. Through the graphical user interface, the user can click on any grid cell, run the model with a given set of algorithms and parameter settings, view the results graphically, and access a traceback of the decisions and calculations leading to the model prediction.

The moving-window regression function for index flood vs. MAP took the form

$$\text{Index flood value} = \beta_1 * \text{sqrt(MAP)} + \beta_0 \quad (1)$$

where β_1 is the slope and β_0 is the intercept of the regression equation, and MAP is the grid cell value of 1961-90 mean annual precipitation

Upon entering the regression function for a given pixel, each station is assigned a weight that is based on several factors. In applications using a climate grid such as MAP as the predictor, the combined weight of a station is typically a function of distance, MAP, cluster, topographic facet, and coastal proximity, respectively. The combined weight W of a station is a function of the following:

$$W = f\{ W_d, W_z, W_c, W_f, W_p \} \quad (2)$$

where W_d, W_z, W_c, W_f, and W_p are the distance, MAP, cluster, topographic facet, and coastal proximity, respectively. Distance, MAP, and cluster weighting are relatively straightforward in concept. A station is down-weighted when it is relatively distant or has a much different MAP value than the target grid cell, or when it is clustered with other stations (which leads to over-representation). Facet weighting effectively groups stations into individual hillslopes (or facets), at a variety of scales, to account for sharp changes in climate regime that can occur across facet boundaries. Coastal proximity weighting is used to define gradients in precipitation that may occur due to proximity to large water bodies (Daly et al., 1997; Daly and Johnson, 1999; Daly et al., 2002, 2003). No coastal areas were present in the SA region, precluding the need for coastal proximity. However, coastal proximity weighting was implemented in the ORB, which encompasses a large section of the eastern coastline. Shown in Figure 6, the coastal proximity grid is a measure of the distance from each pixel to the coastline, expressed in 10-km bands out to 90 km. The "coastline" is defined as the boundary between land and the ocean or Great Lakes. It does not include bays and inlets, such as Chesapeake Bay.

An example of the usefulness of coastal proximity weighting is shown in Figure 7. In this example of the 1-hour index flood precipitation vs mean annual precipitation (sqrt(MAP)) near Charleston, SC, coastal proximity weighting allowed the regression function to preserve higher 1-hour precipitation values along the immediate coastline by producing different regression functions at coastal and inland pixels. In contrast, lack of coastal proximity weighting would produce similar regression functions for both pixels and would not recognize the coastal precipitation maximum.

Relevant PRISM parameters for the applications to 1- and 24-hour index flood statistics are listed in Tables 1 and 2. Further explanations of these parameters and associated equations are available in Daly (2002) and Daly et al. (2002). The difference to note between the parameter set in Tables 1 and 2 and that in Daly et al. (2002) is that the elevation weighting parameters in Daly et al. (2002) are now referred to here as MAP weighting parameters. This is because MAP, rather than elevation, is used as the predictor variable. The input parameters used for the 1-hour index flood application were generally applied to durations of 1-12 hours. The 24-hour input parameters were generally applied to durations of 24 hours and greater.

The values of radius of influence (*R*), the minimum number of on-facet (s_f) and total (s_t) stations required in the regression were based on information from user assessment via the PRISM graphical user interface, and on a jackknife cross-validation exercise, in which each station was deleted from the data set one at a time, a prediction made in its absence, and mean absolute error statistics compiled. One parameter that was varied significantly between the 1-hour (and up through 12 hours) and 24-hour (and up through 60 days) index flood applications was the minimum number of on-facet stations required in the regression (s_f; Tables 1 and2). PRISM has access to topographic facet grids at six different scales, from small-scale to large-scale (Daly et al., 2002). When developing each pixel's regression function, PRISM preferentially searches for stations on the same topographic facet as that of the target pixel, starting with the smallest-scale facet grid. If it does not find the minimum number of on-facet stations required, it moves to the next-larger-scale grid, and accumulates more stations, until either s_f is reached, or the largest-scale grid is used. Because the number of stations available for 1-hour – 12-hour index flood mapping was so much smaller than that for 24-hour – 60-day mapping, a much lower s_f threshold for on-facet stations was used; this kept the applications for the two groups of durations using about the same scale of facet grids in station selection and promoted consistency among the two applications.

Input parameters that changed readily among the various durations were the minimum allowable slope (β_{1m}) and default slope (β_{1d}) of the regression function, with the maximum allowable slope (β_{1x}) varying less readily. Slopes are expressed in units that are normalized by the average observed value of the precipitation in the regression data set for the target cell. Evidence gathered during model development indicates that this method of expression is relatively stable in both space and time (Daly et al., 1994).

Bounds are put on the slopes to minimize unreasonable slopes that might occasionally be generated due to local station data patterns; if the slope is out of bounds and cannot be brought within bounds by the PRISM outlier deletion algorithm, the default slope is invoked (Daly et al., 2002). Slope bounds and default values were based on PRISM diagnostics that provided information on the distribution of slopes across the modeling region. The default value was set to approximate the average regression slope calculated by PRISM. The upper and lower bounds were set to approximately the 95th and 5th percentiles of the distribution of slopes, respectively, because many of the slopes outside this range are typically found to be questionable. For these applications, slope bounds typically increased with increasing duration (Table 3). In general, the longer the duration, the larger the slope bounds. This is primarily a result of higher precipitation amounts at the longer durations, and the tendency for longer-duration index flood statistics to bear a stronger and steeper relationship with MAP than shorter-durations statistics.

One relatively new PRISM input parameter not discussed in Daly et al. (2002) is D_m, the minimum allowable distance in the distance weighting function (Tables 1 and 2). Any station falling within D_m of the target pixel is set to a distance of D_m. D_m was implemented in the ORB (only) with a value of 50 km because it was recognized that many small-scale spatial features (bulls eyes) in the MAP grid, especially in flat terrain, may have not reflected actual climate features, but variations in station data completeness and period of record. The effect of implementing D_m was to spatially smooth the relationship between MAP and index flood over a larger area and produce more spatially homogeneous results. This restriction was applied to all parts of the ORB, except coastal areas, where a rapidly-changing relationship between MAP and index flood produced realistic small-scale features along the coastal strip. When such a smoothing effect is applied, the maps do not reflect the actual station precipitation values quite as closely. Figure 8 shows how well the interpolated grid cell values reproduced the actual station precipitation used in the mapping for 1-hour and 24-hour index flood statistics, with and without the 50-km distance limitation. The correlation coefficient between observed and gridded precipitation fell from 0.91 to 0.81 when the limitation was applied to the 1-hour statistic, and dropped from 0.95 to 0.91 when applied to the 24-hour statistic. The drop in correlation became progressively less pronounced at the longer durations.

After completion of the SA mapping and during the ORB mapping, updates of the 1961-1990 MAP grids to the 1971-2000 climatological period became available. The 1971-2000 grid was created using 1961-1990 MAP as the predictor grid. There are only subtle differences between the two MAP grids, but it was decided that the ORB mapping should use the latest MAP grid. Therefore, the SA maps reflect the 1961-1990 MAP predictor grid and the ORB maps reflect the 1971-2000 predictor grid.

Results

PRISM cross-validation statistics for 1- and 24-hour applications to the SA and ORB regions were compiled and summarized in Tables 4 and 5. In the SA, overall bias was less than 2 percent, and mean absolute error was about 10 percent. In the ORB, errors were lower (about 0.5% bias and 6% mean absolute error), owing to less terrain complexity and higher station density. One-hour errors were somewhat higher than those for the 24-hour run. Likely reasons for this are the much smaller number of stations available, and the somewhat weaker relationship between 1-hour index flood and MAP, compared to those for the 24-hour index flood. Errors for 2- to 12-hour durations were similar to those for the 1-hour duration, and errors for 2 to 60-day durations were similar to those for the 24-hour duration. Overall, these errors are quite low, and are likely comparable to errors associated with precipitation measurement and the calculation of index flood statistics.

Stations used in the SA modeling applications are shown in Figure 9. During the initial modeling process, three stations were found to be unusual: two in the 1-hour application and one in the 24-hour application. The two unusual 1-hour stations were Independence, CA (04-4235), and Raton WB Airport, NM (29-7283). Independence had a 1-hour value that was much lower than other stations in the region; it was also low when compared to its 24-hour value. Subsequent analysis showed that this station had a relatively short period of record. Conversely, Raton WB Airport seemed too high, compared to its neighbors. Both stations were omitted from the final 1-hour index flood application. [Note: The stations met the criteria for the original precipitation frequency analysis and so were retained in the analysis conducted by HDSC and only omitted from the mapping process. - comment added by HDSC] Red Rock Canyon, NV (26-6691) appeared unusual during the modeling of the 24-hour index flood. It is sited on the southern flank of the Spring Mountains, just northwest of Las Vegas. This is an area of steep elevation, and hence, precipitation, gradients. The Red Rock Canyon 24-hour index flood value seemed high compared to the underlying MAP grid-cell value; however, subsequent analysis showed that the underlying MAP grid value was higher than the stations' actual MAP, indicating that imprecision in either the station location or the 4-km grid cell resolution caused a misalignment between the grid MAP and station MAP. This problem was alleviated by substituting the station's MAP value for the grid MAP value when calculating the moving-window regression function.

Stations used in the ORB modeling applications are shown in Figure 10. During the review process, several bulls eyes were identified and questioned. One was found to be caused by a suspicious index flood station value, while the others were caused by unusual spots on the MAP predictor grid, which in turn were caused by unusual station averages used during the mapping of the 1961-1990 and 1971-2000 MAP grids. One suspicious station was Wateree Dam, SC (38-8979), which had an unusually low 1-hour index flood value. This was also noticed by the South Carolina State Climatologist after the original MAP mapping was completed (unfortunately). It was felt that because it is located at a dam, convective precipitation could be suppressed due to proximity to water. The MAP grid was altered to remove the effects of this station. Adding the 50-km minimum distance criterion mitigated its direct effect on the index flood grids, so the station was retained in the mapping process. Tangier Island, VA (44-8323), in Chesapeake Bay, produced a low area in the MAP grid, which was propagated to surrounding areas. It is possible that its location on an island suppressed convective precipitation, and thus lowered the MAP, but no conclusive evidence was presented. The MAP grid was altered to reduce the severity of the bulls eye. Manassas, VA (44-5213), and Middlebourne, OH (33-5199), also produced low spots in the MAP grid. The MAP grid was altered to reduce the severity of these bulls eyes.

After initial mapping of the ORB, three stations were found to have gridded index flood values that were significantly different than their station point values: Tuckasegee (31-8754), Mt. Mitchell (31-5921), and Parker (31-6565), NC. All three were located in the southern Appalachians, an area of steep elevation, and hence, precipitation, gradients, indicating that imprecisions in either the station location or the 4-km grid cell resolution caused a misalignment between the grid MAP and station MAP. This problem was alleviated by moving the station locations slightly.

Draft grids of 1- and 24-hour index flood statistics for the SA and ORB regions were produced by running PRISM at 2.5-minute (~4-km) resolution. These grids were reviewed by HDSC personnel, and found to be suitable for review by the larger user community, after some revision. A full set of maps for all index flood durations was then produced, including 1, 2, 3, 6, 12, and 24 hours; and 2, 4, 7, 10, 20, 30, 45, and 60 days. The maps were subjected to pixel-by-pixel tests to ensure that shorter duration values did not exceed those of longer duration values. To make the grids presentable for detailed contour plotting, SCAS used a Gaussian filter to resample the grids to 30-sec (~ 1km) resolution. Sample final filtered grids are shown in Figures 11-14. These grids were delivered electronically to HDSC via ftp.

References

Daly, C., 2002: Variable influence of terrain on precipitation patterns: Delineation and use of effective terrain height in PRISM. *World Wide Web document*. http://www.ocs.orst.edu/pub/prism/docs/effectiveterrain-daly.pdf

_______, E.H. Helmer, and M. Quinones, 2003: Mapping the climate of Puerto Rico, Vieques, and Culebra. *International Journal of Climatology*, **23**, 1359-1381.

_______ and G.L. Johnson, 1999: PRISM spatial climate layers: their development and use. *Short Course on Topics in Applied Climatology, 79th Annual Meeting of the American Meteorological Society*, 10-15 January, Dallas, TX. 49 pp. http://www.ocs.orst.edu/pub/prism/docs/prisguid.pdf

_______, R.P. Neilson, and D.L. Phillips, 1994: A Statistical-Topographic Model for Mapping Climatological Precipitation over Mountainous Terrain. *J. Appl. Meteor*. **33**, 140-158.

_______, G. Taylor, and W. Gibson, 1997: The PRISM Approach to Mapping Precipitation and Temperature, 10th Conf. on Applied Climatology, Reno,NV, *Amer. Meteor. Soc*., 10-12. http://www.ocs.orst.edu/pub/prism/docs/appclim97-prismapproach-daly.pdf

_______, G.H. Taylor, W. P. Gibson, T.W. Parzybok, G. L. Johnson, P. Pasteris, 2001: High-quality spatial climate data sets for the United States and beyond. *Transactions of the American Society of Agricultural Engineers* **43**, 1957-1962.

______, W. P. Gibson, G.H. Taylor, G. L. Johnson, and P. Pasteris, 2002: A knowledge-based approach to the statistical mapping of climate. *Clim. Res*., **22**, 99-113. http://www.ocs.orst.edu/pub/prism/docs/climres02-kb_approach_statistical_mapping-daly.pdf

Plantico, M.S., L.A. Goss, C. Daly, and G. Taylor, 2000: A new U.S. climate atlas. In: *Proc., 12th AMS Conf. on Applied Climatology, Amer. Meteorological Soc*., Asheville, NC, May 8-11, 247-248.

USDA-NRCS, 1998: PRISM Climate Mapping Project--Precipitation. Mean monthly and annual precipitation digital files for the continental U.S. *USDA-NRCS National Cartography and Geospatial Center*, Ft. Worth TX. December, CD-ROM.

Table 1. Values of relevant PRISM parameters for modeling of 1- and 24-hour index flood statistics for the SA (semiarid southwest region). See Daly et al. (2002) for details on PRISM parameters.

Name	Description	1-hour/24-hour Values
Regression Function		
R	Radius of influence	60/70 km*
s_f	Minimum number of on-facet stations desired in regression	2/12 stations*
s_t	Minimum number of total stations desired in regression	20/20 stations*
β_{1m}	Minimum valid regression slope	1.0/2.0^{+}
β_{1x}	Maximum valid regression slope	30.0/30.0^{+}
β_{1d}	Default valid regression slope	3.5/5.9^{+}
Distance Weighting		
A	Distance weighting exponent	2.0/2.0
F_d	Importance factor for distance weighting	0.5/0.5
D_m	Minimum allowable distance	0 km
MAP Weighting**		
B	MAP weighting exponent	1.0/1.0
F_z	Importance factor for MAP weighting	0.5/0.5
Δz_m	Minimum station-grid cell MAP difference below which MAP weighting is maximum	50/50%
Δz_x	Maximum station-grid cell MAP difference above which MAP weight is zero	500/500%
Facet Weighting		
C	Facet weighting exponent	0.5/0.5 ‡
g_m	Minimum inter-cell elevation gradient, below which a cell is flat	1/1 m/cell
λ_x	Maximum DEM filtering wavelength for topographic facet determination	80/80 km
Coastal Proximity Weighting		
v	Coastal proximity weighting exponent	Not applied

* Optimized with cross-validation statistics (see Table 2).

$^{+}$ Slopes are expressed in units that are normalized by the average observed value of the precipitation in the regression data set for the target cell. Units here are 1/[sqrt(MAP(mm))*1000].

** Normally referred to as elevation weighting

‡ Maximum value; actual value varied dynamically by the model.

Table 2. Values of relevant PRISM parameters for modeling of 1- and 24-hour index flood statistics for the ORB (Ohio River Basin). See Daly et al. (2002) for details on PRISM parameters.

Name	Description	1-hour/24-hour Values
Regression Function		
R	Radius of influence	60/70 km*
s_f	Minimum number of on-facet stations desired in regression	2/12 stations*
s_t	Minimum number of total stations desired in regression	20/20 stations*
β_{1m}	Minimum valid regression slope	0.6/1.2^{+}
β_{1x}	Maximum valid regression slope	30.0/30.0^{+}
β_{1d}	Default valid regression slope	3.5/5.9^{+}
Distance Weighting		
A	Distance weighting exponent	2.0/2.0
F_d	Importance factor for distance weighting	0.5/0.5
D_m	Minimum allowable distance	50/50 km
MAP Weighting**		
B	MAP weighting exponent	1.0/1.0
F_z	Importance factor for MAP weighting	0.5/0.5
Δz_m	Minimum station-grid cell MAP difference below which MAP weighting is maximum	50/50%
Δz_x	Maximum station-grid cell MAP difference above which MAP weight is zero	500/500%
Facet Weighting		
C	Facet weighting exponent	0.5/0.5 ‡
g_m	Minimum inter-cell elevation gradient, below which a cell is flat	1/1 m/cell
λ_x	Maximum DEM filtering wavelength for topographic facet determination	80/80 km
Coastal Proximity Weighting		
v	Coastal proximity weighting exponent	1.0/1.0‡

* Optimized with cross-validation statistics (see Table 4).

+ Slopes are expressed in units that are normalized by the average observed value of the precipitation in the regression data set for the target cell. Units here are 1/[sqrt(MAP(mm))*1000].

** Normally referred to as elevation weighting

‡ Maximum value; actual value varied dynamically by the model.

Table 3. Values of PRISM slope parameters for modeling of index flood statistics for the SA (Semiarid Southwest) and ORB (Ohio River Basin) for all durations. See Table 1 for definitions of parameters.

	Semiarid Southwest			Ohio River Basin		
Duration	β_{1m}	β_{1x}	β_{1d}	β_{1m}	β_{1x}	β_{1d}
1 hour	1.0	30.0	3.5	0.6	30.0	3.5
2 hour	1.2	30.0	3.8	0.7	30.0	3.8
3 hour	1.8	30.0	4.0	1.1	30.0	4.0
6 hour	2.0	30.0	4.5	1.2	30.0	4.5
12 hour	2.0	30.0	5.5	1.2	30.0	5.5
24 hour	2.0	30.0	5.9	1.2	30.0	5.9
48 hour	2.2	30.0	6.5	1.3	30.0	6.5
4 day	2.6	50.0	7.1	1.6	50.0	7.1
7 day	3.4	50.0	7.7	1.9	50.0	7.7
10 day	3.4	50.0	8.6	2.0	50.0	8.6
20 day	4.3	50.0	9.4	2.6	50.0	9.4
30 day	4.7	50.0	10.9	2.8	50.0	10.0
45 day	5.0	50.0	10.5	3.0	50.0	10.5
60 day	5.2	50.0	10.9	3.5	50.0	10.9

Table 4. PRISM cross-validation errors for 1- and 24-hour index flood applications to the SA (semiarid southwest) region.

Statistic	**N**	**% Bias**	**% MAE**
1-hour index flood	459	1.93	11.84
24-hour index flood	1822	1.56	8.99

Table 5. PRISM cross-validation errors for 1- and 24-hour index flood applications to the ORB (Ohio River Basin) region.

Statistic	**N**	**% Bias**	**% MAE**
1-hour index flood	946	0.48	5.77
24-hour index flood	2944	0.41	4.34

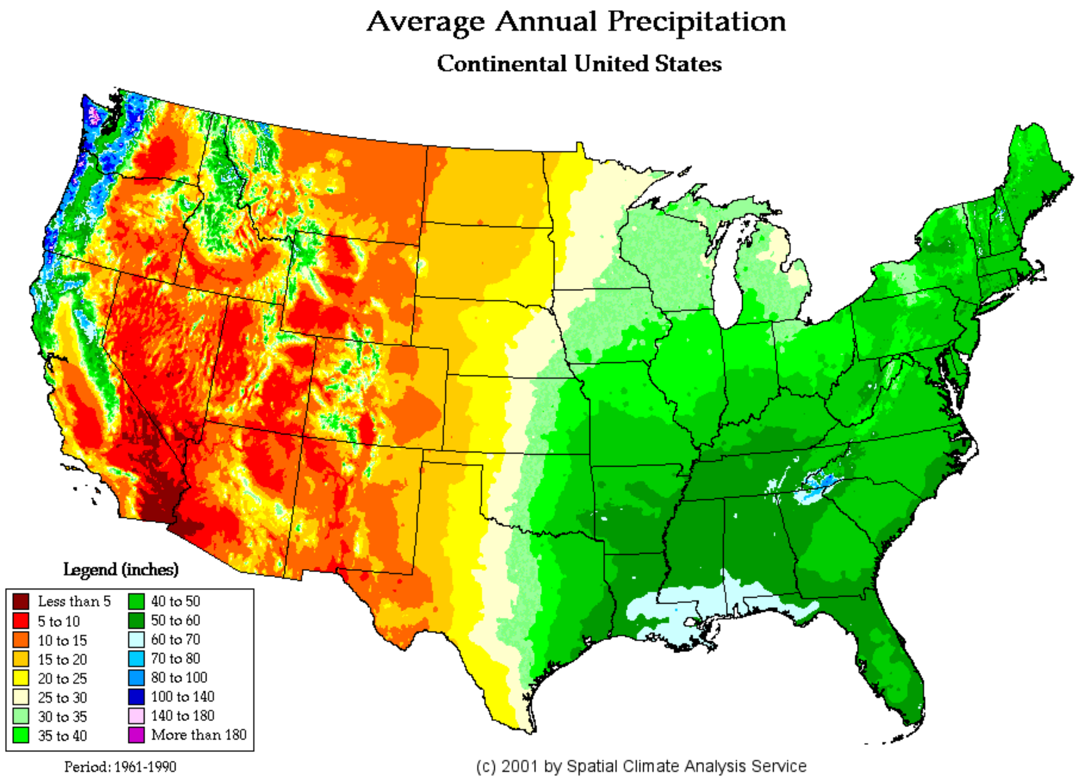


Figure 1. Grid of PRISM Mean Annual Precipitation for the United States (USDA-NRCS 1998, Daly and Johnson 1999), used as the spatial predictor of precipitation frequency.

(a)

(b)

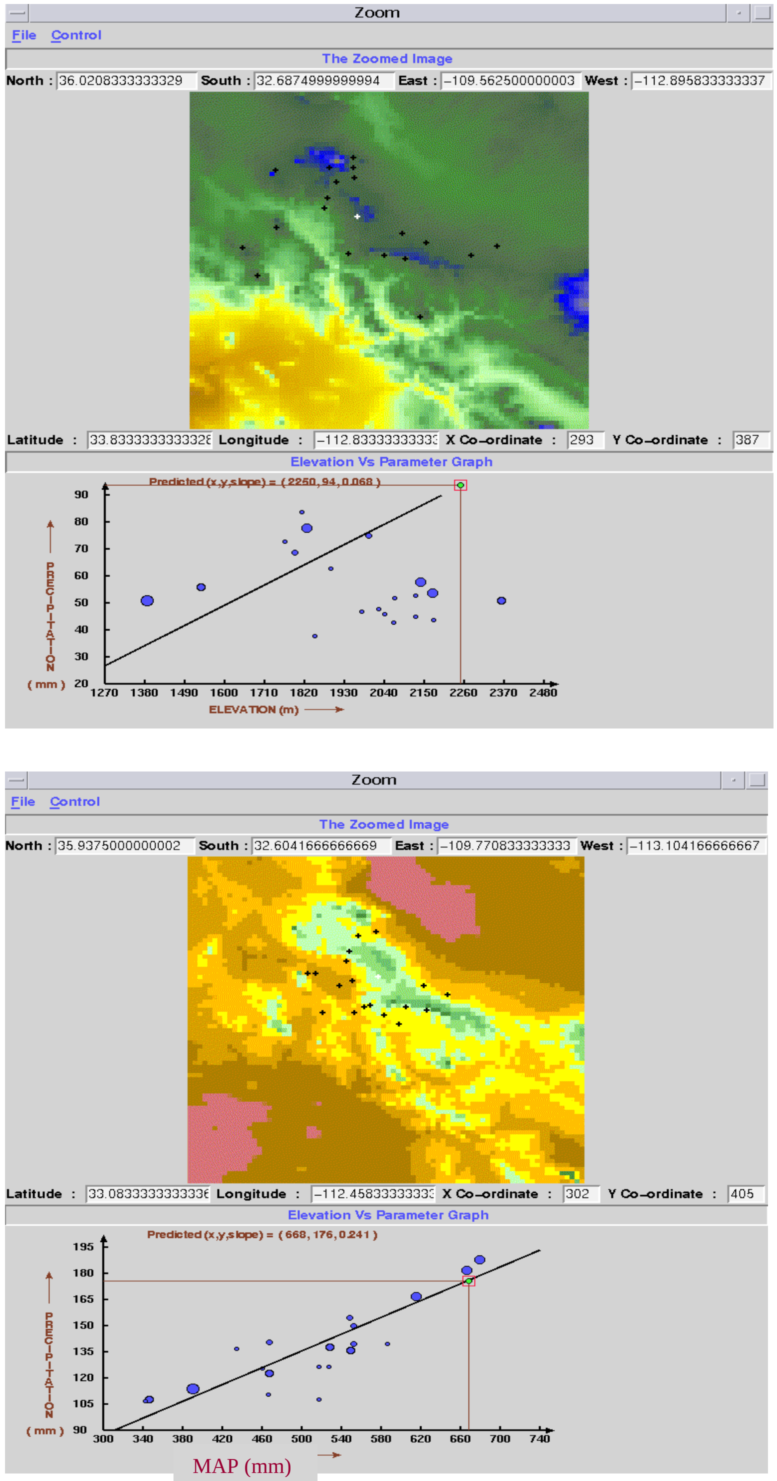


Figure 2. PRISM graphical user interface showing: (a) 100-yr 24-hour precipitation vs elevation; and (b) 100-yr 24-hour precipitation vs mean annual precipitation (MAP), Mogollon Rim, AZ. Size of dot indicates relative weight of station in regression function.

(a)

(b)

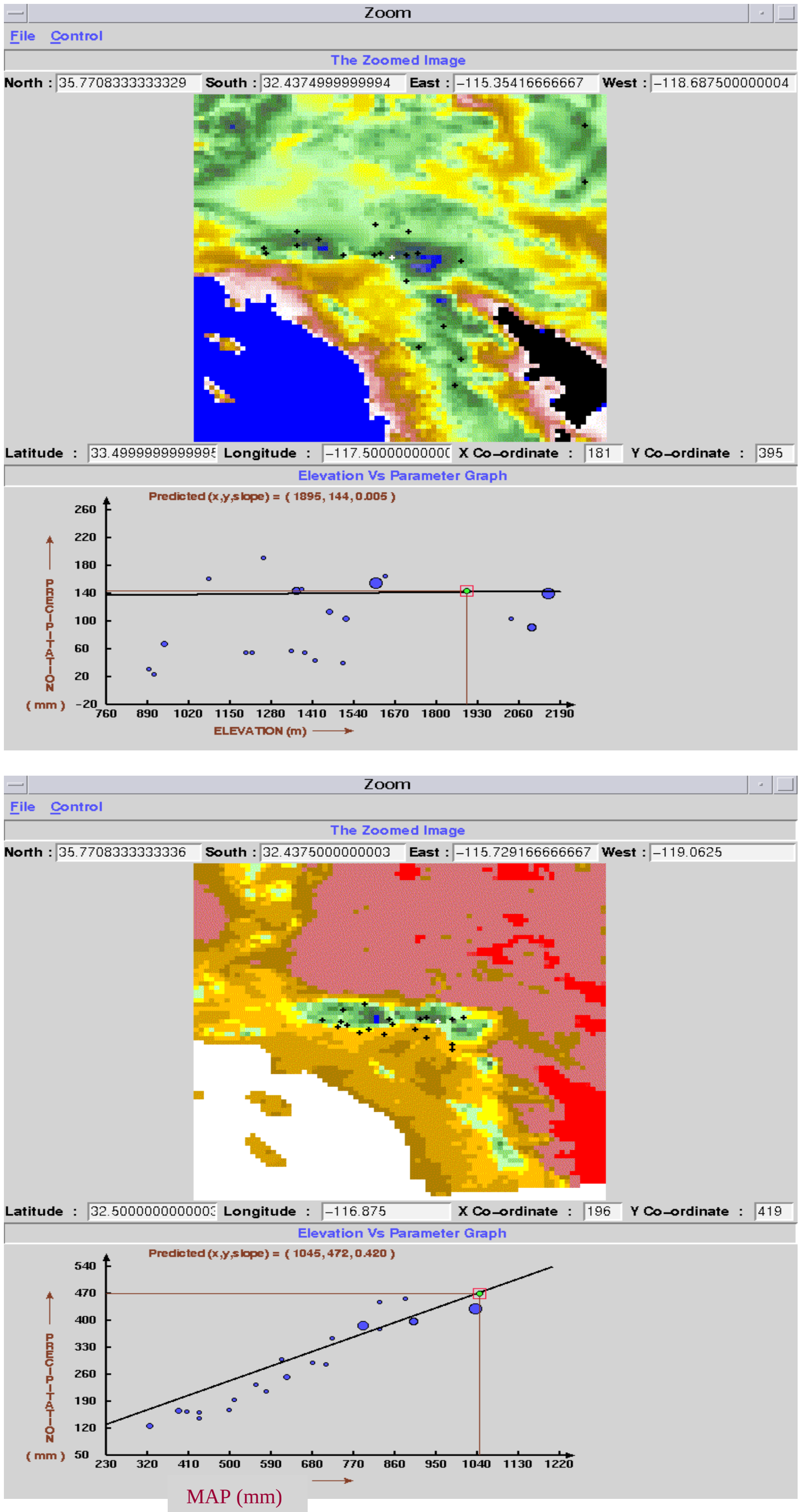
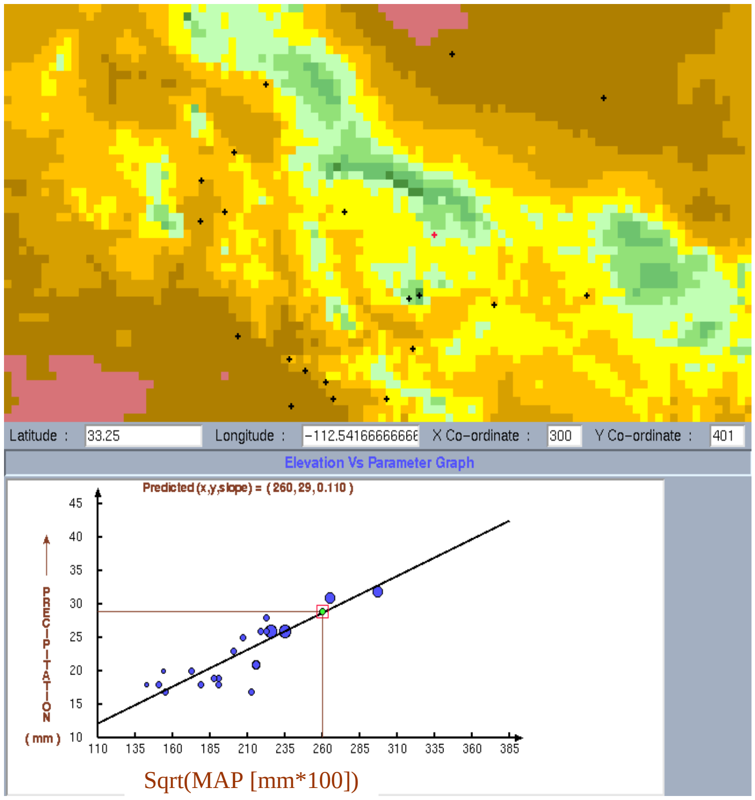


Figure 3. PRISM graphical user interface showing: (a) 100-yr 24-hour precipitation vs elevation; and (b) 100-yr 24-hour precipitation vs mean annual precipitation (MAP), San Bernardino Mountains, CA. Size of dot indicates relative weight of station in regression function.

(a)



(b)

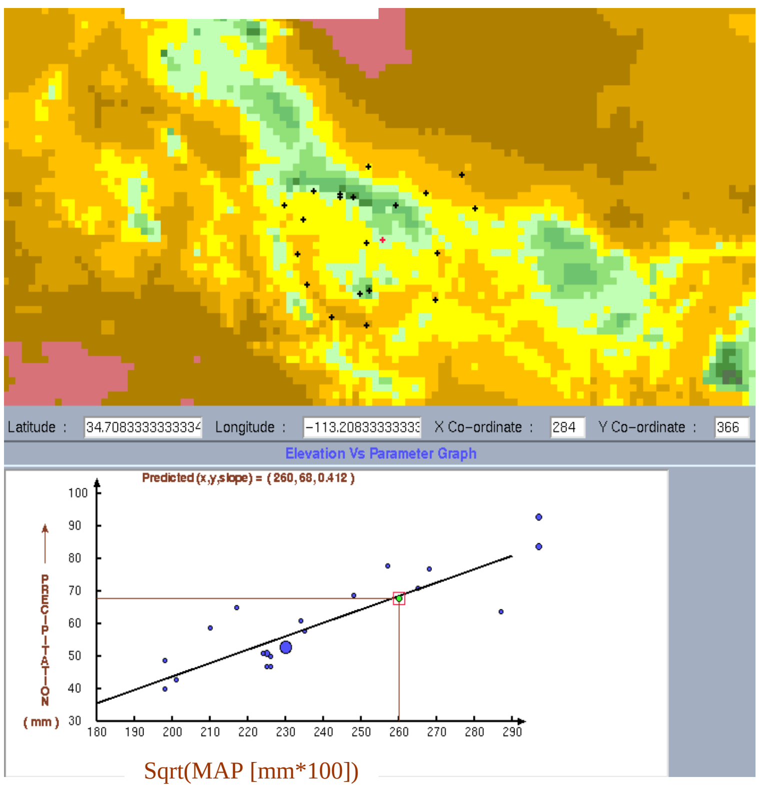
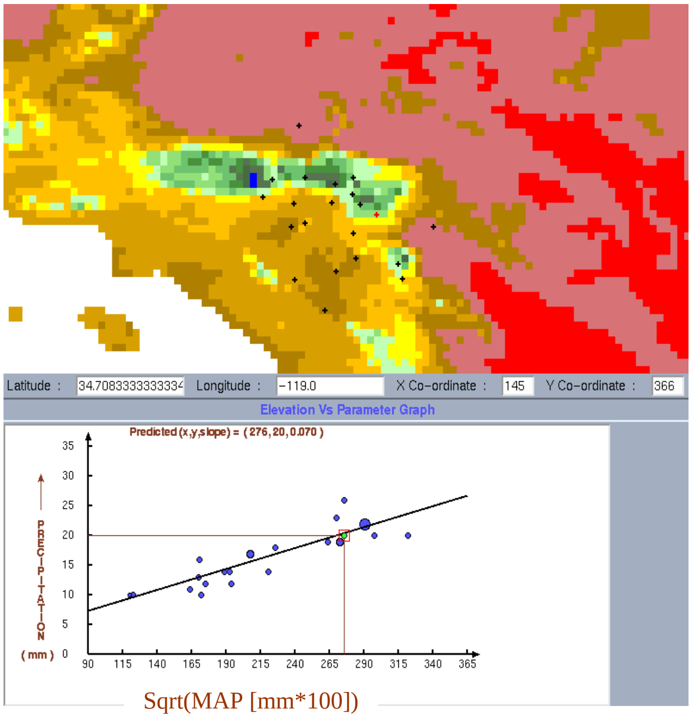


Figure 4. PRISM graphical user interface showing: (a) 1-hour index flood precipitation vs mean annual precipitation (sqrt(MAP)); and (b) 24-hour index flood precipitation vs sqrt(MAP), Mogollon Rim, AZ. Size of dot indicates relative weight of station in regression function.

(a)



(b)

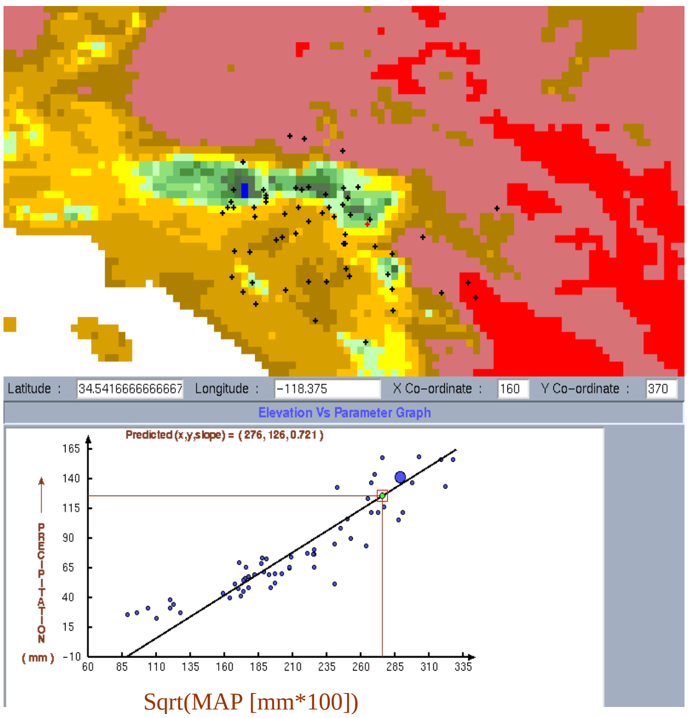


Figure 5. PRISM graphical user interface showing: (a) 1-hour index flood precipitation vs mean annual precipitation (sqrt(MAP)); and (b) 24-hour index flood precipitation vs sqrt(MAP), San Bernardino Mountains, CA. Size of dot indicates relative weight of station in regression function.

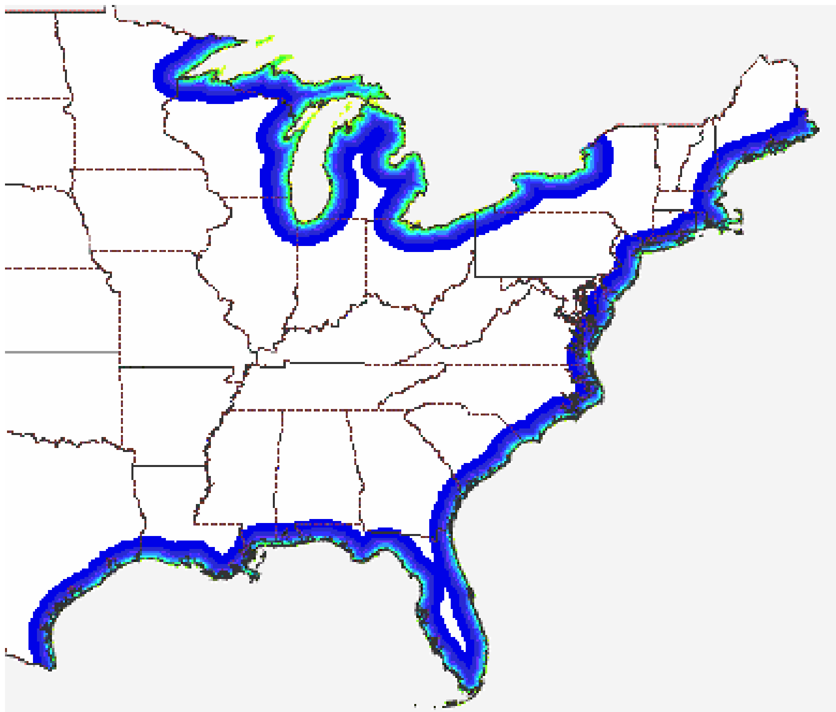
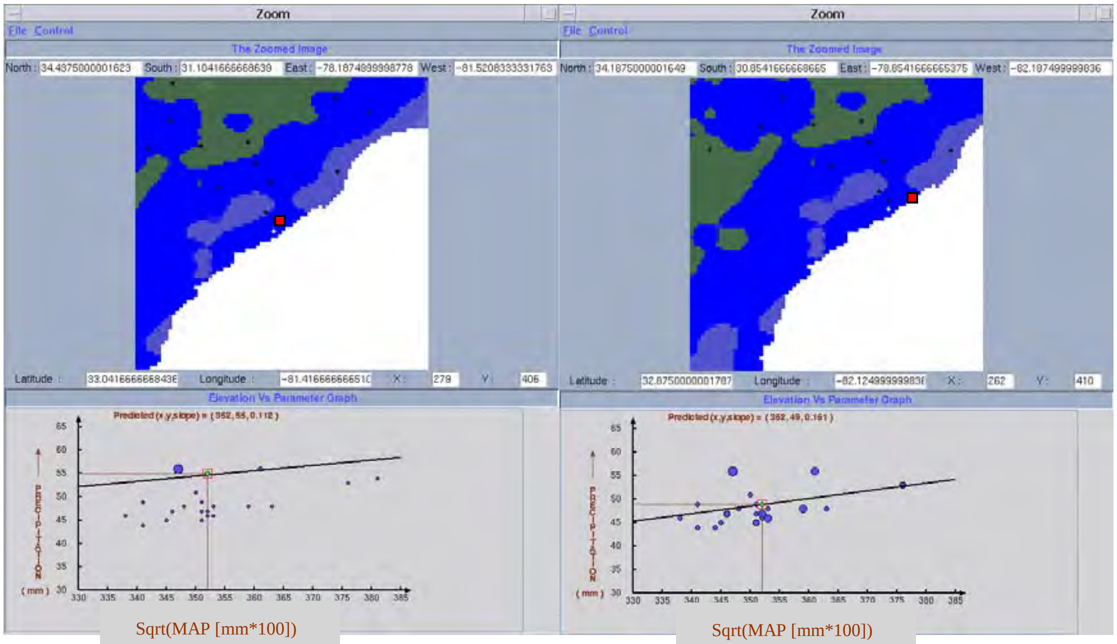
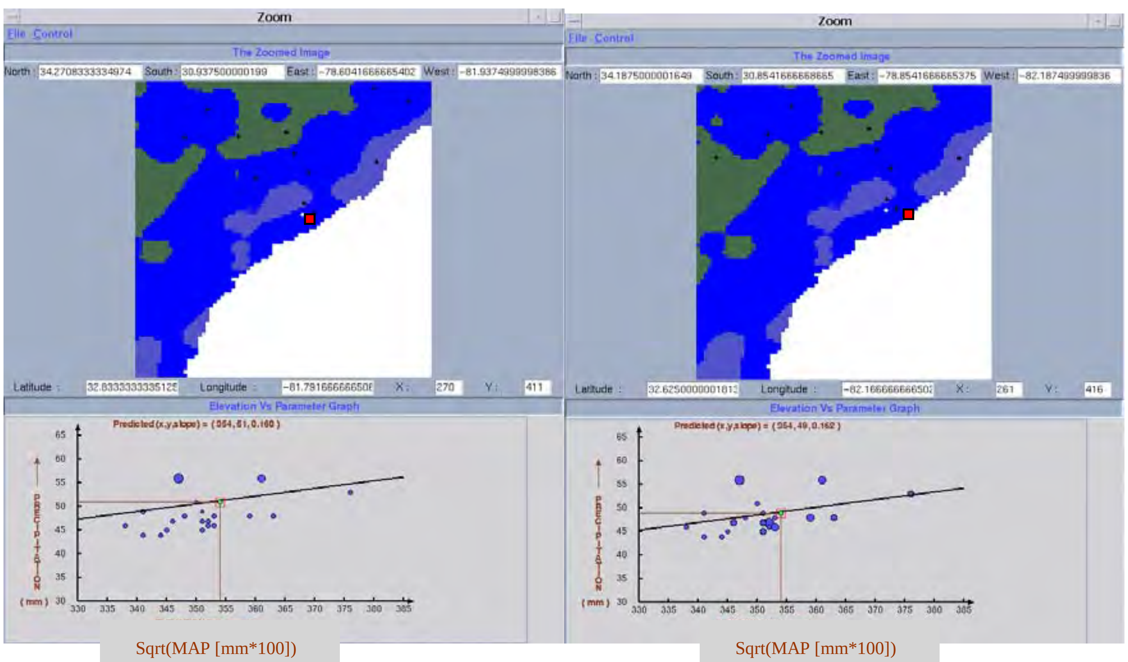


Figure 6. Coastal areas delineated in the eastern United States.

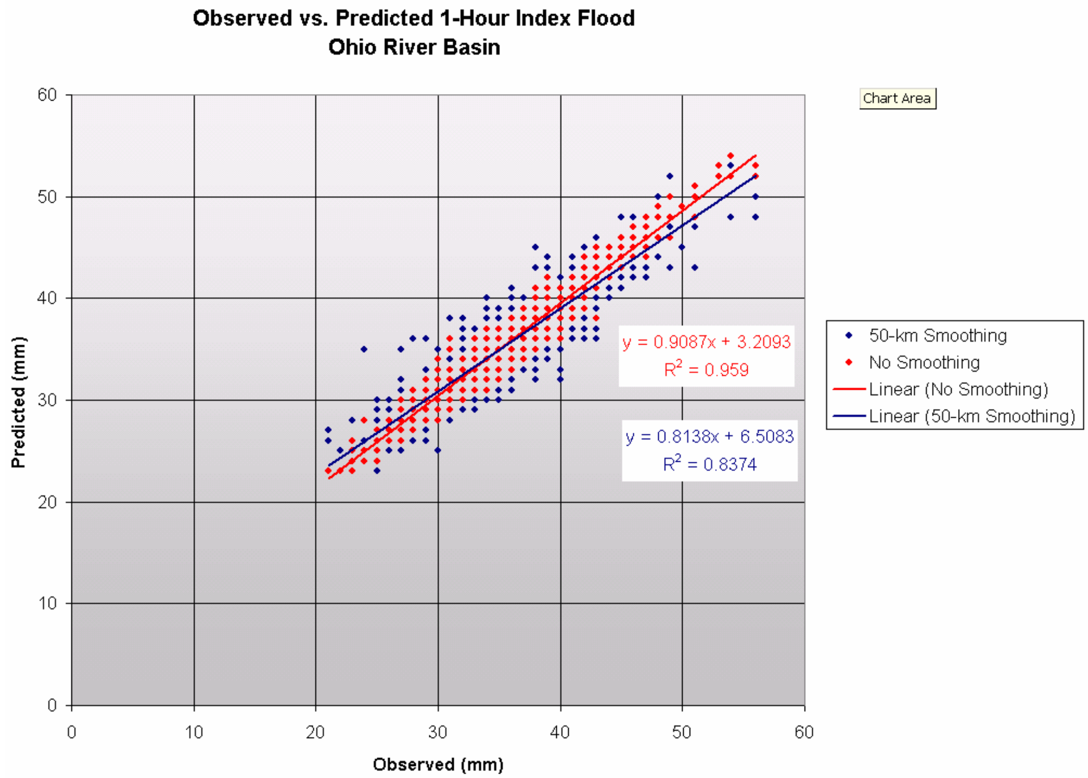


(a) Coastal pixel, coastal proximity enabled. (b) Coastal pixel, coastal proximity disabled.



(c) Inland pixel, coastal proximity enabled. (d) Inland pixel, coastal proximity disabled.

Figure 7. PRISM graphical user interface showing 1-hour index flood precipitation vs mean annual precipitation (sqrt(MAP)) near Charleston, SC. Coastal proximity weighting allows the regression function to preserve higher 1-hour precipitation values along the immediate coastline by producing different regression functions at coastal and inland pixels. In contrast, lack of coastal proximity weighting produces similar regression functions for both pixels and does not recognize the coastal precipitation maximum. Target pixel is shown as a red square. Size of dot on scatterplot indicates relative weight of station in regression function.



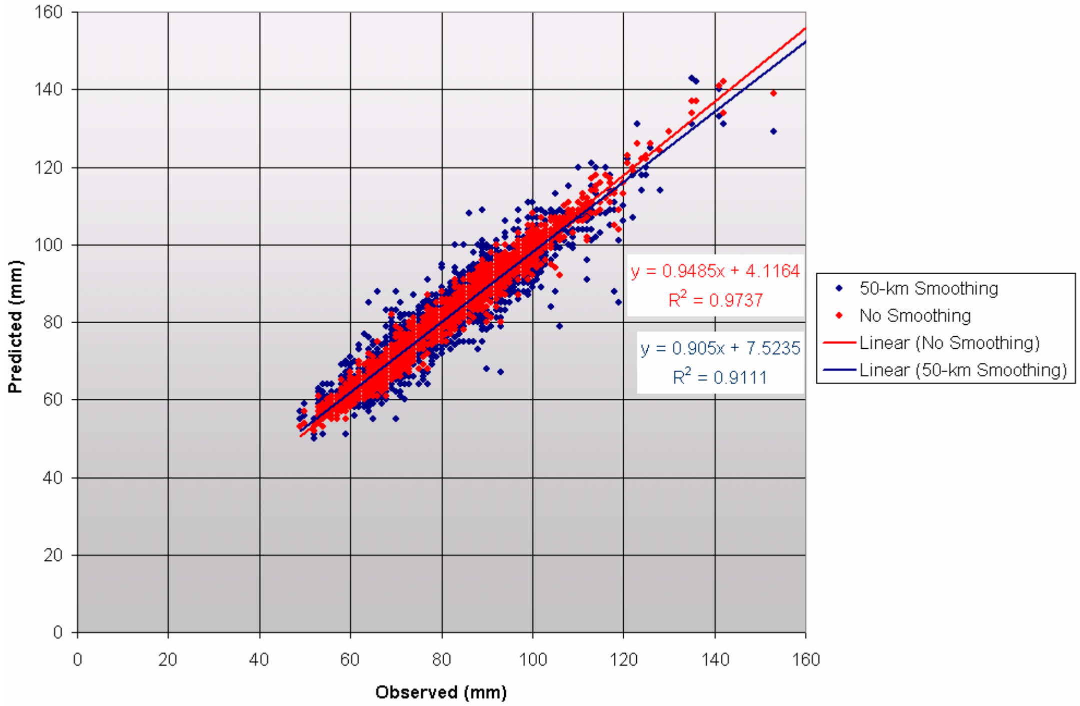
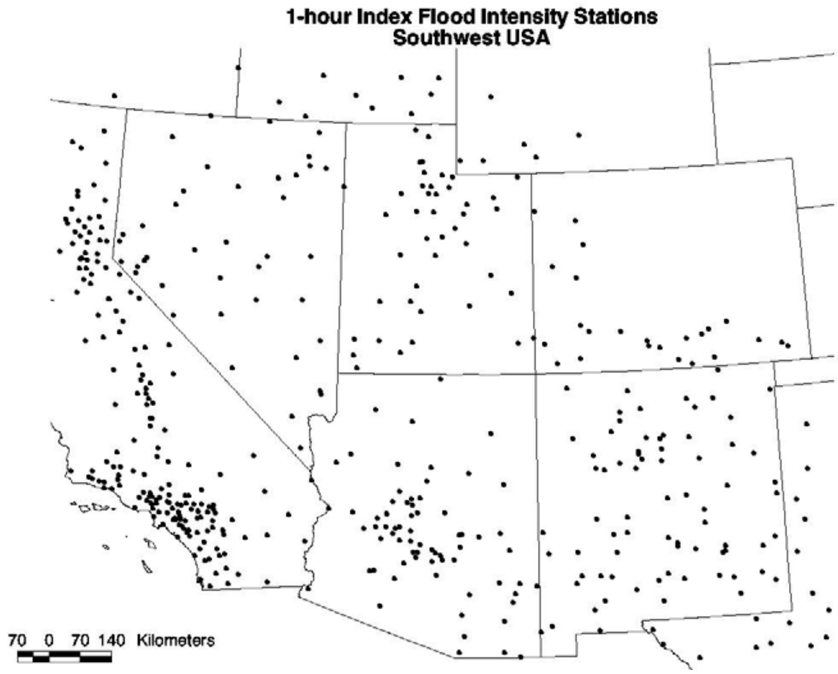


Figure 8. Relationships between station and gridded precipitation values for 1- and 24-hour index floods, with and without the 50-km distance weighting limitation (smoothing). See text for details.

(a)



(b)

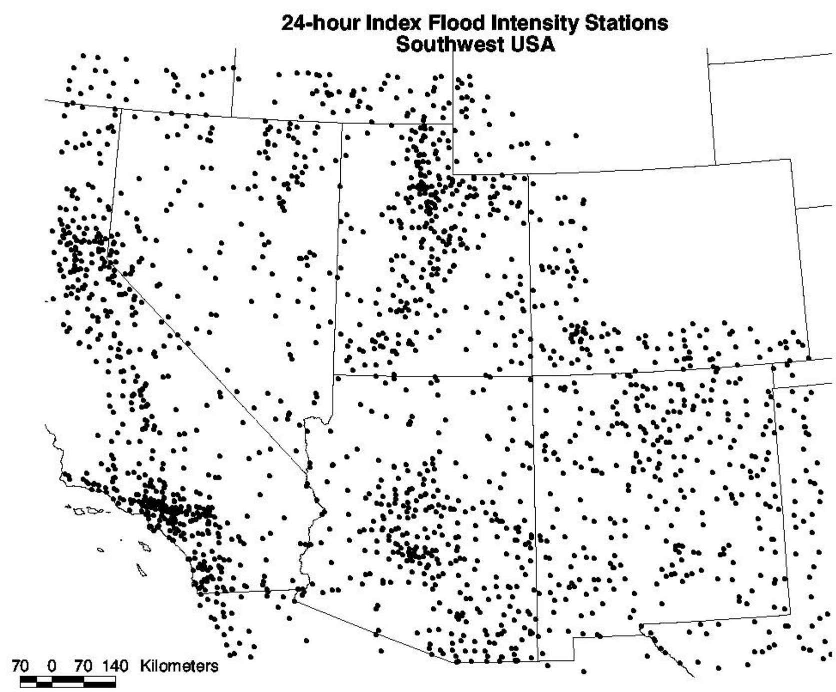
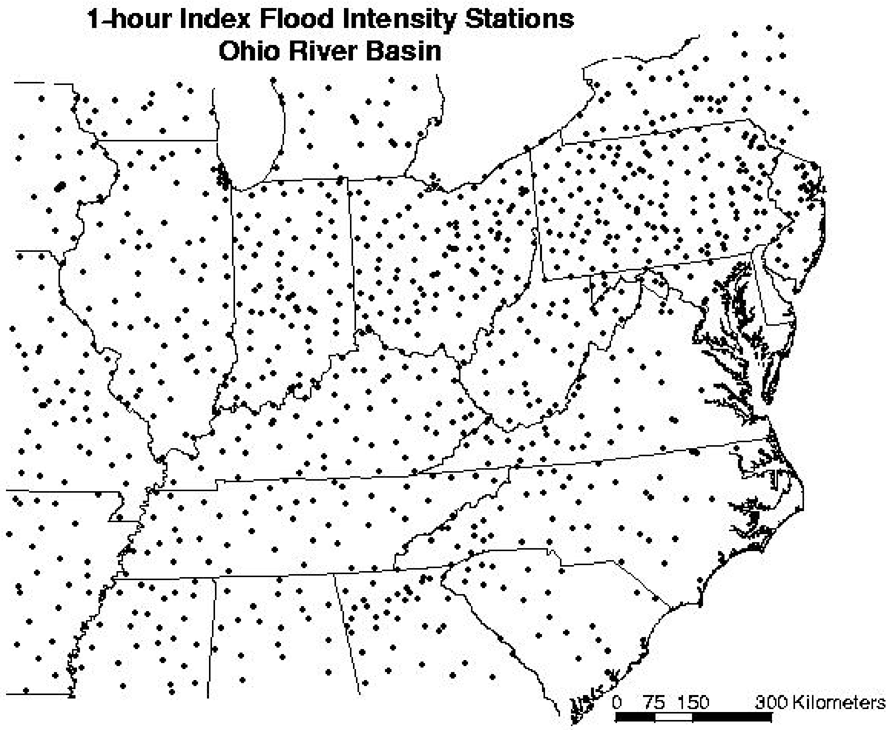


Figure 9. Distribution of station data in the Semiarid Southwest region for: (a) 1-hour; and (b) 24-hour index flood intensities.

(a)



(b)

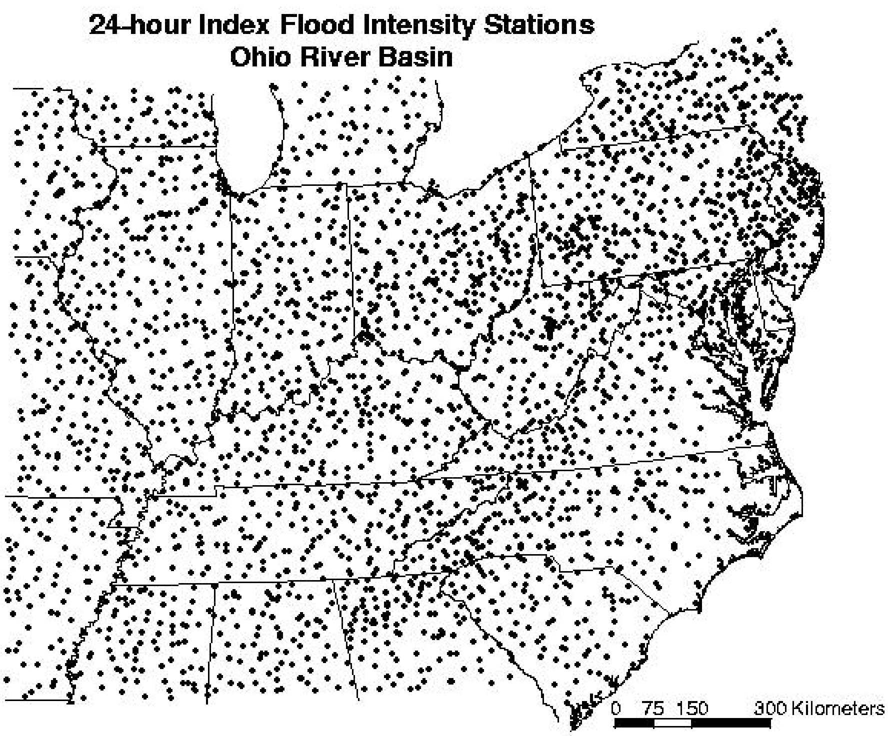


Figure 10. Distribution of station data in the Ohio River Basin for: (a) 1-hour; and (b) 24-hour index flood intensities.

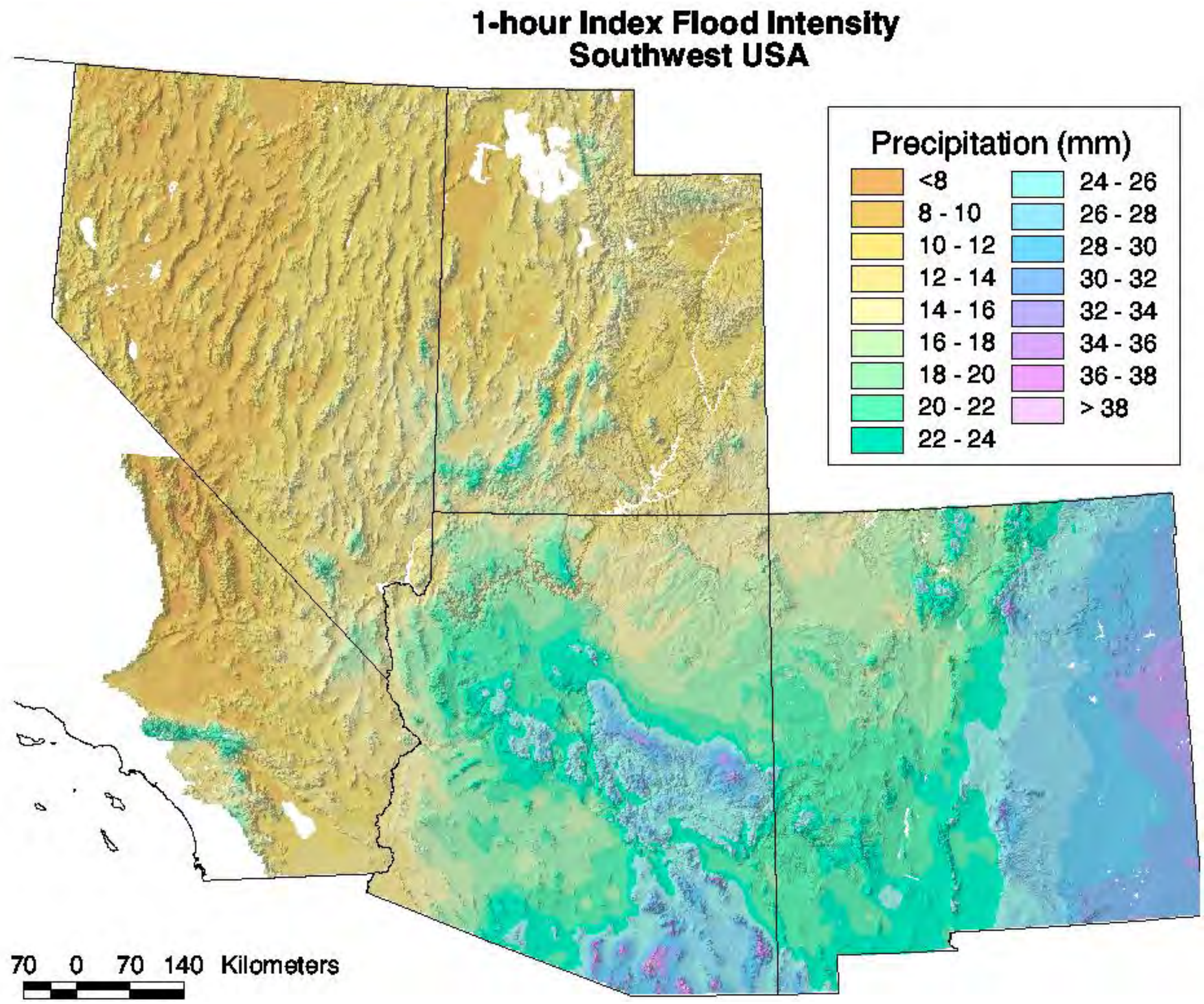


Figure 11. Final PRISM grid of 1-hour all-season, index flood intensity for the Semiarid Southwest region.

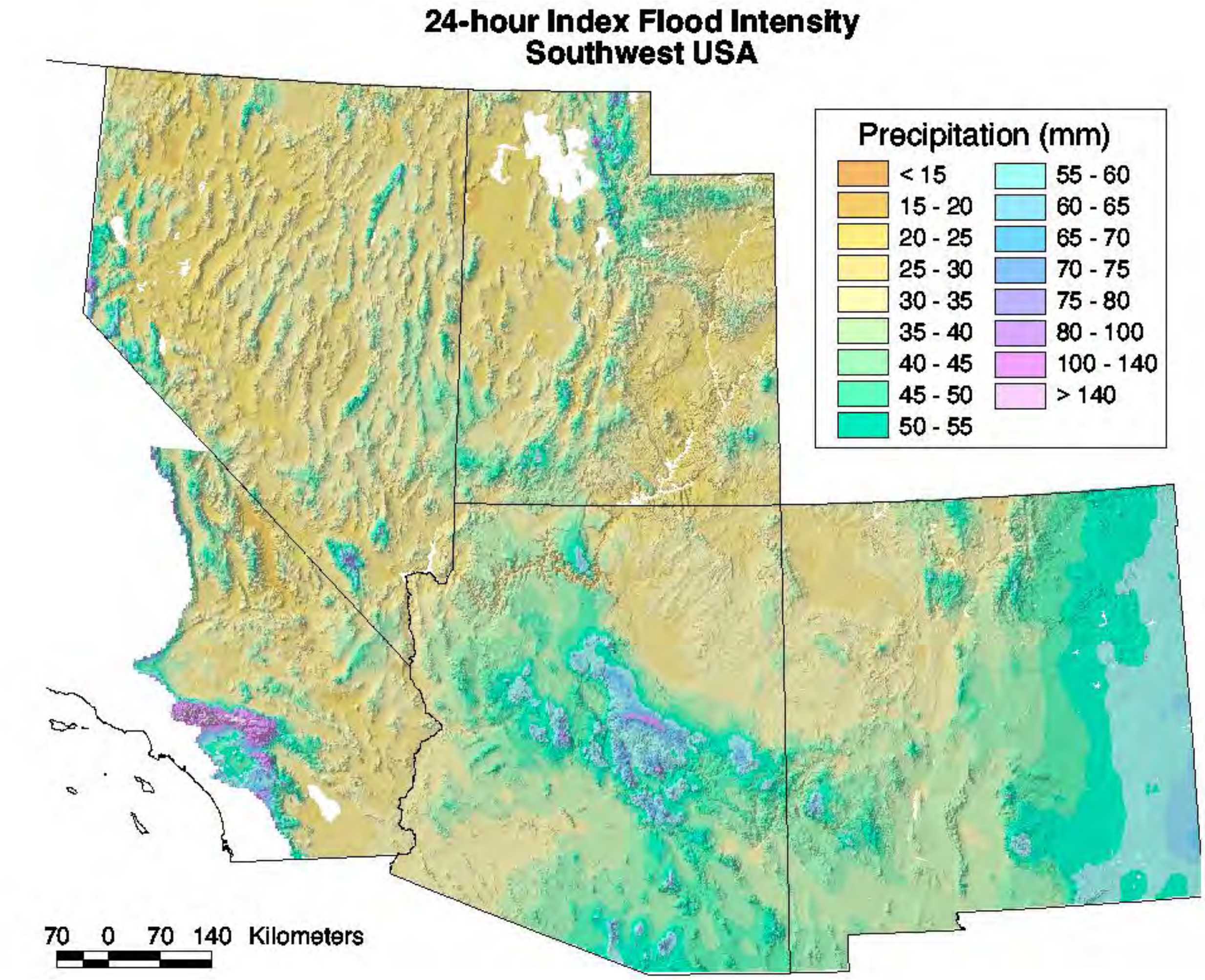


Figure 12. Final PRISM grid of 24-hour, all-season, index flood intensity for the Semiarid Southwest region.

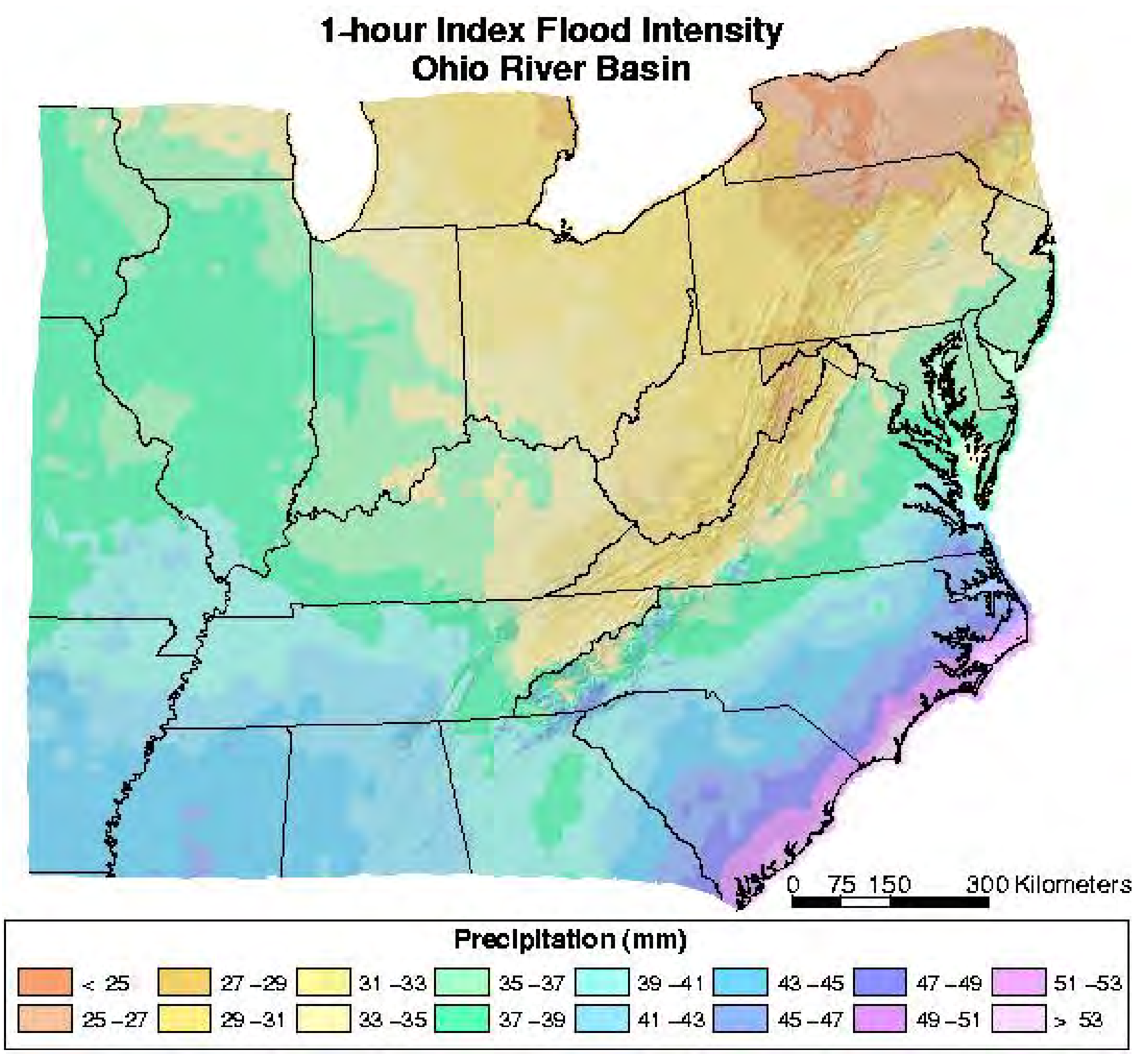


Figure 13. Final PRISM grid of 1-hour all-season, index flood intensity for the Ohio River Basin.

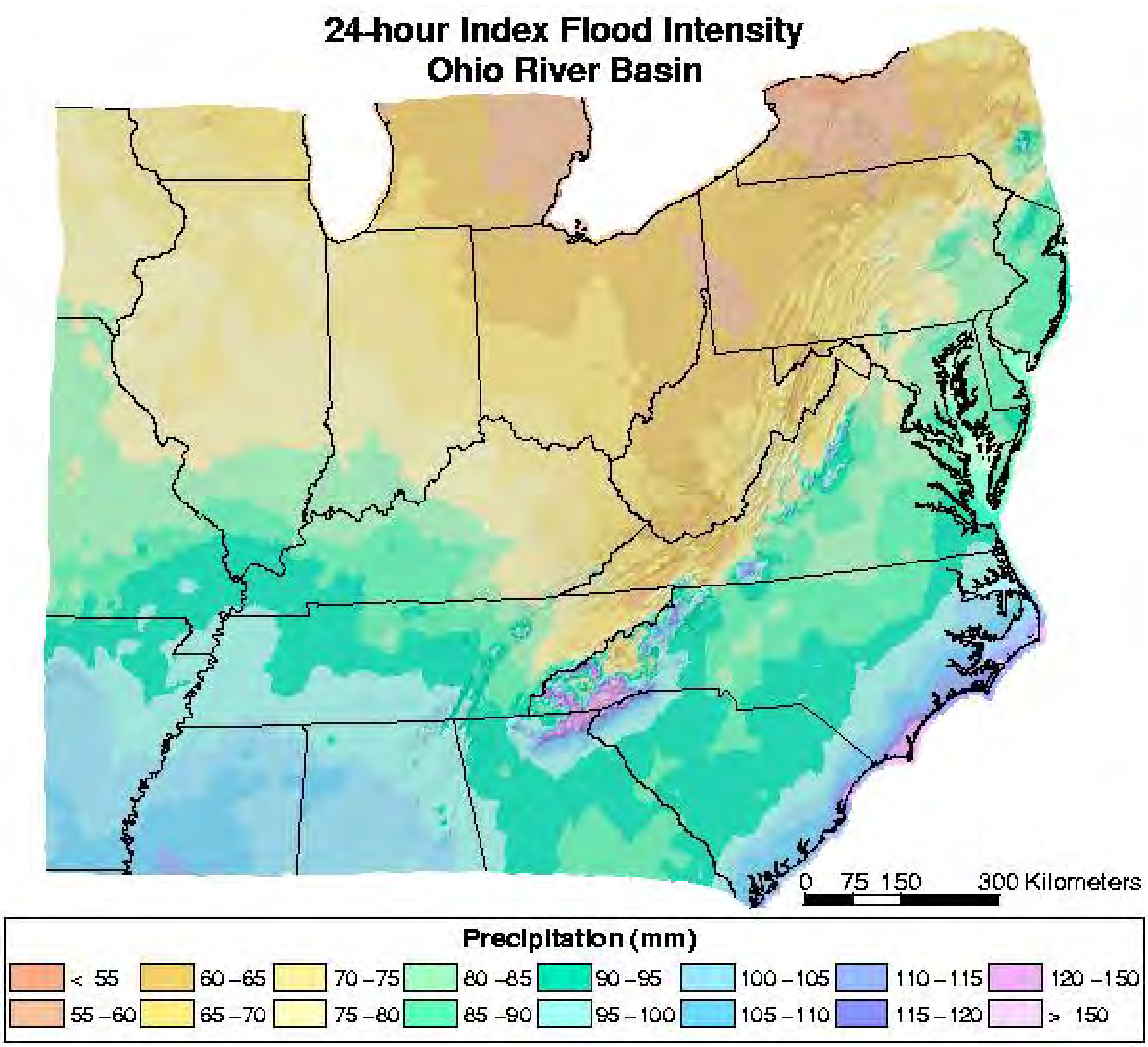


Figure 14. Final PRISM grid of 24-hour all-season, index flood intensity for the Ohio River Basin.

Appendix A.5

Point and Spatial Precipitation Frequency Review Comments and Responses
Ohio River Basin and Surrounding States

NOAA's National Weather Service
Office of Hydrologic Development
Hydrometeorological Design Studies Center
Silver Spring, Maryland

10/3/2003

Introduction

The Hydrometeorological Design Studies Center (HDSC) conducted a peer review of the point and spatially interpolated precipitation frequency estimates for the Ohio River Basin and Surrounding States during the period August 15, 2003 to September 14, 2003. This document presents a consolidation of all the review comments with HDSC's response. We have used the original wording of the comments to make sure the meaning of the comment/question was not misconstrued and so that individual reviewers can identify their comments. HDSC requested comments from nearly 200 individuals and we received comments from 27, some of whom represented the feedback from their staff. There were 82 individual inquiry comments submitted. After parsing all of the comments, we found 53 unique comments that required a response; they are included in this document.

The most reported issue pertained to the "islands" or "bull's eyes" on the 100-year maps. The response to these comments is provided in 5.1.

Similar issues/comments were grouped together and are accompanied by a single response. The comments and their respective responses have been divided into seven categories:

1. **Point estimates – are they representative?**
2. **Point estimates – how do they compare to current (e.g. TP-40) design thresholds?**
3. **Cartographic comments**
4. **General questions and comments**
5. **Are estimates and patterns reasonable when compared to your local or regional knowledge?**
6. **Are stations located correctly on the map?**
7. **Confidence limits and confidence intervals**
8. **Potentially bad data**

1 Point estimates – are they representative?

1.1 I was able to reproduce the numbers you had for Gibson City and Clinton for the 100-year, 24-hour storm. However, when I looked at the data for Farmer City it was marginal (lots of missing data - always a bad sign). The other nearby site that was abnormally low was Downs. I could only find about 3 years of record in my files. Could you check on the quality and quantity of the records for both Farmer City and Downs?

Response: The daily data record for Farmer City, IL (11-2993) is 7/1948 – 12/2000, 53 years of data. 30% of that data are missing. Thus, the annual maximum series used in the analysis has 39 years of data. It is missing maxima for the years 1952-1961, 1993-1995 and 1999. All other years had sufficient data to extract an annual maximum. Farmer City also has co-located hourly data. 24-hour precipitation frequency estimates are derived from daily data for co-located stations. In general, the mean annual maximum of Farmer City is consistent with nearby stations.

Downs, IL (11-2417) is an hourly-only station. Its period of record runs from 7/1948 – 4/1987, 40 years of data. 2% of that data are missing. The annual maximum series is missing only 1987, meaning that there were sufficient data in the other 39 years. The mean annual maximum of Downs does seem low compared to nearby stations. We will investigate this station further.

1.2 For the PFDS data for the individual stations that have continuously recorded data (Toledo Airport WSO, Detroit Metro WSO, Ft. Wayne WSO), the rainfall depth vs. duration curves appear to have "discontinuities" in their smoothness at durations of 60 minutes and around 24 hours. These are especially pronounced for the more extreme storm frequencies (which one would expect), but it's also noticeable for even the 2-year frequency curve. This phenomenon also occurs at the other major "recording" gages I checked (Akron WPCS, Cleveland WSFO). I realize that there may have been no attempt to "smooth" the results, but I feel this raises some questions that should be either addressed, or explained in the final report.

Response: You are correct the data has not been "smoothed" and represents the PF (precipitation frequency) estimates output by our software as apposed to values extracted from a grid of spatially interpolated PF estimates. When the final grids are created, the "discontinuities" you noted will be mitigated through the spatial interpolation procedure. Although the actual PF estimates govern the spatial patterns, the spatial interpolation process will adjust (slightly) the final PF estimates into gradual temporal distributions.

1.3 Looking at Lockport IL, near Joliet, it seems to be significantly lower than surrounding sites and I only have about five years of daily data for that site. I'd say toss it, unless you have access to a lot more data than I can find from Td-3200.

Response: Lockport, IL (11-5136) is an hourly-only station with a data record of 7/1948-12/1974. Even though 30% of the data are missing, there were sufficient data to extract annual maximums for 26 years of data. Only the data in year 1974 did not yield an annual maximum based on our criteria. It is not discordant within its daily region (region 54 with 26 stations) or within its hourly region (region 20 with 23 stations). Given the inconsistency of this station with its surrounding stations, we will take a closer look at this station and assess the appropriateness of removing it from the analysis.

1.4 A comment very similar to the above regards sites shown on the mapping where there are two or more gages with high rainfall and a gage or gages in between with lower frequency rainfall as proposed by NWS. For areas where the topography remains the same, it appears that the probabilities of an area receiving the larger frequency rainfall at the sites of proposed lower frequency rainfall would be the same as the higher rainfall stations. One typical example of many is shown at the Columbus and Crothersville rainfall stations in Indiana where the 24 hour 1% chance rainfall are given as 7.8 and 8.1 inches. A Seymour gage located between these two gages shows frequency rainfall of 6.9 inches with the map isohyets adjusted for these rainfall depths. There is absolutely no difference in the topography of these sites that could cause reduced rainfall at the Seymour site. It would appear that the Seymour location could expect a 1% chance rainfall depth of 7.8 to 8.1 inches as the Columbus and Crothersville sites would.

Response: A check of these stations, which all reside in the same L-moment region and have essentially the same 24-hour mean of 3", suggest the data is accurate. The question then becomes, are the PF estimates at Seymore or Columbus and Crothersville more representative of this area? Perhaps the most accurate answer is a blend of all, which can be accomplished by integrating some kind of filtering (smoothing) of the final PF estimate grids. We are investigating the integration of some kind of filtering (smoothing) of the final PF estimate grids to mitigate the "high/low centers." (See also response to 5.1 for more details)

1.5 Some concerns I have with the station data in general and/or results of the point frequency information being represented on the mapped spatial analysis can best be addressed by looking at the precipitation frequency information shown for the station Stickney W. Side Treat (11-8278). This station is one that provides hourly data.

The 100 year, 60 minute analysis I read from the table provided for Stickney that the point value is 3.55 but the mapped analysis only depicts a level of 3.31-3.50. Why wasn't and small center representing the precipitation level of 3.51-3.70 indicated? Additionally, along the same lines, for the 100 year, 24 hours a value of 6.7 is plotted on the map but from what I can see is not at all analyzed for with some enclosed (deficit) or the same for the station immediately to the south (Chicago Roseland Pump) that indicates a value of 8.2 (maximum). If these highs and lows are not drawn for, than why draw for all the other station centers that exhibit highs/lows? From what you show for Stickney and Chicago Roseland Pump, the results only supports my earlier concern that additional smoothing should be taken into account to help eliminate or at least tone down the effect of all the high/low centers your currently indicate on the draft map analysis.

Response: In areas with a high density of stations, the resolution of the grids (30-seconds) can not depict all of the existing variability - particularly if more than one station resides in the same grid cell. In these cases, the spatial interpolation procedure is forced into smoothing the PF estimates. In areas with few stations, the spatial interpolation is not constrained by nearby stations and therefore develops an appropriate radius of influence around stations. We are investigating the integration of some kind of filtering (smoothing) of the final PF estimate grids to mitigate the "high/low centers." (See also response to 5.1 for more details)

1.6 I spent the majority of my time examining the station values listed for 100-year, 24-hours. In general, the station values computed appear to be reasonable. However, I did note that for Chicago-Midway (11-1577), that for return periods of 500 & 1000 years, the 24 hr values were greater than that indicated for 48 hours. Suggest that you review the station point tables for all locations to make sure that this doesn't occur.

Response: This was the result of a software bug that has now been fixed. Thank you for spotting it.

2 Point estimates – how do they compare to current (e.g. TP-40) design thresholds?

2.1 I did note that in the immediate Chicago area that site-specific station 2 year precipitation seemed pretty representative to what one might read using T.P. 40 information. However, at 100 year, the change indicated seems to be much larger, especially looking at the 100 year, 1 hour amounts, where the change is some 30 to 40 percent greater than what was determined for T.P. 40. I noticed that this didn't seem to present as much of a problem to me for a number of stations I looked at in West Virginia.

Response: We recognize the difference between the draft NOAA Atlas 14 results and those published in TP-40. For a number of reasons we expect differences, but most importantly we strongly believe the new estimates are more accurate than TP-40. Certainly the statistical estimation procedure (regional L-moments) and spatial interpolation schemes are much better than was available back in the 1960s for TP-40 and we also have additional data to work with.

2.2 The spatial pattern of rainfall in the HDSC Study is consistent with the spatial pattern in TP 40 (Southeastern Wisconsin Regional Planning Commission in conjunction with Camp Dresser & McKee, Inc. and the University of Wisconsin-Madison Department of Civil and Environmental Engineering published SEWRPC Technical Report No. 40, Rainfall Frequency in the Southeastern Wisconsin Region, April 2000). Do you plan to publish isohyetal maps in hard copy or just show the isohyetal maps on your web site? When will the spatial interpolation procedures be available for review? Under the study documented in TR No. 40, the 2-year 24-hour rainfall depth based on an annual series was determined to be 2.26 inches and the 100-year 24-hour depth was determined to be 5.88 inches. Those depths compare well with the Ohio Basin Study depths for gauges within the Southeastern Wisconsin Region. The two-year depths for the individual Ohio Basin study gauges within the SE Wisconsin Region are within -4 to +16 % of the SEWRPC TR No. 40 depth, with most gauges being within +1 to +11% of the TR 40 depth. The 100-year depths for the individual gauges are within -16 to +12 % of the SEWRPC TR No. 40 depth, with most gauges being within -11 to +11% of the TR 40 depth.

Response: We will provide isohyetal maps that can be downloaded from our web site and printed. We do not plan to print and sell hard copies ourselves. The spatial interpolation procedure, which is based on the approach used to create the new National Climatic Data Center Climate Atlas maps, will be described in the final study documentation. We are pleased that the draft NOAA Atlas 14 precipitation frequency estimates compare favorably with those published in TR No. 40.

2.3 A marked low precipitation area in southern West Virginia and northeastern Tennessee (100yr 24hr) is shown on the study area maps. This area does not show up in TP40, which may have been wrong. The area seems fairly homogeneous. However, the results are much lower than TP40. A discussion explaining why this may or may not be accurate is requested.

The range seems large with isohyetal amounts from 4.5 inches around the Tri-Cities area in northeast Tennessee to 13.5 inches around the Lake Toxaway, North Carolina area. The TP40 atlas ranges from 6 to 11+ inches in similar areas. A verification of those numbers would be recommended.

Response: There are an adequate number of stations in each of these areas to support the lower precipitation frequency estimates. Our high-resolution spatial interpolation procedure is capturing the rain-shadow effect of the Appalachian Mountains. This level of detail was not possible when TP-40 was developed.

2.4 How do all these return period's affect the matching with New England in either TP-40 or Cornell's "Atlas of Extreme Precipitation Events'?

Response: We have not tried to match previous studies in developing the new updates. If we receive funding to update NWS estimates in the New England area we would expect a pretty good match at the edges because we have deliberately made our calculations well beyond the State lines to ensure continuity.

I note some changes in the new values relative to TP40 over NC, where I focused my review since I'm quite familiar with that state. For instance, the 2-year return values for 24 hour durations are quite similar to TP40, but differences become quite evident at the 100-year return interval. For example, at Neuse 2 NE near Raleigh, the 2-yr/24hr value is now 3.20 inches, while the TP40 value was 3.60 inches. The 100yr/24hr value at Neuse is now 7.49 inches, which also is less than the TP40 map value of around 8 inches. On the coast, the Wilmington WSO Airport 2yr/24hr value is now 4.38 inches, while TP40 showed around 4.5 inches—very little change. However, at 100yr/24hr, Wilmington is now 13.30 inches, which is much larger than the old TP40 value of around 10.0 inches—3.3 inches, or 33% more. This is substantial. A similar increase is observed at Southport, immediately south of Wilmington and also on the coast, which has a new 100yr/24hr value of 13.75 inches compared to approximately 10.5 inches in TP40. In the wettest part of the mountains at Highlands (3800 feet elevation) the new 2yr/24hr value is now 5.02 inches, which is almost exactly the same (5 inches) as in TP40. The 100yr/24hr value at Highlands is now 11.20 inches, which is just slightly larger than the 10.8 inches that is roughly determined from the TP40 map.

In short, inland areas show relatively small changes, if any, from TP40, although the Piedmont location selected showed new values were slightly less than the older ones. In contrast, the coastal locations saw substantial upward change in the longer return interval values (100 years or so), but no change at shorter return intervals. Thus, as the return interval increases the coastal values increase and the gradient from coast to Piedmont and mountains also increases in the new calculations, relative to TP40.

This would seem to be appropriate just from these quick comparisons, and based on personal experience and knowledge in the area. The coastal increases are no doubt due to a greater frequency of tropical storms, and very heavy rain from some extreme storms and hurricanes in recent years. Are these recent storms and years included in these analyses (such as Hurricane Floyd in 1999)? If so, then this certainly makes sense.

Response: Our database includes data through and including December 2000, so yes, the recent storms you referred to are included.

2.5 As you get to the middle and southern parts of the Pittsburgh District, the new rainfall amounts were almost one inch less than the old values for the 24hr-100yr. This occurred from Morgantown, WV to the Tygart River basin. In Pittsburgh, the 24-hour 100yr rainfall decreased by almost one half inch. These values need to be double checked. It is suggested that NWS take a good hard look at the rainfall data, including Pittsburgh and south of Pittsburgh, to make sure it is not skewed by extremely low rainfall periods (droughts) which would tend to reduce the rainfall frequency values.

Response: After double checking the precipitation frequency estimates at Pittsburgh and the vicinity, nothing unusual or suspicious was found. We have not tried to "match" the result of previous studies; rather we have taken advantage of vastly more data, and improved statistical and spatial interpolation techniques to derive new estimates. We have noticed that the deviations from TP40 are most pronounced in areas of significant terrain. We are not surprised at this result because it is in these areas in particular that the new techniques combined with increased data density are most likely to show differences.

2.6 Based upon a recent telephone conversation with NWS, it is recognized that the large rainfall in central Indiana this (September 1, 2003) Labor Day weekend that caused flooding of many streams will not be included in the study at this time due to time constraints. This rainfall varied from about 7 to 10 inches in a 24 hour time period with Indianapolis receiving about 7.3 inches at the NWS gage for this 24 hour duration. We request that frequency rainfall data for central Indiana be revised at a later date and be included as an addendum to this study when time permits. As now shown, the 1% chance rainfall is about 5.7 to 5.9 inches for the Indianapolis area

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Kokomo (in north-central Indiana) reportedly received 9 to 11 inches of rain in places during a 24-hour period during the July 4th weekend of 2003. The draft study gave 9.32" for the 1000-year 24-hour estimate (no 90% Confidence Limits). For the 7-day period of July 5-11, the official total was 11.01". The draft study gave 11.27" for the 1000-year 7-day estimate (the 90% Confidence Limits were 11.96" and 10.41") and 10.49" for the 500-year 24-hour estimate (90% Confidence Limits of 11.14" and 9.73").

Indianapolis Airport (central Indiana) officially received 7.20" during a 24-hour period that included most of September 1, 2003 (Labor Day). The draft study gave 7.65" for the 1000-year 24-hour estimate (90% Confidence Limits of 8.10" and 6.92"), and 7.11" for the 500-year 24-hour estimate (90% Confidence Limits of 7.51" and 6.48").

Can you evaluate whether these large events would alter (1) the statistical distribution/curve-fitting, and (2) draft precipitation estimates to a significant extent?

Response: The July 2003 rainfall event and September 1, 2003 rainfall event in the Indianapolis, IN area were significant events. However, we face the moving train problem and have fixed December 2000 as the end of the period of record to be included in this study. As we increase the period of record, the influence of extreme events is reduced. The statistical technique we are using is also more robust than previous techniques. The range of the confidence intervals we are providing provides some indication of the degree of estimate variability. While 2003 events are not included in this study, a quick analysis of results after adding those events to the annual maximum series for Kokomo, IN (12-4662) and Indianapolis Airport (12-4259) did not change the best-fitting distribution for the affected regions (daily regions 52 and 45, respectively). The 1000-year precipitation frequency estimates for the 24-hour and 7-day durations changed by 3% or less. We also agree that if funding is provided we should update the estimates more frequently than they have been in the past. Such an update would not only include just the extreme events, but all the events that have occurred since the last update to ensure the statistics are not biased. We would hope updates are made about every 10 years in future.

2.7 My main concern is that we are now going to use rainfall frequency values which are less than the old TP-40 in our designs. This is OK if it is based on the new rainfall data and there are no errors in the data. The original TP-40 was published in 1960 and we now have more rainfall data (about 40 years) to use in the frequency analysis.

Response: We strongly believe the new estimates are more accurate than TP-40. The statistical procedure (Regional L-moments) and spatial interpolation schemes are much better than those available back in the 1960s for TP-40 and as you mention we have additional data to work with.

2.8 When we receive a request for rainfall frequency, I typically refer to Bulletin 71 from the Midwestern Climate Center (Rainfall Frequency Atlas of the Midwest). Between Bulletin 71 and the current precip frequency review, there seems to be pretty significant differences. As a general rule - the 100 year events for both hourly and daily rainfall is lower than that of the MCC study.

The draft precipitation frequency estimates for the 100-year 24-hour storms for selected stations in northern, central, and southern Indiana fell mostly within the range estimated from TP-40 and Bulletin 71 by Huff and Angel. However, the draft estimate for LaPorte was substantially higher than the estimate from TP-40 and Bulletin 71.

We printed out the station data for about 20 rainfall stations across the state and compared the 100-year 24-hour rainfall from the rainfall stations to spatial patterns on the two maps provided on the HSDC web site: the 100-year 24-hour rainfall isohyetal map and the map showing the percent difference with TP 40. In extreme western Maryland (e.g., Garrett County), there is significant variation from station to station and most stations show 100-year 24-hour rainfalls in excess of 6.0 inches. This is greater than TP 40 since that report shows less than 6.0 inches in Garrett County for the 100-year 24-hour rainfall. The percent difference map shows percentages of 0 to –10 percent but several stations that we examined indicated that HDSC values were increased over TP 40. It appears that the HDSC values are less than TP 40 only in Allegany and Washington Counties.

Response: 64.1% by area of the Ohio River Basin & Surrounding States region is within +/- 10% of TP-40 (for 100-year 24-hour), which is remarkable considering all of technological improvements and the vastly increased amount of data to work with. This gives us confidence we are in fact homing in on the “real” point probabilities.

3 Cartographic comments

3.1 The spatial maps also look reasonable, although a bit hard to read on the computer or printed out on 8.5 x 11 inch paper. I would like to note two things with the presentation of the data.

- On the "Draft Mean Annual Maximum 60-Minute Precipitation" legend some color blocks have ranges like 0.9-0.9 and others have single values like 1.3 assigned. This is confusing.
- I am somewhat color blind and found the colors hard to distinguish on the maps. Also when I printed the maps the colors on the maps were slightly different that the corresponding color in the blocks in the legend for the same range. I verified this with another person with normal color vision.

Although I must admit town labels were a bit small, and color contours were a bit tough to distinguish one from another.

The numbers were too small to read on some of the maps.

Response: We will fix the range and font size issues for the final maps. The color issues you raise are ones we recognize and have had problems resolving with the mapping software we have. We plan to fix at least the colors in the legend block in time for the final maps.

3.2 The USACE Nashville District states that it is always not apparent that the lines drawn on the maps are isolines. For example, looking at the draft mean annual maximum 24 hour precipitation, the isolines are not consistent when you start looking at the individual gage station values.

It takes a long time to load the map, and the process will restart if panning around. We ended up selecting a relatively small area to save time. It appears that in a number of cases isolines had to be adjusted considerably to take site estimates (?) into account; an effect we noticed at Brazil, Spencer, Bloomington, Nashville, Crothersville and Lockport Lock.

What is slightly more disconcerting though is that while the value at the gauge reads '8.1' (for Crothersville) the value at the isoline reads '80'. According to the legend isolines are annotated in 10th of inches, but the gauge values in inches, which appears inconsistent.

Response: The spatial interpolation process used to create the draft mean annual maximum 24-hour precipitation maps performs some minor smoothing, therefore there are cases where the labeled mean value (at an observing site) is slightly different than what is indicated by the nearest "isoline." The final maps will not display gauge values, thus eliminating the inconsistence you raise.

3.3 The USACE Nashville District states the need for consistency with regards to the legends on the maps. Every category in the legend should be a range of frequency precipitation values and the upper bound of one range should be equal to the lower bound of the next range (ie 1.1-1.2, 1.2-1.3, 1.3-1.4).

Precipitation legend: In viewing the entire ORB region (100 year, 24 hour) I was at first taken back by the seemingly detail provided in some states compared to others until I noticed that the precipitation scale provided used different increments of precipitation for each shaded division depending on the general total magnitude of precipitation. Would have preferred that the interval shown would remain constant. Use quarter, half, or full inch so that a better relationship of precipitation frequency values from one state to the other could have been easily made.

Response: We have deliberately chosen not to do this because it would produce over-crowding of contours in high-gradient areas. We are using a sliding scale so that the density of contour lines is consistent across each map. If more detail is needed than provided by the existing contours, users will be able to download the underlying grids from our web site and import them into a Geographic Information System (GIS) for finer contouring.

3.4 Additionally, showing the last interval in white (14.01-15.00) leaves one to think that a lot of precipitation is falling over reservoir, estuaries, lakes and ocean surfaces.

Response: To avoid this impression, the final maps will contain contour lines over water bodies.

4 General questions and comments

4.1 On another matter, looking at the DDF curves we noticed that the curves for the 6 and the 12 hour duration will cross, although admittedly for very high return periods. Did this problem occur for shorter return frequencies as well (say 50 or 100 years) and if yes, how did you deal with it? (We are interested in this for our own work.)

Response: The precipitation frequency calculation is performed separately for each duration. It is natural, as you have pointed out, for errors in the estimating process to produce such internal inconsistencies. We have developed procedures for identifying and eliminating these inconsistencies. The procedures will be described in our final documentation.

4.2 Seasonality did not work for this particular site, although we have seen it work before, but we assume this is not part of what you are reviewing at the moment.

Response: The reviewer is referring to the PFDS button which (in the final version) will provide access to information on the seasonal distribution of heavy precipitation. That button was not functional during the peer review.

4.3 Confidence limits are given for one significance level only (90%), we would have wished for more flexibility here as well. These tables cannot be exported as a text version. This would be useful if one wanted to add the confidence limits to a graph showing the IDF curve for a certain duration.

Response: Adding an export option to the confidence limit data is something we will consider.

4.4 Another point where there could be a bit more flexibility is for 'non-standard' estimates, e.g. estimates for the say 3 day duration with a return frequency of 20 years will have to be derived by users 'manually'. We assume there will be well defined procedures, to ensure estimates are derived in a unique way?

Response: We have added additional grid lines (both in the duration and frequency dimensions) to the output graphs to accommodate interpolation from the graphs.

4.5 We were able to export the data to a text file, which turned out to be a comma-separated file with a header (containing station details) and a date stamp at the end. We would have liked to find the gauge name and number in the header. We do understand that, since these tables will soon be available at any given location, this might be the more universal solution, but users might want to add there own names?

Response: We have already modified the PFDS to include the station name and ID in the text table for observing locations.

4.6 Is there documentation on your web site of how you chose the frequency distribution, the homogeneity tests and other aspects of the analysis? In other words, a report that describes the analysis techniques.

Response: That information will be provided as part of the final documentation and will be available on our web site.

4.7 The web tools are great but not enough to get the overall picture of the data quality. It would nice to see more info in this regard. Graphs showing year-by-year availability for each site would be nice, for example.

Response: We have provided the confidence intervals because they provide a fair estimate of the quality of the estimates, better than merely the period of record. As part of the final documentation, we will post the time series that were derived and used in the statistical calculations.

4.8 One thing that has bothered me, probably the most, about the Ohio River study is the issue of climate change and its ramifications on rainfall frequency estimates - especially at the longer return periods. Picking on my favorite station, Aurora IL, the new study has the 100-year, 24-hour value at 8.07" and the 1000-year, 24-hour value at 14.71". However, Aurora has seen a remarkable increase in precipitation over time.

First of all, my estimates based on records from 1887-2003 and L-moments and GEV for the single site:

100-year, 24-hour value of 10.26"
1000-year, 24-hour value of 22.77"

If you used the 1948-2003 record, you get:
100-year, 24-hour value of 14.81"
1000-year, 24-hour value of 38.73"

If you used the 1887-1948 record, you get:
100-year, 24-hour value of 5.05"
1000-year, 24-hour value of 5.63"

As you can see, this gives you huge differences depending on what part of the record you use when climate change is present. This has several ramifications. First of all, you have to be careful about mixing sites with different periods of record. Second, the confidence intervals in the tables do not reflect the real uncertainty in the data and in the climate. Finally, it means the 1000-year estimates are probably worthless. In addition, the RF study seems to be going against the grain by ignoring the body of research on historical changes in precipitation and possible future changes in precipitation, both of which argue against putting out an estimate of the 1000-year event.

Response: Our trend analysis utilized data through 1998. The Chicago area, including the Aurora (11-0338), falls within a narrow east-west band across the entire study area of statistically significant positive upward trend. (Lin, B. and L.T. Julian, 2001: Trend and shift statistics on annual maximum precipitation in the Ohio River Basin over the last century. Symposium on Precipitation Extremes: Prediction, Impacts, and Responses, 81st AMS annual meeting. Albuquerque, New Mexico.) The spatial distribution of trends and shifts that emerged and the lack of reliable forecasts of climate with sufficient spatial and temporal resolution forced us to conclude that we could do no better than to assume that the entire period of record was valid for use in this study. We agree that the semantics of return period are confusing and note that a 1,000 year return period does not mean that we expect the climate to be invariant for the next 1,000 years. We hope the confidence intervals supplied with the estimates will give users a better feel for the value of those estimates.

4.9 Did I miss it or you did not have the method of your analysis on the page somewhere?

Response: You're right, the methodology was not provided on the review web pages. In general we have followed the methodology described in Hosking, J. R. M., and Wallis, J. R. (1997) Regional frequency analysis, an approach based on L-moments. Cambridge University Press, Cambridge. A more complete description of the methodology will be provided as part of the final documentation.

4.10 Will values for less than 24 hour duration be available for stations without hourly data? I see that they presently are not available.

Response: Yes, values for less than the 24 hour duration will be available for stations without hourly data. In fact, the final product will include estimates for durations from 5 minutes through 60 days, at a spatial resolution of 30 arc-seconds, across the entire domain. Such values were recently published for the semiarid southwest and are available on our web site.

4.11 I'm also wondering how the maps based on hourly data are melded into the maps based on daily data? It seems like you could have real continuity problems as you move from < 24 hours to >= 24 hours. Personally, I don't like the hourly data for reasons stated earlier (shorter record, fewer sites, more missing data) so I give more credit to the patterns found in the maps based on the daily data.

Response: We certainly recognize this challenge. The procedures we are using to resolve this issue will be discussed as part of the final documentation.

4.12 The generalized PMP (HMR-51) maps are stippled in the Appalachian Mountains extending from Georgia to Maine. These stippling areas define generalized PMP estimates that might be deficient because detailed terrain effects have not been evaluated. Do the new point rainfall frequency maps consider the terrain effects? The NWS Hydrometeorological Branch has been involved in detailed generalized studies covering the stippled regions. This has been ongoing for a number of years. This information needs to be included in the results of the study.

Response: The updated precipitation frequency estimates are updates to precipitation frequency estimates only and not to probable maximum precipitation estimates or HMR-51. In updating the precipitation frequency estimates we considered terrain effects when developing the homogeneous regions used in the statistical approach and when spatially interpolating the estimates derived at observing locations. The procedures we are using will be discussed in the final documentation.

4.13 The PFDS is very well put together and is easy to follow the maps and the graphics. However, it does appear to run very slow and wonders if this will be true for all users.

Response: The PFDS is actually significantly faster than some of our earlier iterations. The speed at which the state-specific pages load is based on Internet traffic and your computer speed. The speed of formation of the output page is related to the PFDS software and hardware. We are keeping an eye on PFDS performance and hope to ensure it is reasonable, particularly as the site becomes more popular.

4.14 The rainfall from this study will be used in hydrologic modeling for the determination of flows for drainage basins of all sizes some of which could be quite large. For these drainage basins, based upon the proposed mapping, rainfall depths could vary greatly within a particular study area. Decisions will need to be made on how to include this rainfall in the modeling. Should the rainfall be weighted along the basin, or maximum precipitation only be included? A general consensus should be reached on this topic with input from NWS included.

A method needs to be found for using point rainfall to generate the proper runoff that accounts for duration and season to develop good hypothetical hydrographs for study purposes. The current practice of eliminating rainfall and stream gages continues to make the calibration process very difficult.

Response: While these are important issues in hydrologic modeling, it is not within the scope of this project to make recommendations on methods of hydrologic modeling beyond the interpretation of the results themselves. The NWS is currently examining the areal reduction factor curves published in TP-40 and expects to publish the results in the near future. However, the interpretation of the curves is not likely to change from that published in TP-40. A more detailed discussion of this interpretation is included in NOAA Atlas 2 and this discussion is likely to make its way into the discussion to be published with the results of this study.

4.15 It was noticed in the point estimates (PFDS) presentations that an area computation feature will be added. Nice feature. This page should really emphasize that these are "point" values.

Response: The output page currently reads “Site-specific Estimates,” but based on your comment we may instead say “Site-specific Point Estimates” or simply “Point Estimates.”

4.16 Northeast of the St. Louis area are shown two stations in Illinois (Carlinville:11-1280 & Carlinville 2: 11-1248) that have the same precipitation frequency vales given in the point estimate PF tables. Was the data forced to present similar results? Even though the stations are very close to each other, I wouldn't have expected exactly the same results.

Response: Carlinville, IL (11-1280) is a daily-only station, meaning that only estimates for 24-hour and longer were derived from this data. Carlinville 2, IL (11-1248) is an hourly-only station, meaning that only estimates for 48-hour and shorter were derived from this data. The PFDS has grid cells of, roughly, 3-miles by 3-miles and so apparently put both of these stations in the same grid cell. This caused them to have exactly the same data. The final deliverable grids will have a resolution of 30-seconds, roughly a mile. The 3-mile by 3-mile grid cell was only used for the purposes of the point estimate review. However, the close proximity suggests that these two stations could be joined as a co-located pair of an hourly and daily station. We will investigate this possibility. Thank you for pointing this out to us.

4.17 Looking at the point estimate upper and lower bounds data, many of the stations have a -9.99 indicated for all return periods for 60 minutes. Not sure why this should happen.

We checked the 24 hr/ 100 year estimate at Crothersville (8.1 inches) and noticed that for the 60 minute duration no upper/ lower limit for the confidence interval was given (-9.99), although there must have been data available to estimate the precipitation frequency?

The Stickney W. Side Treat, IL (11-8278) station exhibits -9.99's indicated for all return periods for 60 minutes. Not sure why this should happen.

I found that the confidence limit precipitation values for Wilmington NC WSO were missing for the 60 minute column, but were available for all other durations.

Response: A software glitch prevented some of the 60-minute upper and lower PF estimates from appearing. This will be resolved before the final estimates are released.

4.18 I was curious regarding the time of records of some stations used. In the documentation, I couldn't find an explanation regarding 'only data since 1950 was used'. I'm curious if stations which closed more than 20 years ago were used along with stations that have only been open for the past 20 years(?). It would be helpful to include this information in the final report that we would eventually use. It would also be great to have more detail on the statistical analysis (and perhaps an example with comparisons with other methods).

Response: The time series we derived and used will be posted on our web site as part of the final documentation. We are utilizing all available digitized data, including data collected in the late 1800's. A station is eligible to be used in our computations if it has 30 years of usable daily data or 20 years of useable hourly data, regardless of when the data was collected. A complete station list, which will include begin and end dates, will be provided. The methodology we used will be described in the final documentation. (Also see response to 4.7)

4.19 Edgerton, OH - only has 28 years of record. I was thinking the minimum period of record for use with the 24 hour rainfall was 30 years.

Response: Edgerton, OH (33-2512) is actually an hourly station that has been used in the 24-hour analysis. The criterion for hourly stations is that they must have at least 20 years of data. With 28 years of data, Edgerton meets this criterion.

4.20 We are interested in rainfall hyetographs that are needed for watershed modeling. We are aware of the temporal distributions for the Ohio River Basin that are documented in a paper proposed for the 2004 Transportation Research Board (TRB) Conference in Washington, DC. This paper includes graphs that show the 10th to the 90th percentile distribution for storms that occurred primarily in 1st, 2nd, 3rd, and 4th quartile of the total storm event. Is that the form that National Weather Service (NWS) plans to publish the results or will NWS make more detailed recommendations as to which distribution to use for preparing rainfall hyetographs?

Response: Temporal distributions of heavy rainfall in the Ohio River basin and surrounding states project will be presented in the form submitted to the 2004 TRB Conference. The methodology largely follows that of the Illinois State Water Survey (Huff, 1990) except for a significant difference in the definition of duration. The temporal distributions will be expressed in probabilistic terms as cumulative percentages of precipitation and duration at various percentiles. The data will also be subdivided into quartiles based on when in the distribution the most precipitation occurred in order to provide more specific information on the varying distributions that were observed. It is not within the scope of this project to make recommendations on how to use these estimates of temporal distribution beyond the interpretation of the results themselves. These temporal distributions will not describe a single hyetograph. Rather we expect that modelers will be able to use the information to prepare an ensemble of possible scenarios from which they can extract most likely estimates.

Huff, F. A., 1990: time Distributions of Heavy Rainstorms in Illinois. Illinois State Water Survey, Champaign, 173, 17pp.

4.21 As described in your quarterly progress reports, new research is underway to develop depth area reduction factors for the Ohio River Basin. We believe this research work is important to either update or validate the depth area reduction factors in TP 40. When will this work be completed and will NWS request another review at that time?

Response: The NWS hopes to complete its Areal Reduction Factor (ARF) analysis for the United States by the end of calendar year 2003. Tests will be performed in order to determine if a single set of ARF curves for the entire country is valid or if a set of regional curves may need to be developed. We will carefully review the results in order to determine what additional work, if any, needs to be done.

4.22 It would be informative to show the frequency distribution used [in Maryland], such as the Generalized Extreme Value (GEV), and the length of record under the table showing the precipitation frequency estimates. The length of record would provide some justification for the variation in upper and lower 90% bounds among various stations.

Response: Information such as the frequency distributions used and the length of record will be included in the final documentation. The specific distribution can be different depending on both duration and location. Maryland stations are included in 7 of the different regions used in our regional analysis of the Ohio River Basin and Surrounding States. The following table provides current draft distributions being used over Maryland summarized in general geographic areas. These distributions may change prior to publication. Please note that as a result of the spatial interpolation and internal consistency adjustments within and among estimates at different frequencies and durations, the final estimates are not necessarily directly derivable from a distribution equation.

Area	daily (24hr-60d)	hourly (60min-48hr)
Eastern MD	GEV	GEV
Northeast MD	GEV	GEV
Central MD	GEV	GEV
Western MD	GLO	GEV

where : GEV is Generalized Extreme Value, GLO is Generalized Logistic

4.23 Once the spatial interpolation procedures are available, does NWS plan for a subsequent review?

Response: No. The spatial interpolation procedure, which is based on the approached used for derivation of the new NCDC Climate Atlas maps, has already undergone an internal review. (See 12th Progress Report for more details on the Cascade Residual Add-Back (CRAB) grid derivation procedure at http://www.nws.noaa.gov/oh/hdsc/current-projects/ORBPR12.pdf)

5 Are estimates and patterns reasonable when compared to your local or regional knowledge?

5.1 As I have stated earlier, the mapped depiction of the many small high and low precipitation is not warranted in my opinion, especially for longer return periods and in consideration that the results are to be used for water control structure design in most cases. I strongly support the elimination of all single station/point high and low centers as well as a general smoothing of other intermediate isolines. The current draft analysis portrays an accuracy that I don't believe is really obtainable. would be interested in seeing a mapped analysis of 100 year, 24 hour precipitation for the state of Illinois that deleted the most recent 10 - 20 years of data. Would the same centers show up at the same locations or would there be dramatic shifts?

Huntsville at 4.4 inches seems relatively high with 'bull's-eye' contouring surrounding the Huntsville station. A verification of those numbers would be recommended.

On the spatial review we had picked one map only – Indiana, 100 year 24 hour precipitation.

The lack of temporal consistency shows up as conspicuous bull's-eyes all over the maps.

There are quite a few bulls eyes on the 100 year 60 minute and 24 hour data maps for Northwest Indiana and Western Michigan.

Looking at the map for the 100-year, 60-minute, it really brings back the memories and frustration we had with the hourly data. The three main things against the hourly record are the shorter period of record, the much poorer quality of the data, and its sparseness. Looking at just IL, I can see bulls-eyes at Moline, Rockford, and Farmer City. The one at Belleville may very well be real and reflect the urban influence of St Louis.

Regarding the 100-year 24-hour precipitation map for Ohio, I question the inclusion of rainfall contours forming small "islands" around certain rain gages (e.g. Fremont water works, Vickery, Galion water works). I realize that these contours may have been "automatically" computer-generated, but the final products (I believe) should be "smoothed" using some judgment. In contrast, the Toledo Express WSO gage, which indicates a value of 4.6" of rain, does not receive a contour "island". I am unsure I disagree about that, however; I have personally experienced at least one extreme storm of over 6" in a few hours in West Toledo, while the Airport gage reported 0.25" for that day. There is a commonly held belief in the Toledo area that storms tend to track north or south of Toledo, perhaps due to some effect of Lake Erie, but I have no hard data to back up that contention.

I have not had time to examine the gridded coverages, but I've heard others mention they were concerned about the "bull's-eyes" they see, especially noticeable for shorter durations (say, 60 min. or so). I would guess this is because there are fewer numbers of short interval reporting stations? If so, perhaps some way could be developed to insure short duration maps have the same essential smoothness as, say, 24 hour or 7 day maps. Over most of the flatter Midwest, I can't think why there should be any proclivity toward greater unevenness in the look of the map as one goes toward shorter durations, but perhaps I'm not thinking of all possible reasons.

I am assuming that this is gage only data. I would like to see radar estimates included in these plots. While the radar estimates would not be useful from a point data sense, it would help in painting the generalities associated with each incremental amount, which leads me to my next comment. I am troubled by the blotchiness of the maps. Having a small circle representing higher or lower amounts within broad region of a certain incremental amount does not appear representative, unless there is an orographic effect. Can these areas be smoothed?

Huntington District voices a similar concern as previous comments in that the new maps have a number of defined areas with rainfall amounts that seem to disrupt the isohyetal patterns. Evidently, the historical record supports having these isolated rainfall amount changes that could increase or decrease the hydrologic/hydraulic requirements on small localized projects in the same general area.

Would like to see more continuous isolines without the maps "so broken up".

The maps are consistent except for some "bulls eye" spots in Johnstown, Pa, Bradford, Pa, and Confluence, Pa that need to be looked into.

I have serious concerns about "bulls eyes" in the maps. The peak at Farmer City, IL 100-yr 60-min precipitation does not make sense. This tells me that 30 miles in all directions this event would produce 1 inch less rainfall. There is nothing in the terrain to explain why such a radical aerial change in climate. I thought the initial concerns of the NWS about the Illinois Water Survey reports were the closed circles (bulls eyes), which NWS said should not occur in that area. This feature is occurring in many other areas of homogeneous terrain. In east central Ohio, the difference between Dillon Dam and Mohawk Dam is dramatic. I know of no features including terrain that can cause such a rapid change in precipitation over small distances. It appears that there is a basic problem with regionalizing the statistics.

The maps provided us show large pockets, or bulls eyes, of large frequency rainfall at many rainfall gages surrounded by areas of lower rainfall where there are no gages. For areas where the topography is relatively constant and the same climatological results would be expected, it would make more sense to show the higher frequency rainfall as continuous. For instance the 24 hour 1% chance (100-year) rainfall maps for the Rockville and Greencastle gages in Indiana show 7.3 and 7.6 inches of rainfall. However, the areas between these two gages where there are no additional gages show rainfall depths of 6.5 to 7.0 inches. It appears the rainfall within this reach should be in the 7.3 to 7.6 inch range. Many other examples with this type feature exist within the Louisville District boundaries.

Bottom line...our TP-40 and Hydro-35 data needs updated and probably increased. With the 60 minute - 100 year frequency data that has been included from this current analysis, there are too many increments. In the June 1977 Hydro-35, the state of Arkansas has a 3.5 inch increment in the north and a 3.75 inch increment across the center. There is a 4 inch amount just over into north La. In the map that was included in this round, there is everything from 2.75 to 4 inches. Only a small portion of the map, mainly Little Rock Adams Field airport, has a 4 inch value. That is probably one event, a hell of a storm that happened a couple of years ago. These are not rare and there are numerous events such as these that occur over the state, just not over our buckets. Instead of relying on data with a point only assumption, I believe that weight should be given to applying these extreme events at one location over a broader area, not just a small circle around the site.

I concentrated mainly on reviewing 100 year, 24 hour analysis for the states of Illinois & West Virginia. Looking at the analysis provided I do question the reality of the numerous small, single station based, high and low centers that show up. For example, in central Illinois northwest of the St. Louis area, I would not draw for the three detached centers analyzed around the towns of Hillsboro 2 SSW, Pana, and Taylorville. Likewise, some 50 miles south of Hillsboro 2 SSW, one comes upon the stations Carlyle Reservoir and Centralia 2 SW both providing a 100 year, 24 hour value of 7.2 inches. I see no reason that Centralia 2 SW has a small encompassing isoline of 7.0 drawn around it whereas Carlyle Reservoir does not. I strongly believe the 7.0 isoline should be deleted surrounding Centralia 2 SW. There are many of these single station analyses (both high/low centers) that I believe should be eliminated. Additionally, I noticed not in Illinois but in West Virginia and other states that there are a number of very small centers that are depicted, not encompassing a station location, that are drawn. I think the largest/smallest encompassing isohyet should be deleted. Examples are the 4.4 enclosed isolines drawn just NW and SW of Athens Concord College in West Virginia or the 6.5 enclosed isohyet located just north of Willisburg 4 N in north central Kentucky for the 100 year, 24 hour mapped analysis. I see some support if topography is involved but if orographic effects are minimal, than I would not indicate such isolated centers.

We compared the new contoured analyses for the Ohio Basin Rainfall Frequency Study for southern Wisconsin against the graphs from Huff and Angel (1992) from the Midwestern Regional Climate Center. Some bull's-eyes appear in the newer charts across Southern Wisconsin. While the origins of these bull's-eyes may be due as she said to the peculiarities of the individual stations and their spacing, some of the problem may also be associated with southern Wisconsin being close to the edge of the analyses. If the analyses were centered over the Upper Mississippi Valley and western Great Lakes, then these would be more of an issue.

Although MDOT's (Michigan Dept. of Transportation) regional approach may have tended to average the estimates too much, I believe that it did a better job of accounting for sampling variability at the gage locations than your methodology. Given the lack of orographic effects in lower Michigan, the "bulls-eyes" (such as Kent City for 60-min and 24-hr and Burnside for 24-hr) do not seem realistic. I believe these could be traced back to one extreme event that has an equally likely chance of occurring at other nearby locations.

We question the spatial variability of the precipitation depths over relatively small geographic areas as shown on the Ohio Basin study maps. We believe it is unlikely that the "islands" of relatively higher or lower depths represent true variations in spatial precipitation frequency depths. We do not think that there is a valid climatological reason for such variation.

Response: We are in the process of evaluating several methods to mitigate the "bull's eyes." Simply filtering (smoothing) the precipitation frequency grids will be a last resort solution since it will disrupt spatial detail where it is appropriate (e.g. in complex terrain).

5.2 Just as bad, if not worse, is the lack of spatial detail in the 60-minute map. The features in southern Illinois and northeast Illinois (around Chicago) have pretty much disappeared. That doesn't seem right since the same processes that drive the 24-hour pattern will probably drive the 60-minute pattern. BTW, the spot checks I made with our Bulletin 70 and my own calculations using different distributions and fitting techniques produces values that are comparable with what I see on the 100-yr, 24-hour map (given the level of uncertainty).

Response: The spatial patterns in/around Illinois have been among the most challenging of this project. Based on results for the entire Ohio project area, we made the conscious decision to regionalize the 24-hour duration and apply those regions to the longer durations and to regionalize the 60-minute duration for the shorter durations. We will carefully examine the results in/around Chicago, based on your comments. We regard corresponding with you during our investigation critical to obtaining the best results possible.

5.3 Western Kentucky, around Dyer, same story - area of relatively high values at 24-hours and a local minima at the 60-minute scale looks suspicious. Same for western Ohio around Greenville and northeast Ohio, along Erie.

Response: Dyer, KY has 49 years of usable hourly data which is enough to make stable estimates of 100-year depths. Its 60-minute mean annual maximum value is 3.13", relatively low as compared to the surrounding stations. Greenville, OH has 47 years of usable hourly data, which is enough to make stable estimates of 100-year depths. The mean values look reasonable compared with nearby sites. We will look at these stations again. We believe the pattern around the Great Lakes, including along Lake Erie in northeast Ohio, is indicative of a real lake influence on short-duration precipitation.

5.4 Southwest of Indianapolis, there is an area of relatively high values in the 24-hour map and relatively low values in the 60-minute map. I think we can safely assume that many of the physical processes operating on the 60-minute rainfall are operating on the 24-hour rainfall. So I wonder when the pattern reverses between the two sets of maps. This looks suspicious.

Response: The relatively low 60-minute precipitation frequency estimates in this area are the result of Eminence, IN and Martinsville, IN, both of which we will investigate further.

5.5 Attached [to right] is a map of mean annual precipitation in Cook County, Illinois, based on a 25-gage network operating since 1990. In the southern portion of Cook County is a relative high, w.r.t. precipitation. I'd bet that you would find a similar pattern in Cook County on the 24-hour, 100-year map if you had a station(s) in that part of Cook County. It would tie in with the pattern extending from Rockford to Peotone. Are there ways to incorporate "auxiliary" information when defining the spatial patterns?

Response: A "pseudo" station could be added to increase the mean annual maximum estimates in this area. A change in the mean annual maximum pattern will influence the 100-year map/grid. We will be in touch to discuss any possibilities.

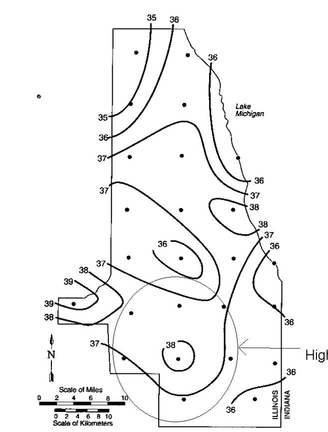

Figure 7. Thirteen-year average precipitation pattern (inches), Water Years 1990-2002.

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5.6 Regarding the 100-year 60-minute map: In west-central Indiana, the 3.3" isohyet is closed at Waveland and Brazil. It appears all of the areas between the towns should be at least 3.3", and perhaps 3.5" in some areas.

Regarding the 100-year 60-minute map: In south-central Indiana, the 3.3" isohyet is closed around Nashville and Columbus. It appears that the 3.3" isohyet should be redrawn to include at least all of the areas between both towns.

Regarding the 100-year 60-minute map: In southwestern Indiana, the 3.5" isohyet is closed at

Princeton and Spurgeon. It appears that the 3.5" isohyet should be redrawn to include more areas between Princeton and Spurgeon, and between Spurgeon and Jasper.

Regarding the 100-year 24-hour map: In west-central Indiana, the 7.0" isohyet is closed at Rockville/Waveland, Greencastle and Brazil. It appears all of the areas enclosed by these towns should be at 7.0", and perhaps combined with the areas of Bowling Green, Bloomington, and possibly Nashville.

Regarding the 100-year 24-hour map: In southwestern Indiana, the 7.5" isohyet is closed at Princeton, Petersburg and Spurgeon, but not drawn at Jasper and Huntingburg (just to the east). It appears all of the areas enclosed by the 5 towns should be at 7.5".

Response: The method(s) we plan to implement to smooth the spatial patterns in topographically and climatologically similar regions will likely mitigate these. (See response to 5.1.) Once we have implemented a smoothing process, we will evaluate each of these areas.

6 Are stations located correctly on the map?

6.1 I would like to have three CORRECTIONS made:

CURRENT NAME	CORRECT NAME
Chattanooga WSO AP	Lovell Field
Knoxville WSO AP	McGhee Tyson AP
Bristol WSO AP	Tri-Cities AP

These corrected names are as they appear in NCDC climatic reports. WSO's are no longer located in those locations.

Response: Thank you. We will make these corrections.

6.2 I did notice on some of the maps that I pulled up that certain stations are not listed. For example, on the Illinois 100 year, 24 hour map the station Belleview SIU Research is not labeled however the dot indicating its location is printed. Hopefully this is just a printer (scale) error. Same goes for Harrisburg Disposal PL not indicated on the Mean Annual Maximum 24 hour map in southern Illinois.

On the 100 year, 60 minute and 24 hour maps the station label is not shown. I do see a dot on each of these maps that represents the location of this station; however, only the 24 hour map shows the computed 100 year, durational value of 6.7 which is representative of the 6.74 indicated in the appropriate table for this station. Why isn't the 60 minute value shown for 100 years for this station on the 100 year, 60 minute map?

Response: In areas with a high density of stations, the mapping software cannot fit in all of the station labels. This does not mean that its PF estimate was not used in the interpolation. The station "dots" are always shown.

6.3 The town of Parkton is situated East of I-83. Please check to see if the Parkton Precipitation Station is West of I-83 as your map shows. We were surprised that there were no hourly stations in the larger metropolitan areas like Frederick and Salisbury.

Response: The "PARKTON 2 SW" station is 2 miles southwest of Parkton, and thus placing it west of I-83. A Frederick station exists, but it only has data back to 1996. The hourly gauge data we have for SALISBURY FAA ARPT (18-8005) has less than 20 years of data (1948-1951) and was therefore not used.

7 Confidence limits and confidence intervals?

7.1 There is a little confusion as to the terminology confidence limits and intervals. You are defining, I think, upper and lower one-sided confidence limits that yield one-sided confidence intervals. The upper bound is the 5-percent confidence limit (5 percent chance of being exceeded) and the lower bound is the 95-confidence limit (95 percent chance of being exceeded). As you state you are defining a 90-percent confidence interval but the lower and upper bounds are 95- and 5-percent confidence limits. As stated in Bulletin 17B (page 9-2), "Thus, the union of two one-sided 95-percent confidence intervals is a two-sided 90-percent interval." This is no big deal but we though it was at least worthy of mention.

The upper and lower bounds are not symmetric with respect to the estimated value which was no surprise. However the negative departure (lower bound) is greater than the positive departure (upper bound). Given that rainfall is bounded by zero on the lower end, one would think the positive departure would be larger. This is certainly true for uncertainty bounds on streamflow.

Also the 90-percent confidence interval is usually small with values on the order of +/- 10 to 15 percent. Since this represents about 1.64 standard errors, one would expect this value to be larger.

Response: To compute the confidence limits we are using a Monte Carlo simulation technique described in Hosking and Wallis with 1,000 trials. This technique makes no assumption about the shape of the distribution of errors. The limits we are providing are defined as follows:

$$LL95\% =< P <= UL5\%$$

Where P stands for the estimated precipitation quantile and LL and UL are the lower and upper bounds or limits respectively. We refer to the range between LL and UL as the confidence interval. In this case, the "true" estimate has a 5% chance of lying below the lower limit, and a 5% chance of lying above the upper limit. It has a 90% chance of lying between the lower and upper limits. We are referring to the interval between the lower and upper limits as the confidence interval, and in this case, the 90% confidence interval.

The regional approach significantly reduces errors associated with estimates. The tight error bounds we see illustrate that effect. Sample calculations provided by Hosking and Wallis show variation in the relative magnitudes of departures of lower and upper bounds from the mean, even at single sites.

8 Bad data

8.1 Several research papers have been published regarding the possibility of a precipitation anomaly at the LaPorte gage in northern Indiana. However, I am unable to determine if the perceived broader range in the 90% confidence limits is statistically significant and the degree of correlation of the recorded data with the statistical distribution compared to the results for other nearby stations.

Response: To keep us fully-informed, please provide us with references to the research papers regarding the precipitation anomaly observed at La Porte. In response to your comment, La Porte, IN (12-4837) is a co-located daily and hourly station in our analysis. The 24-hour analysis and 60-minute analysis do not indicate that it is discordant with its surrounding stations based on annual maximum precipitation, nor did it cause regional heterogeneity.

We did analyze all daily annual maximum series with at least 50 years of 24-hour data for trends in mean. La Porte has 53 years and our analysis did not show a trend in mean annual maximum precipitation. Other trends in yearly precipitation do not always translate into trends in annual maximum precipitation. We are currently conducting an analysis of cross-correlation between stations. Preliminary results suggest that La Porte is not cross-correlated with nearby stations but that does not necessarily imply it is anomalous. Our confidence limits are computed using 1,000 Monte Carlo simulations with the same statistical characteristics as the station. The 100-year 24-hour confidence intervals for La Porte are 6.70”-8.89”, a range of 2.19”. These are broader than immediate surrounding stations, which have ranges of 0.96-1.98”. However, they seem consistent for the region.

8.2 I did some checking on Farmer City, Illinois, looking at the old NWS and WB forms on the site. In a 1962 sketch, they have the recording rain gage about 20 feet to the north of an unidentified building. I remember Floyd Huff telling the story of a gage that was higher than surrounding sites and was getting extra water from the roof of the barn sitting right next to it. Now I'm wondering if it wasn't Farmer City.

Response: Without concrete evidence, it is difficult for us to objectively remove a station from the analysis. Farmer City, IL passed our tests for discordancy and heterogeneity within its region; however, we will investigate the data further and take appropriate action. In addition, please see response to 5.1.

Appendix A.6. Daily and hourly station lists for NOAA Atlas 14 Volume 2 showing station ID, station name and state, daily region in which the station resides, longitude, latitude, elevation (feet), begin date of record, end date of record, number of data years (i.e., years for which a reliable annual maximum was extracted), station coefficient of L-variation (L-CV), L-skewness (L-CS), L-kurtosis (L-CK), and discordancy of the station within its region (Disc.).

Table A.6.1. Daily stations (statistical values for the 24-hour duration)

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
01-0148	ALBERTVILLE 2 SE	AL	36	-86.1667	34.2333	1142	01/1928	12/1976	49	0.1926	0.2690	0.1594	1.06
01-0178	ALICEVILLE	AL	79	-88.1269	33.1394	240	01/1948	12/2000	52	0.2036	0.2880	0.1546	0.60
01-0184	ALICEVILLE LOCK & DAM	AL	79	-88.2878	33.2100	165	01/1949	12/2000	52	0.2269	0.2928	0.2379	1.10
01-0272	ANNISTON FAA AIRPORT	AL	38	-85.8556	33.5872	594	01/1941	12/2000	59	0.1871	0.2506	0.2116	0.29
01-0338	ARLEY 1 S	AL	38	-87.2333	34.0667	745	03/1938	12/1982	45	0.1480	0.1363	0.1054	1.34
01-0369	ASHLAND 3 ENE	AL	38	-85.7919	33.2836	1000	06/1948	12/2000	47	0.1871	0.1611	0.0838	0.84
01-0377	ASHVILLE 4 W	AL	38	-86.3333	33.8500	591	05/1895	12/1972	56	0.1774	0.2710	0.2460	0.85
01-0390	ATHENS	AL	37	-86.9511	34.7772	680	01/1937	12/2000	34	0.1621	0.2309	0.1437	0.79
01-0395	ATHENS 2	AL	37	-86.9833	34.8000	720	01/1956	12/1990	35	0.2231	0.3043	0.2067	1.22
01-0505	BANKHEAD LOCK AND DAM	AL	38	-87.3572	33.4528	280	01/1939	12/2000	62	0.1751	0.2896	0.2085	0.72
01-0655	BELLE MINA 2 N	AL	37	-86.8825	34.6908	600	03/1940	12/2000	61	0.2119	0.2836	0.1648	0.65
01-0748	BERRY 3 S	AL	38	-87.6497	33.6944	504	02/1940	10/1998	51	0.1969	0.2684	0.2070	0.34
01-0764	BESSEMER 3 WSW	AL	38	-87.0078	33.3953	445	01/1955	12/2000	43	0.2083	0.2145	0.1947	1.35
01-0829	BIRMINGHAM WSFO	AL	38	-86.8333	33.4667	744	01/1939	12/1989	49	0.1896	0.2801	0.1486	0.72
01-0831	BIRMINGHAM FAA ARPT	AL	38	-86.7450	33.5656	615	01/1930	12/2000	71	0.1831	0.2521	0.1761	0.09
01-0957	BOAZ	AL	36	-86.1633	34.2008	1070	03/1938	12/2000	57	0.1703	0.1051	0.0822	0.95
01-1099	BRIDGEPORT 5 NW	AL	36	-85.8008	34.9786	670	01/1897	12/2000	95	0.1784	0.2584	0.1568	0.56
01-1143	BROOKWOOD	AL	38	-87.2936	33.2536	515	06/1960	12/2000	41	0.2027	0.2655	0.1721	0.36
01-1288	CALERA 2 SW	AL	38	-86.7461	33.1106	530	01/1901	12/2000	91	0.1684	0.1763	0.2028	1.10
01-1377	CARBON HILL	AL	38	-87.5269	33.8931	430	03/1938	11/1998	60	0.1836	0.2436	0.2470	1.06
01-1615	CHILDERSBURG	AL	38	-86.3667	33.2833	479	01/1937	12/1967	31	0.1682	0.2121	0.1159	0.62
01-1620	CHILDERSBURG WATER PLA	AL	38	-86.3436	33.2822	418	03/1957	12/2000	44	0.1941	0.2278	0.1043	0.71
01-1819	COLBERT STEAM PLANT	AL	76	-87.8500	34.7500	469	01/1949	12/1980	32	0.1671	0.1732	0.2080	0.91
01-1849	COLLINSVILLE	AL	38	-85.8833	34.2500	751	03/1938	10/1977	39	0.1707	0.2196	0.1649	0.15
01-1940	CORDOVA 2 ENE	AL	38	-87.1500	33.7500	320	02/1901	07/1991	78	0.1756	0.2306	0.1729	0.08
01-2141	DANCY 4 N	AL	79	-88.2833	33.0667	210	02/1905	12/1964	41	0.1700	0.1672	0.1146	0.76

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
01-2149	DANVILLE	AL	37	-87.0833	34.4167	600	01/1941	12/1997	57	0.2057	0.3257	0.2815	1.81
01-2207	DECATUR	AL	37	-86.9667	34.5833	581	02/1880	12/1968	80	0.1697	0.1709	0.0902	1.27
01-2632	ELROD	AL	38	-87.7972	33.2569	252	02/1940	12/1999	60	0.1435	0.2283	0.2361	2.21
01-2840	FALKVILLE 1 E	AL	37	-86.8833	34.3667	625	01/1939	12/1991	53	0.1678	0.2737	0.1500	1.44
01-2883	FAYETTE	AL	77	-87.8219	33.6847	365	01/1922	12/2000	65	0.1890	0.2736	0.2046	0.47
01-2945	FLAT ROCK	AL	36	-85.6833	34.7667	1401	01/1939	12/1997	59	0.1572	0.1056	0.1247	0.82
01-2971	FLORENCE	AL	76	-87.6833	34.8000	581	01/1893	12/1976	70	0.1704	0.1793	0.0762	0.77
01-3043	FORT PAYNE	AL	38	-85.7236	34.4406	917	01/1936	12/1999	56	0.1754	0.2004	0.1953	0.47
01-3151	GADSDEN	AL	38	-86.0000	34.0167	571	01/1894	12/1967	74	0.1930	0.2753	0.1181	1.28
01-3154	GADSDEN STEAM PLANT	AL	38	-85.9878	34.0219	565	03/1953	12/2000	46	0.1738	0.1617	0.0534	1.43
01-3200	GARDEN CITY	AL	38	-86.7500	34.0167	502	03/1938	12/1983	45	0.1870	0.2730	0.1738	0.29
01-3399	GOODWATER	AL	38	-86.0500	33.0667	1010	01/1896	12/1953	58	0.2132	0.2644	0.0911	2.10
01-3430	GORGAS	AL	38	-87.1833	33.6667	350	01/1937	10/1994	57	0.1812	0.3082	0.2822	1.65
01-3573	GUNTERSVILLE	AL	36	-86.3297	34.3344	578	01/1905	12/2000	88	0.1618	0.1052	0.1402	1.02
01-3578	GUNTERSVILLE CITY WATE	AL	36	-86.2833	34.3667	610	01/1949	09/1980	32	0.1572	0.1753	0.1500	0.15
01-3620	HALEYVILLE 2 ENE	AL	38	-87.6347	34.2311	920	01/1937	12/2000	64	0.1837	0.2100	0.1019	0.54
01-3645	HAMILTON 3 S	AL	77	-87.9914	34.0967	435	01/1962	12/2000	39	0.1814	0.2285	0.2234	0.63
01-3655	HANCEVILLE	AL	38	-86.7625	34.0619	530	06/1948	12/2000	53	0.1600	0.1380	0.1338	0.89
01-3775	HEFLIN	AL	28	-85.6006	33.6483	850	01/1956	12/2000	44	0.1818	0.1129	0.0817	0.47
01-3783	HELENA 1 S	AL	38	-86.8500	33.2833	-999	01/1917	08/1951	34	0.2027	0.3319	0.1631	1.80
01-3842	HIGHTOWER	AL	28	-85.3781	33.5172	1175	01/1942	12/2000	59	0.1596	0.2242	0.1878	0.87
01-3899	HODGES	AL	38	-87.9283	34.3606	840	03/1938	12/1999	62	0.1867	0.1893	0.0946	0.58
01-4064	HUNTSVILLE WSO AP	AL	37	-86.7858	34.6439	624	01/1959	12/2000	42	0.1718	0.1887	0.2393	2.91
01-4209	JACKSONVILLE 1 NW	AL	38	-85.7664	33.8167	685	06/1948	12/1999	49	0.1981	0.1604	0.0940	1.14
01-4226	JASPER	AL	38	-87.3150	33.9053	486	01/1961	12/2000	36	0.2084	0.2563	0.2387	1.50
01-4619	LEEDS	AL	38	-86.5272	33.5447	636	02/1917	12/2000	81	0.1926	0.2229	0.2031	0.54
01-4845	LOCK 4	AL	38	-86.1833	33.6333	512	01/1897	08/1949	53	0.1580	0.1481	0.0956	0.95
01-4976	MADISON	AL	37	-86.7500	34.7000	581	02/1894	12/1974	78	0.1774	0.2648	0.1474	0.47
01-5529	MONTE SANO	AL	36	-86.5167	34.7500	1601	01/1940	07/1976	37	0.1853	0.1314	0.0199	2.50
01-5537	MONTEVALLO	AL	38	-86.8667	33.0981	410	01/1941	12/2000	54	0.1752	0.2509	0.1847	0.21
01-5625	MOULTON	AL	37	-87.3000	34.4667	630	01/1939	12/1997	50	0.2011	0.2744	0.1606	0.22
01-5635	MOULTON 2	AL	37	-87.2933	34.4856	645	04/1957	12/2000	44	0.1934	0.2355	0.1079	0.63

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01-5749	MUSCLE SHOALS FAA ARPT	AL	76	-87.5997	34.7442	540	01/1941	12/2000	56	0.1666	0.1343	0.1126	0.21
01-5867	NEW MARKET 2	AL	36	-86.4500	34.9167	732	02/1943	12/1974	31	0.2022	0.2659	0.1717	1.53
01-6121	ONEONTA	AL	38	-86.4692	33.9478	892	01/1895	12/2000	95	0.2040	0.2265	0.1443	0.49
01-6226	PAINT ROCK 2 N	AL	36	-86.3333	34.7000	640	01/1936	09/1980	45	0.1703	0.0623	0.1362	2.65
01-6246	PALMERDALE	AL	38	-86.6431	33.7453	720	01/1949	12/2000	52	0.1757	0.2178	0.1628	0.05
01-6805	RED BAY	AL	77	-88.1333	34.4333	679	01/1941	12/1997	57	0.1710	0.2148	0.1674	0.29
01-6847	REFORM 2 E	AL	79	-88.0200	33.3753	238	03/1938	12/2000	63	0.1873	0.3019	0.2657	0.98
01-7025	ROCK MILLS	AL	38	-85.2892	33.1592	745	06/1938	12/2000	51	0.1495	0.2231	0.1930	1.23
01-7131	RUSSELLVILLE 2	AL	38	-87.7319	34.5100	830	01/1954	12/2000	47	0.2101	0.2833	0.1555	0.88
01-7157	SAINT BERNARD	AL	38	-86.8133	34.1736	800	01/1908	12/2000	92	0.1759	0.1828	0.1603	0.27
01-7207	SAND MOUNTAIN SUBSTN	AL	36	-85.9692	34.2872	1195	01/1941	12/2000	60	0.1717	0.1954	0.1826	0.28
01-7282	SAYRE 5 NW	AL	38	-87.0500	33.7500	304	03/1938	12/1991	48	0.1860	0.1722	0.0965	0.58
01-7304	SCOTTSBORO	AL	36	-86.0536	34.6736	615	01/1892	12/2000	105	0.1696	0.1258	0.1109	0.51
01-7415	SHEFFIELD TVA NURSERY	AL	76	-87.7000	34.7667	512	01/1893	07/1954	59	0.1384	0.1341	0.1530	0.68
01-7999	SYLACAUGA 4 NE	AL	38	-86.2114	33.2053	490	01/1955	12/2000	41	0.1653	0.1102	0.0849	1.30
01-8024	TALLADEGA	AL	38	-86.1350	33.4164	448	02/1888	12/2000	109	0.1816	0.2733	0.1365	0.99
01-8259	TONEY	AL	36	-86.7333	34.9000	830	01/1949	09/1980	32	0.1853	0.2877	0.1504	1.33
01-8380	TUSCALOOSA FAA AIRPORT	AL	38	-87.6092	33.2222	169	01/1939	12/2000	61	0.1903	0.1952	0.0929	0.66
01-8385	TUSCALOOSA OLIVER DAM	AL	38	-87.5936	33.2097	152	01/1900	12/2000	99	0.1951	0.3157	0.2194	0.78
01-8469	VALLEY HEAD	AL	38	-85.6128	34.5667	1062	01/1893	12/2000	108	0.1687	0.2348	0.1836	0.28
01-8517	VERNON 2 N	AL	77	-88.1275	33.7392	298	06/1948	12/2000	48	0.1799	0.2047	0.1746	0.07
01-8605	WADLEY	AL	38	-85.5667	33.1167	675	02/1933	10/1992	60	0.1618	0.1517	0.1987	1.68
01-8648	WALNUT GROVE	AL	38	-86.3069	34.0661	850	06/1941	12/2000	51	0.2068	0.2222	0.1563	0.66
01-8670	WARRIOR 2	AL	38	-86.8258	33.7925	520	06/1948	10/1998	46	0.1665	0.2678	0.1525	1.19
01-8686	WATERLOO	AL	76	-88.0667	34.9167	459	01/1938	12/1974	36	0.1529	0.0294	-0.0491	3.84
01-8755	WEISS DAM	AL	38	-85.8000	34.1333	590	01/1939	12/1992	54	0.1551	0.2783	0.1947	1.73
01-8809	WEST BLOCTON	AL	38	-87.1267	33.1178	500	03/1940	12/2000	60	0.1985	0.3393	0.2308	1.23
01-8998	WINFIELD 2 SW	AL	38	-87.8475	33.9111	468	04/1923	12/2000	69	0.1675	0.1718	0.1039	0.54
03-0064	ALICIA	AR	74	-91.0583	35.9289	252	05/1905	12/2000	65	0.1428	0.1882	0.0734	3.25
03-0234	ARKANSAS CITY	AR	74	-91.1997	33.6117	145	01/1886	12/2000	115	0.1767	0.1464	0.0796	0.39
03-0240	ARKANSAS POST	AR	74	-91.3444	34.0250	194	01/1964	12/2000	37	0.1806	0.1939	0.1132	0.39
03-0326	AUGUSTA 2 NW	AR	74	-91.3878	35.3056	195	01/1944	12/2000	57	0.1558	0.1780	0.1163	0.68

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
03-0456	BATESVILLE AIRWAY	AR	74	-91.6500	35.7667	361	01/1900	12/1950	50	0.1672	0.1432	0.1285	0.04
03-0458	BATESVILLE LIVESTOCK	AR	74	-91.7944	35.8306	571	01/1942	12/2000	58	0.1716	0.2525	0.1648	1.20
03-0460	BATESVILLE L & D 1	AR	74	-91.6389	35.7600	290	01/1905	12/2000	96	0.1573	0.1295	0.1222	0.23
03-0530	BEEBE	AR	74	-91.8961	35.0644	250	01/1950	10/1998	47	0.1574	0.1074	0.1606	1.10
03-0534	BEECH GROVE	AR	72	-90.6333	36.1833	302	01/1942	04/1975	33	0.1712	0.2911	0.2261	1.08
03-0536	BEEDEVILLE 4 NE	AR	74	-91.0561	35.4583	240	03/1940	12/2000	60	0.1668	0.1729	0.2339	2.51
03-0676	BIG LAKE OUTLET	AR	74	-90.1333	35.8500	230	01/1931	07/1960	30	0.1711	0.1525	0.1325	0.03
03-0746	BLACK ROCK	AR	72	-91.1039	36.1067	240	01/1905	12/2000	96	0.1729	0.2290	0.1780	0.14
03-0806	BLYTHEVILLE	AR	74	-89.9044	35.9239	252	03/1926	12/2000	75	0.1691	0.1273	0.0681	0.51
03-0936	BRINKLEY	AR	74	-91.1878	34.8825	200	01/1895	12/2000	106	0.1571	0.1118	0.0954	0.35
03-1052	BURDETTE	AR	74	-89.9500	35.8167	240	04/1943	07/1985	42	0.1667	0.2265	0.2418	2.22
03-1102	CABOT 4 SW	AR	73	-92.0064	34.9817	300	01/1948	12/2000	53	0.1895	0.2444	0.1889	0.12
03-1132	CALICO ROCK 2 WSW	AR	73	-92.1636	36.1092	350	01/1905	12/2000	96	0.1910	0.2417	0.2193	0.29
03-1224	CARLISLE 1 SW	AR	74	-91.7500	34.7833	240	02/1940	12/1974	34	0.1681	0.1699	0.2202	1.95
03-1442	CLARENDON	AR	74	-91.2983	34.6928	180	01/1905	12/2000	90	0.1545	0.1954	0.2110	1.52
03-1492	CLINTON	AR	73	-92.4639	35.5789	540	01/1922	12/2000	71	0.1953	0.3571	0.3329	1.05
03-1596	CONWAY	AR	73	-92.4289	35.0842	315	01/1892	12/2000	108	0.1654	0.1995	0.0826	1.26
03-1632	CORNING	AR	72	-90.5858	36.4197	300	01/1893	12/2000	107	0.1905	0.1728	0.0716	1.81
03-1730	CROSSETT 2 SSE	AR	74	-91.9492	33.1111	180	02/1915	12/2000	77	0.1681	0.2209	0.2080	1.15
03-1750	CRYSTAL VALLEY	AR	73	-92.4500	34.6886	355	01/1942	12/2000	57	0.2087	0.3760	0.2926	0.58
03-1829	DAMASCUS 2 NNE	AR	73	-92.3833	35.4047	680	01/1939	12/2000	61	0.1896	0.2466	0.2122	0.16
03-1962	DERMOTT 3 NE	AR	74	-91.3847	33.5594	143	01/1942	12/2000	59	0.1877	0.2987	0.1794	2.30
03-1968	DES ARC	AR	74	-91.4978	34.9772	200	01/1904	12/2000	62	0.1843	0.1622	0.1313	0.24
03-2148	DUMAS	AR	74	-91.5317	33.8847	163	05/1912	12/2000	89	0.1806	0.1656	0.1078	0.17
03-2355	EUDORA	AR	74	-91.1578	33.0686	135	03/1962	11/2000	39	0.1780	0.1051	0.1138	0.56
03-2366	EVENING SHADE 1 NNE	AR	74	-91.6142	36.0811	500	01/1939	12/2000	62	0.1695	0.1102	0.0983	0.22
03-2540	FORDYCE	AR	73	-92.4322	33.8228	230	01/1937	12/2000	59	0.1740	0.2212	0.1224	0.61
03-2760	GEORGETOWN	AR	74	-91.4489	35.1278	200	01/1913	12/2000	88	0.1780	0.1803	0.1356	0.10
03-2962	GREENBRIER	AR	73	-92.3619	35.2353	330	01/1944	12/2000	51	0.1499	0.2528	0.1435	2.50
03-2978	GREERS FERRY DAM	AR	74	-91.9997	35.5206	527	05/1948	12/2000	53	0.1390	0.1345	0.1341	1.20
03-3088	HAMBURG	AR	74	-91.7939	33.2278	180	01/1957	12/2000	43	0.2259	0.2722	0.1644	3.86
03-3242	HELENA	AR	75	-90.5903	34.5211	195	01/1893	12/2000	107	0.1861	0.2442	0.1793	0.04

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
03-3556	HUTTIG LOCK	AR	74	-92.0833	33.0333	59	01/1940	12/1976	37	0.1582	0.1759	0.1157	0.53
03-3734	JONESBORO 4 N	AR	74	-90.6881	35.8486	315	01/1896	12/2000	104	0.1497	0.1435	0.1264	0.54
03-3821	KEISER	AR	74	-90.0964	35.6872	232	05/1959	12/2000	42	0.1538	0.1053	0.1158	0.47
03-3862	KEO	AR	73	-92.0072	34.6053	230	01/1948	12/2000	53	0.1948	0.2700	0.2233	0.06
03-3998	LAKE CITY	AR	72	-90.4500	35.8000	230	01/1942	12/1996	51	0.1804	0.2679	0.1479	1.19
03-4010	LAKE MAUMELLE	AR	73	-92.4889	34.8511	305	01/1957	12/2000	40	0.1560	0.1124	0.0731	1.95
03-4248	LITTLE ROCK FAA ARPT	AR	73	-92.2389	34.7272	258	01/1897	12/2000	104	0.2072	0.3085	0.2162	0.30
03-4528	MADISON 1 NW	AR	75	-90.7347	35.0264	300	01/1939	12/2000	62	0.1631	0.2848	0.2797	1.92
03-4572	MAMMOTH SPRING	AR	71	-91.5350	36.4947	502	04/1904	12/2000	95	0.1992	0.2638	0.2234	0.07
03-4638	MARIANNA 2 S	AR	75	-90.7661	34.7336	234	01/1917	12/2000	84	0.1579	0.1711	0.1398	0.75
03-4654	MARKED TREE	AR	74	-90.4167	35.5333	230	01/1930	12/1971	41	0.1593	0.0158	0.0408	2.09
03-4746	MELBOURNE 5 WNW	AR	73	-91.9458	36.0733	600	01/1946	12/2000	55	0.2239	0.3040	0.1352	2.96
03-4900	MONTICELLO 3 SW	AR	74	-91.8111	33.5972	290	01/1937	12/2000	62	0.1854	0.0985	0.0859	0.85
03-4934	MOROBAY LOCK	AR	73	-92.4500	33.3167	89	01/1941	12/1983	43	0.2075	0.3518	0.3197	0.58
03-5036	MOUNTAIN HOME 1 NNW	AR	70	-92.3939	36.3458	800	01/1917	12/2000	83	0.1813	0.1812	0.1740	0.18
03-5046	MOUNTAIN VIEW	AR	73	-92.1042	35.9147	780	01/1940	12/2000	61	0.1961	0.3280	0.2971	0.44
03-5186	NEWPORT	AR	74	-91.2744	35.6042	228	01/1892	12/2000	107	0.1506	0.1902	0.1453	0.92
03-5228	NORFORK DAM	AR	70	-92.2561	36.2494	425	01/1948	10/1998	51	0.1624	0.0025	0.0459	1.22
03-5480	OSCEOLA	AR	74	-89.9833	35.7167	249	01/1892	12/1974	66	0.1795	0.1944	0.1455	0.21
03-5563	PARAGOULD 1 S	AR	72	-90.4978	36.0336	270	01/1939	12/2000	62	0.1667	0.2422	0.1804	0.50
03-5586	PARKIN 2 W	AR	74	-90.5833	35.2667	220	01/1931	09/1963	33	0.1706	0.2015	0.1215	0.48
03-5754	PINE BLUFF	AR	74	-92.0189	34.2256	215	01/1890	12/2000	109	0.1770	0.1649	0.1410	0.10
03-5820	POCAHONTAS 1	AR	72	-90.9681	36.2639	315	04/1894	12/2000	107	0.1652	0.2338	0.1508	0.82
03-5866	PORTLAND	AR	74	-91.5044	33.2381	120	04/1909	12/2000	88	0.2037	0.1878	0.1212	1.22
03-6174	RISON	AR	74	-92.2019	33.9539	280	05/1893	12/1958	46	0.1658	0.1494	0.1344	0.06
03-6253	ROHWER 2 NNE	AR	74	-91.2703	33.8100	150	01/1960	12/2000	41	0.1676	0.0926	0.0981	0.42
03-6376	ST CHARLES	AR	74	-91.1272	34.3767	200	02/1930	12/2000	67	0.1561	0.1772	0.1898	0.96
03-6380	ST FRANCIS	AR	72	-90.1469	36.4519	300	04/1927	12/2000	73	0.2022	0.2948	0.2571	1.92
03-6403	SALEM	AR	71	-91.8036	36.3561	680	04/1955	12/2000	46	0.1985	0.1989	0.1587	0.62
03-6506	SEARCY	AR	74	-91.7164	35.2683	230	01/1915	12/2000	86	0.1569	0.0855	0.1331	0.96
03-6566	SHERIDAN TOWER	AR	73	-92.3500	34.4500	289	01/1942	12/1976	35	0.1993	0.2841	0.2673	0.32
03-6586	SHIRLEY	AR	73	-92.3167	35.6500	560	06/1939	12/1986	47	0.2050	0.3284	0.2864	0.27

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
03-6918	STUTTGART	AR	74	-91.5578	34.4978	214	01/1892	12/2000	109	0.1601	0.1330	0.0765	0.58
03-6920	STUTTGART 9 ESE	AR	74	-91.4172	34.4744	198	01/1892	12/2000	84	0.1595	0.1969	0.1238	0.75
03-7582	WARREN 2 WSW	AR	74	-92.0997	33.6044	210	01/1896	12/2000	102	0.1969	0.1925	0.1084	0.89
03-7712	WEST MEMPHIS	AR	75	-90.1806	35.1242	215	03/1962	12/2000	39	0.1567	0.2585	0.1999	1.20
03-7744	WHEELING 3 W	AR	71	-91.9000	36.3167	775	01/1946	11/1986	40	0.1993	0.2585	0.1570	0.88
03-8052	WYNNE	AR	74	-90.7964	35.2547	260	01/1909	12/2000	88	0.1790	0.1615	0.0622	1.00
06-0128	ANSONIA 1 NE	CT	84	-73.0694	41.3489	140	04/1966	12/2003	38	0.2137	0.3422	0.2432	0.62
06-0227	BAKERSVILLE	CT	84	-73.0103	41.8417	597	06/1948	12/2003	42	0.2108	0.1951	0.1673	0.79
06-0801	BRIDGEPORT	CT	84	-73.2000	41.2000	141	08/1893	03/1951	56	0.1556	0.2246	0.2602	1.97
06-0806	BRIDGEPORT SIKORSKY AP	CT	84	-73.1289	41.1583	5	07/1948	12/2003	56	0.2122	0.2449	0.1545	0.55
06-0961	BULLS BRIDGE DAM	CT	84	-73.4833	41.6500	260	06/1948	09/2000	53	0.1840	0.2912	0.2344	0.33
06-1715	CREAM HILL	CT	84	-73.3167	41.9000	1302	06/1896	11/1972	68	0.1921	0.3343	0.2647	0.54
06-1762	DANBURY	CT	84	-73.4167	41.4000	405	10/1937	12/2003	59	0.2069	0.2351	0.2026	0.30
06-2658	FALLS VILLAGE	CT	84	-73.3667	41.9500	550	02/1916	12/2003	88	0.1932	0.3318	0.2425	0.51
06-5445	NORFOLK 2 SW	CT	84	-73.2208	41.9725	1340	011/1884	12/2003	62	0.2088	0.2968	0.2660	0.39
06-5892	NORWALK	CT	84	-73.4500	41.1333	121	01/1893	04/1956	63	0.1901	0.1287	0.1765	1.42
06-5893	NORWALK GAS PLANT	CT	84	-73.4167	41.1167	37	04/1956	10/1987	32	0.1869	0.1532	0.0622	0.98
06-6655	PUTNAM LAKE	CT	84	-73.6386	41.0825	300	06/1948	12/2003	54	0.1959	0.3124	0.1937	0.53
06-6966	ROCKY RIVER DAM	CT	84	-73.4333	41.5833	220	06/1948	09/2000	53	0.2051	0.3634	0.2883	0.74
06-7002	ROUND POND	CT	84	-73.5369	41.3008	800	06/1948	08/2003	55	0.1953	0.2507	0.1700	0.09
06-7109	SALISBURY	CT	84	-73.4500	41.9833	1079	12/1933	03/1966	32	0.2573	0.3900	0.3208	3.64
06-7157	SAUGATUCK RESERVOIR	CT	84	-73.3500	41.2500	300	06/1948	12/2003	56	0.1613	0.1573	0.1424	0.92
06-7373	SHEPAUG DAM	CT	84	-73.3000	41.7167	840	06/1948	11/2002	55	0.2012	0.2942	0.2573	0.22
06-7970	STAMFORD 5 N	CT	84	-73.5475	41.1247	190	12/1955	12/2003	48	0.1568	0.1667	0.0986	1.35
06-8065	STEVENSON DAM	CT	84	-73.1717	41.3819	115	01/1893	12/2003	47	0.2071	0.2475	0.2048	0.23
06-8436	TORRINGTON	CT	84	-73.1167	41.8000	580	06/1948	02/1996	47	0.2324	0.2411	0.1430	1.92
06-8906	WATERBURY	CT	84	-73.0333	41.5500	341	01/1893	03/1954	61	0.1803	0.2042	0.0920	0.79
06-8911	WATERBURY CITY HALL	CT	84	-73.0333	41.5667	341	01/1926	06/1958	30	0.1590	0.2997	0.1501	2.83
06-9568	WIGWAM RESERVOIR	CT	84	-73.1333	41.6667	570	06/1948	01/1997	49	0.1829	0.2936	0.2906	0.78
06-9775	WOODBURY	CT	84	-73.2333	41.5500	650	05/1966	12/2003	38	0.1727	0.1656	0.2350	1.53
07-1330	BRIDGEVILLE 1 NW	DE	1	-75.6167	38.7500	49	01/1893	12/1985	91	0.2228	0.2952	0.1635	0.28
07-2625	DELAWARE CITY REEDY PO	DE	1	-75.5833	39.5667	10	01/1903	12/1953	50	0.1979	0.2898	0.1749	0.37

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
07-2730	DOVER	DE	1	-75.5167	39.2583	30	01/1893	12/2000	97	0.2135	0.2712	0.1748	0.03
07-3570	GEORGETOWN 5 SW	DE	1	-75.4500	38.6333	45	01/1947	12/1996	50	0.1834	0.3104	0.1862	1.15
07-5320	LEWES	DE	1	-75.1389	38.7756	15	02/1945	12/2000	55	0.1703	0.2187	0.2108	1.80
07-5852	MIDDLETOWN 3 E	DE	1	-75.6667	39.4500	55	01/1954	08/1988	33	0.2166	0.3446	0.2047	0.41
07-5915	MILFORD 4 SE	DE	1	-75.4250	38.8983	35	01/1894	12/2000	93	0.1813	0.3476	0.2314	1.55
07-6020	MILLSBORO	DE	1	-75.3167	38.5833	20	01/1893	12/1953	61	0.2074	0.2829	0.1647	0.20
07-6410	NEWARK UNIVERSITY FARM	DE	7	-75.7514	39.6694	90	04/1894	10/2000	75	0.2005	0.2872	0.2155	0.28
07-9595	WILMINGTON WSO ARPT	DE	7	-75.6008	39.6728	79	01/1948	12/2000	53	0.1917	0.4128	0.3452	2.95
07-9600	WILMINGTON CITY HALL	DE	7	-75.5500	39.7500	102	01/1894	10/1958	65	0.1675	0.3043	0.2356	1.08
07-9605	WILMINGTON PORTER RSVR	DE	7	-75.5414	39.7739	270	01/1931	12/2000	70	0.2095	0.3499	0.2490	0.82
09-0041	ADAIRSVILLE	GA	28	-84.9333	34.3667	700	02/1892	09/1986	81	0.1814	0.1349	0.0894	0.29
09-0181	ALLATOONA DAM 2	GA	28	-84.7300	34.1650	975	06/1948	12/2000	44	0.1703	0.2063	0.1577	0.33
09-0219	ALPHARETTA 5 SSW	GA	28	-84.3000	34.0000	1040	06/1957	12/1994	38	0.1721	0.2138	0.1122	0.59
09-0311	APPLING 2 NW	GA	12	-82.3389	33.5619	370	01/1961	12/2000	40	0.2170	0.4443	0.3899	1.43
09-0430	ATHENS	GA	13	-83.3833	33.9667	-999	01/1884	12/1970	87	0.2190	0.2580	0.1670	2.15
09-0432	ATHENS COLLEGE OF AGRI	GA	13	-83.3500	33.9167	689	01/1936	12/1970	35	0.1935	0.2442	0.0756	1.46
09-0435	ATHENS WSO AIRPORT	GA	13	-83.3275	33.9481	785	06/1944	12/2000	57	0.2157	0.3467	0.2180	1.60
09-0444	ATLANTA BOLTON	GA	28	-84.4983	33.8236	885	03/1956	12/2000	45	0.1348	0.2289	0.1958	2.94
09-0451	ATLANTA WSO AIRPORT	GA	28	-84.4417	33.6300	1010	01/1930	12/2000	71	0.1681	0.2219	0.1754	0.59
09-0495	AUGUSTA WSO AIRPORT	GA	13	-81.9647	33.3697	132	08/1940	12/2000	61	0.1730	0.2710	0.2210	0.32
09-0500	AUGUSTA	GA	13	-81.9667	33.4667	131	07/1891	12/1960	69	0.1670	0.1678	0.1841	1.18
09-0603	BALL GROUND	GA	28	-84.4708	34.3297	1270	03/1947	12/2000	53	0.1722	0.1273	0.0729	0.25
09-0746	BEAVERDALE 1 E	GA	36	-84.8322	34.9194	740	06/1940	09/1999	58	0.1502	0.1429	0.1326	0.46
09-0969	BLAIRSVILLE EXP STA	GA	28	-83.9444	34.8544	1949	01/1932	12/2000	69	0.1717	0.1764	0.0909	0.32
09-1029	BLUE RIDGE RESVR DAM	GA	27	-84.2833	34.8833	1562	01/1915	12/1961	36	0.2010	0.3209	0.3615	1.74
09-1132	BOWMAN	GA	13	-83.0333	34.2000	785	01/1952	12/1996	45	0.1742	0.2149	0.1235	0.38
09-1266	BROOKLET 1 W	GA	83	-81.6731	32.3750	180	01/1925	12/2002	78	0.2078	0.3509	0.3121	1.64
09-1413	BURTON DAM	GA	26	-83.5500	34.7833	1772	06/1948	11/1978	31	0.1889	0.3402	0.2702	1.47
09-1474	CALHOUN EXPERIMENT STN	GA	28	-84.9667	34.4833	655	03/1953	12/1996	44	0.1592	0.0572	0.0852	0.90
09-1585	CANTON	GA	28	-84.4956	34.2361	876	01/1892	12/2000	109	0.1830	0.1959	0.0787	0.74
09-1601	CARLTON BRIDGE	GA	13	-82.9833	34.0667	449	03/1899	12/1961	63	0.1750	0.2670	0.1901	0.19
09-1619	CARNESVILLE 3 N	GA	28	-83.2067	34.4125	866	06/1948	12/2000	53	0.1696	0.1733	0.1359	0.06

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
09-1640	CARROLLTON	GA	28	-85.0806	33.5972	995	01/1939	12/2000	62	0.1765	0.1651	0.1181	0.08
09-1657	CARTERS 1 WSW	GA	28	-84.7194	34.6061	740	03/1947	08/1998	51	0.1902	0.1927	0.0917	0.77
09-1665	CARTERSVILLE	GA	28	-84.7847	34.2261	786	01/1939	12/2000	61	0.1864	0.1988	0.1123	0.55
09-1670	CARTERSVILLE # 2	GA	28	-84.7958	34.1825	770	05/1937	12/2000	64	0.1733	0.1640	0.0889	0.21
09-1715	CAVE SPRINGS 4 SSW	GA	28	-85.3500	34.0500	801	02/1949	08/1979	31	0.1964	0.1987	0.0633	1.47
09-1732	CEDARTOWN	GA	28	-85.2339	34.0589	785	01/1937	12/2000	64	0.1647	0.1505	0.1175	0.04
09-1856	CHATSWORTH	GA	26	-84.7833	34.7667	771	01/1939	12/1978	39	0.1477	0.0463	0.0998	1.12
09-1863	CHATSWORTH 2	GA	26	-84.7650	34.7589	709	06/1948	12/2000	53	0.1887	0.3338	0.2356	0.95
09-1906	CHICKAMAUGA PARK	GA	36	-85.2717	34.9000	740	06/1941	12/2000	60	0.1676	0.1317	0.1421	0.54
09-1927	CHOESTOE	GA	28	-83.9000	34.8000	1903	01/1942	12/1997	56	0.1764	0.1948	0.1138	0.27
09-1982	CLAYTON 1 SSW	GA	26	-83.4044	34.8667	1880	01/1894	12/2000	106	0.1831	0.2199	0.0840	1.03
09-1998	CLERMONT 4 WSW	GA	28	-83.8550	34.4503	1281	06/1948	09/1998	50	0.1786	0.1704	0.1933	1.31
09-2006	CLEVELAND	GA	28	-83.7683	34.5883	1567	04/1943	12/2000	57	0.1460	0.0454	0.1463	2.03
09-2180	COMMERCE 4 NNW	GA	28	-83.4858	34.2633	750	07/1957	11/2000	43	0.1796	0.2136	0.1221	0.48
09-2198	CONCORD	GA	38	-84.4333	33.1000	830	06/1912	12/1974	62	0.1967	0.1422	0.1035	1.42
09-2283	CORNELIA	GA	28	-83.5286	34.5181	1470	05/1919	12/2000	81	0.1744	0.1583	0.1275	0.07
09-2318	COVINGTON	GA	14	-83.9142	33.5950	690	07/1893	12/2000	106	0.1670	0.1150	0.1296	0.11
09-2408	CUMMING	GA	28	-84.1222	34.2214	1210	01/1938	12/2000	60	0.1570	0.1360	0.1863	0.88
09-2429	CURRYVILLE 3 W	GA	28	-85.1033	34.4397	617	02/1947	12/2000	53	0.1774	0.2458	0.2241	1.79
09-2475	DAHLONEGA	GA	28	-84.0047	34.5286	1260	01/1893	07/2000	108	0.1519	0.1302	0.1358	0.46
09-2485	DALLAS 7 NE	GA	28	-84.7475	33.9881	1100	02/1947	12/2000	54	0.1744	0.0837	0.1059	0.72
09-2493	DALTON	GA	26	-84.8872	34.7700	799	01/1936	10/2000	65	0.1284	0.0615	0.1149	1.60
09-2578	DAWSONVILLE	GA	28	-84.1039	34.4206	1343	04/1947	12/2000	53	0.1549	0.1921	0.0684	2.17
09-2677	DIAL POST OFFICE	GA	28	-84.2167	34.7667	1903	01/1944	12/1997	46	0.1737	0.2009	0.1076	0.41
09-2791	DOUGLASVILLE	GA	28	-84.7303	33.7006	1002	06/1940	12/2000	58	0.1788	0.1580	0.1063	0.13
09-2799	DOVER	GA	83	-81.7078	32.5997	103	07/1930	12/2002	73	0.1863	0.2137	0.1516	0.11
09-2839	DUBLIN	GA	83	-82.9036	32.5575	230	010/1892	12/2002	93	0.1814	0.1632	0.0806	0.63
09-3060	ELBERTON 2 N	GA	12	-82.8581	34.1456	540	01/1892	12/2000	72	0.1995	0.3725	0.2802	0.29
09-3115	ELLIJAY	GA	26	-84.4836	34.6947	1287	01/1938	12/2000	62	0.2004	0.2211	0.1052	1.27
09-3147	EMBRY	GA	28	-85.0008	33.8750	1273	06/1940	12/2000	60	0.1630	0.1431	0.1913	0.95
09-3271	EXPERIMENT	GA	38	-84.2842	33.2631	934	06/1900	12/2000	89	0.2094	0.2467	0.1677	0.63
09-3295	FAIRMOUNT	GA	28	-84.7000	34.4364	743	06/1937	12/2000	63	0.1664	0.1451	0.1066	0.05

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
09-3303	FAIRVIEW	GA	14	-84.1000	33.0000	732	03/1915	12/1952	38	0.1790	0.2498	0.1474	0.37
09-3409	FLEMING	GA	83	-81.4167	31.8833	20	01/1893	05/1978	43	0.2143	0.2389	0.1471	0.31
09-3506	FORSYTH 6 NNW	GA	14	-83.9417	33.0161	640	01/1954	12/2000	45	0.1715	0.2936	0.2072	1.30
09-3538	FORT STEWART	GA	83	-81.6289	31.8717	92	08/1964	12/2002	39	0.1807	0.2250	0.1509	0.21
09-3621	GAINESVILLE	GA	28	-83.8600	34.3006	1170	01/1893	12/2000	106	0.1675	0.0741	0.0984	0.64
09-3695	GIBSON	GA	13	-82.5950	33.2261	416	01/1956	12/2000	45	0.1844	0.2301	0.0757	1.26
09-3754	GLENNVILLE	GA	83	-81.9275	31.9336	170	11/1904	12/2002	97	0.2429	0.4130	0.2887	1.59
09-3792	GODFREY 3 NE	GA	14	-83.4500	33.4667	570	02/1959	09/1995	37	0.1302	0.0102	0.1656	2.36
09-3899	GREENSBORO	GA	13	-83.2167	33.5667	630	04/1902	12/1959	58	0.2102	0.3251	0.2185	1.09
09-3915	GREENVILLE 2 NNW	GA	38	-84.7350	33.0286	960	02/1957	08/2000	38	0.2262	0.3732	0.2578	2.64
09-3936	GRIFFIN	GA	38	-84.2667	33.2500	981	01/1893	12/1968	70	0.2032	0.0997	0.0330	3.43
09-4070	HARALSON	GA	38	-84.5500	33.2333	820	06/1948	12/1995	47	0.2161	0.3083	0.2033	1.12
09-4133	HARTWELL	GA	12	-82.9167	34.3519	690	03/1908	12/2000	89	0.1932	0.2581	0.1501	0.44
09-4230	HELEN	GA	28	-83.7214	34.7083	1440	04/1956	12/2000	39	0.1939	0.1812	0.1618	1.65
09-4623	JACKSON DAM	GA	14	-83.8436	33.3200	430	06/1948	12/1996	44	0.1693	0.1163	0.1086	0.23
09-4648	JASPER 1 NNW	GA	28	-84.4592	34.4958	1465	06/1937	12/2000	64	0.1741	0.1203	0.0873	0.17
09-4688	JOHNTOWN	GA	28	-84.2500	34.5500	1310	01/1949	12/1993	45	0.1668	0.0605	0.1539	1.97
09-4700	JONESBORO	GA	38	-84.3544	33.5311	930	06/1940	12/2000	59	0.1939	0.1846	0.1523	0.58
09-4728	JULIETTE	GA	14	-83.7881	33.1139	450	01/1958	12/2000	42	0.2211	0.2662	0.1619	2.18
09-4802	KENSINGTON	GA	36	-85.3667	34.7833	860	01/1953	12/1997	40	0.1604	0.1600	0.1040	0.29
09-4854	KINGSTON	GA	28	-84.9453	34.2333	702	02/1947	10/2000	52	0.1749	0.1179	0.0310	0.95
09-4941	LAFAYETTE 4 SSW	GA	38	-85.3619	34.6483	817	01/1935	12/2000	66	0.1623	0.2185	0.1586	0.45
09-4949	LA GRANGE	GA	38	-85.0294	33.0650	715	03/1887	10/2000	79	0.1975	0.2480	0.1467	0.29
09-5165	LEXINGTON 1 NW	GA	13	-83.1208	33.8817	760	01/1952	12/2000	49	0.1655	0.2303	0.2594	1.54
09-5204	LINCOLNTON	GA	12	-82.4667	33.8000	480	01/1945	12/2000	55	0.1838	0.1390	0.1486	1.98
09-5314	LOUISVILLE 1 E	GA	13	-82.3914	33.0125	322	01/1893	12/2000	98	0.1827	0.2459	0.2143	0.27
09-5633	MAYSVILLE	GA	28	-83.5581	34.2647	910	05/1941	12/1997	56	0.1413	0.0824	0.0737	1.85
09-5811	METTER	GA	83	-82.0819	32.3972	120	10/1955	06/1996	34	0.1936	0.3022	0.1752	0.73
09-5858	MIDVILLE	GA	83	-82.2372	32.8089	175	07/1930	12/1998	69	0.1621	0.1471	0.1558	1.16
09-5863	MIDVILLE EXP STA	GA	83	-82.2156	32.8753	280	06/1957	12/2002	45	0.2129	0.3169	0.1720	0.54
09-5874	MILLEDGEVILLE	GA	14	-83.2497	33.0831	368	01/1893	12/2000	104	0.1750	0.2497	0.1683	0.37
09-5882	MILLEN 4 N	GA	83	-81.9672	32.8703	195	010/1892	12/1998	97	0.1850	0.2850	0.1668	0.86

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
09-5896	MILLHAVEN-WADE 2 SE	GA	83	-81.5000	32.9333	100	02/1956	05/1986	30	0.1874	0.2622	0.1664	0.28
09-5988	MONTICELLO	GA	14	-83.6975	33.3328	518	01/1893	12/2000	98	0.1765	0.1549	0.1079	0.28
09-6323	NEWINGTON	GA	83	-81.4997	32.5953	209	09/1956	12/2002	35	0.1682	0.2535	0.1197	2.27
09-6335	NEWNAN 4 NE	GA	28	-84.7886	33.4428	920	01/1898	12/2000	103	0.1783	0.1495	0.1253	0.21
09-6407	NORCROSS 4 N	GA	28	-84.2281	33.9536	1030	05/1910	12/2000	85	0.1493	0.2119	0.1487	1.35
09-7430	RESACA	GA	28	-84.9589	34.5911	650	01/1892	12/2000	108	0.1718	0.1716	0.1184	0.05
09-7489	RINGGOLD 2 SW	GA	36	-85.0667	34.9003	770	01/1953	12/2000	48	0.1823	0.2087	0.1529	0.24
09-7600	ROME	GA	28	-85.1514	34.2453	659	01/1893	12/2000	108	0.1718	0.1922	0.1181	0.22
09-7605	ROME 8 SW	GA	28	-85.2583	34.1650	700	06/1948	10/1998	51	0.1666	0.1407	0.1454	0.17
09-7610	ROME WSO AIRPORT	GA	28	-85.1667	34.3500	640	01/1948	10/1980	33	0.1526	0.1965	0.2096	1.16
09-7777	SANDERSVILLE	GA	83	-82.8044	32.9744	451	05/1955	12/2002	47	0.1697	0.1175	0.1185	1.29
09-7842	SAVANNAH USDA PLANT GD	GA	83	-81.2667	32.0000	20	03/1928	03/1977	46	0.2618	0.2710	0.0663	3.75
09-7847	SAVANNAH INTL AP	GA	83	-81.2100	32.1300	46	01/1937	12/2002	59	0.2275	0.2871	0.1708	0.45
09-8064	SILOAM 3 N	GA	14	-83.0767	33.5636	695	01/1961	12/1999	39	0.1540	0.1229	0.1496	0.28
09-8223	SPARTA	GA	14	-82.9669	33.2725	570	01/1930	12/1998	69	0.1881	0.2728	0.1684	0.58
09-8351	STILLMORE	GA	83	-82.2181	32.4414	260	05/1926	01/2002	65	0.1514	0.1061	0.1361	1.87
09-8436	SUMMERVILLE	GA	38	-85.3611	34.4708	760	06/1937	12/2000	64	0.1853	0.2853	0.2218	0.47
09-8496	SWAINSBORO	GA	83	-82.3822	32.5806	320	02/1905	03/2000	51	0.1966	0.2713	0.1884	0.05
09-8504	SWEET GUM	GA	27	-84.2167	34.9667	1801	01/1949	09/1980	32	0.1600	0.1802	0.1431	0.27
09-8547	TALLAPOOSA 2 N	GA	28	-85.3000	33.7667	981	01/1897	12/1974	67	0.1640	0.1400	0.0616	0.71
09-8600	TAYLORSVILLE	GA	28	-84.9828	34.0861	721	06/1937	12/2000	63	0.1733	0.1465	0.1215	0.05
09-8732	TITUS	GA	28	-83.6333	34.9500	2182	01/1942	12/1997	44	0.1930	0.1144	0.0444	1.25
09-8740	TOCCOA	GA	26	-83.3361	34.5733	1012	01/1893	12/2000	106	0.1852	0.1735	0.1692	0.61
09-8806	TRAY MOUNTAIN	GA	28	-83.7000	34.8000	3904	01/1949	12/1978	30	0.1668	0.1925	0.1107	0.39
09-8950	U OF GA PLANT SCI FARM	GA	14	-83.5358	33.8722	840	06/1971	12/2000	30	0.1648	0.2263	0.1750	0.41
09-9077	WALESKA	GA	28	-84.5375	34.3108	1196	03/1947	12/2000	53	0.1635	0.1761	0.1226	0.19
09-9141	WARRENTON	GA	13	-82.6344	33.4067	490	04/1914	12/2000	87	0.1706	0.1511	0.1571	1.13
09-9157	WASHINGTON 2 ESE	GA	13	-82.7058	33.7264	620	04/1897	12/2000	104	0.1787	0.1812	0.1781	0.81
09-9169	WATKINSVILLE SCS	GA	13	-83.4361	33.8731	750	06/1948	10/1998	49	0.1696	0.2042	0.1042	0.77
09-9194	WAYNESBORO 2 NE	GA	13	-82.0092	33.0725	270	01/1893	12/2000	80	0.1996	0.2679	0.1747	0.38
09-9466	WINDER 1 SSE	GA	14	-83.7261	33.9275	889	06/1948	12/2000	49	0.1745	0.1790	0.0622	2.41
09-9524	WOODSTOCK	GA	28	-84.5150	34.1097	1052	06/1937	08/2000	63	0.1884	0.0917	0.0830	1.20

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09-9805	YOUNG HARRIS	GA	28	-83.8500	34.9333	1923	01/1938	12/1997	60	0.1716	0.1636	0.1406	0.09
11-0055	ALBION	IL	60	-88.0569	38.3944	530	01/1894	12/2000	83	0.1739	0.2982	0.1722	1.16
11-0072	ALEDO	IL	65	-90.7469	41.1961	720	01/1901	12/2000	99	0.2002	0.2975	0.2032	0.27
11-0082	ALEXIS 1 SW	IL	65	-90.5639	41.0639	680	07/1948	09/1998	50	0.1965	0.2638	0.2248	0.28
11-0137	ALTON DAM 26	IL	69	-90.1500	38.8167	430	01/1944	12/2000	56	0.1937	0.2747	0.2398	0.08
11-0187	ANNA 1 E	IL	70	-89.2344	37.4814	640	01/1895	12/2000	106	0.1765	0.1329	0.0963	0.22
11-0203	ANTIOCH	IL	53	-88.0994	42.4811	750	07/1901	12/2000	78	0.2045	0.2720	0.2874	2.93
11-0291	ASTORIA	IL	67	-90.2200	40.1400	650	01/1899	07/1931	33	0.1302	0.0576	0.0045	4.24
11-0338	AURORA COLLEGE	IL	54	-88.3092	41.7806	660	01/1888	12/2000	111	0.2450	0.4257	0.3636	0.97
11-0356	AVON 5 NE	IL	67	-90.3628	40.7086	640	01/1952	12/2000	49	0.2183	0.1754	0.1332	1.17
11-0442	BARRINGTON	IL	53	-88.1639	42.1153	875	01/1963	12/2000	33	0.1705	0.0923	0.1415	1.85
11-0445	BARRY WATERWORKS	IL	67	-91.0500	39.6833	712	01/1941	12/1975	35	0.1812	0.1607	0.1218	0.10
11-0492	BEARDSTOWN	IL	67	-90.4381	40.0178	450	01/1896	12/2000	98	0.1990	0.2645	0.2215	1.00
11-0510	BELLEVILLE SIU RESEARC	IL	69	-89.8467	38.5200	450	01/1945	12/2000	56	0.1993	0.3074	0.3049	0.64
11-0598	BENTLEY	IL	66	-91.1128	40.3436	650	06/1948	12/2000	53	0.1739	0.1029	0.0392	1.90
11-0608	BENTON FOREST SERVICE	IL	60	-88.9206	38.0336	450	01/1902	12/2000	97	0.2054	0.2778	0.1822	0.71
11-0761	BLOOMINGTON WATERWORKS	IL	56	-89.0006	40.4956	775	01/1950	12/2000	49	0.2080	0.2610	0.2315	0.55
11-0781	BLUFFS	IL	67	-90.5333	39.7500	540	06/1940	10/1986	47	0.1602	0.2460	0.1880	1.21
11-0993	BROOKPORT DAM 52	IL	74	-88.6531	37.1275	330	01/1929	12/2000	72	0.1552	0.1296	0.1117	0.30
11-1160	CAHOKIA	IL	69	-90.1942	38.5669	400	01/1942	12/2000	53	0.2602	0.4308	0.3505	3.36
11-1166	CAIRO 3 N	IL	74	-89.1856	37.0425	310	01/1896	12/2000	104	0.1916	0.1386	0.0869	0.72
11-1250	CANTON	IL	67	-90.0211	40.5447	650	07/1940	12/2000	61	0.1688	0.1111	0.1923	2.52
11-1265	CARBONDALE SEWAGE PLAN	IL	60	-89.1658	37.7308	390	01/1894	12/2000	101	0.1914	0.1842	0.1269	0.33
11-1284	CARLINVILLE 2	IL	67	-89.8700	39.2881	621	02/1891	12/1999	108	0.1961	0.2083	0.1866	0.50
11-1290	CARLYLE RESERVOIR	IL	67	-89.3658	38.6308	501	03/1896	12/2000	77	0.2087	0.2833	0.1475	1.08
11-1296	CARMI 6 NW	IL	60	-88.2244	38.1497	390	01/1924	12/2000	77	0.1985	0.2711	0.1482	0.81
11-1329	CASEY	IL	57	-87.9747	39.2972	620	01/1893	12/2000	80	0.1767	0.2327	0.1602	0.30
11-1386	CENTRALIA 2 SW	IL	60	-89.1297	38.5547	460	01/1941	12/2000	55	0.1914	0.2270	0.2505	1.21
11-1420	CHANNAHON DRESDEN ISLA	IL	82	-88.2819	41.3978	505	01/1941	12/2000	60	0.1823	0.2741	0.3151	2.51
11-1436	CHARLESTON	IL	57	-88.1875	39.4697	680	01/1896	12/2000	101	0.1819	0.2867	0.2129	0.73
11-1475	CHENOA	IL	56	-88.7128	40.7406	710	07/1944	12/2000	56	0.2232	0.3725	0.2594	1.62
11-1491	CHESTER	IL	80	-89.8314	37.9031	460	01/1897	12/2000	102	0.2012	0.2998	0.2271	2.07

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
11-1542	CHICAGO MAYFAIR PUMP S	IL	55	-87.7500	41.9667	650	07/1948	12/1979	30	0.2423	0.3835	0.2406	1.45
11-1549	CHICAGO O'HARE WSO ARP	IL	55	-87.9336	41.9950	658	07/1940	12/2000	58	0.2060	0.2784	0.1906	0.19
11-1552	CHICAGO ROSELAND PUMP	IL	55	-87.6333	41.7000	659	07/1948	12/1979	30	0.2311	0.2078	0.1644	0.53
11-1564	CHICAGO S WTR FILT PLA	IL	55	-87.5500	41.7500	610	07/1948	12/1979	30	0.2137	0.1062	0.0348	3.10
11-1567	CHICAGO SPRINGFLD PUMP	IL	55	-87.7167	41.9167	600	07/1948	12/1979	30	0.2391	0.2546	0.1996	0.48
11-1572	CHICAGO UNIVERSITY	IL	55	-87.6000	41.7833	594	01/1926	10/1994	65	0.1738	0.0760	0.0985	2.77
11-1577	CHICAGO MIDWAY AP 3 SW	IL	55	-87.7775	41.7372	620	01/1942	12/2000	59	0.1849	0.2021	0.1617	0.60
11-1627	CHILLICOTHE	IL	67	-89.5031	40.9156	535	07/1940	12/2000	60	0.1838	0.1241	0.0945	0.48
11-1700	CLAY CITY 6 SSE	IL	57	-88.3111	38.6078	460	01/1949	12/2000	52	0.1618	0.2195	0.2373	1.96
11-1743	CLINTON	IL	56	-88.9678	40.1403	700	01/1910	12/2000	91	0.2040	0.3436	0.3175	0.98
11-1992	CREAL SPRINGS	IL	60	-88.8333	37.6167	502	01/1896	08/1968	73	0.1584	0.2464	0.1781	1.06
11-2011	CRETE	IL	55	-87.6222	41.4492	664	01/1940	10/1998	56	0.2016	0.2558	0.2183	0.15
11-2140	DANVILLE	IL	58	-87.6483	40.1389	558	04/1895	12/2000	97	0.1844	0.2202	0.1125	0.32
11-2145	DANVILLE SEWAGE PLANT	IL	58	-87.5964	40.1022	527	07/1948	12/2000	53	0.1972	0.3696	0.2364	1.57
11-2193	DECATUR	IL	67	-88.9525	39.8275	620	01/1894	12/2000	106	0.1750	0.1983	0.1233	0.19
11-2223	DE KALB	IL	54	-88.7756	41.9342	873	01/1893	12/2000	108	0.1857	0.2457	0.2446	0.84
11-2348	DIXON 1 NW	IL	64	-89.5047	41.8472	700	01/1887	12/2000	109	0.1904	0.2073	0.1280	0.44
11-2353	DIXON SPRINGS AGR CENT	IL	70	-88.6672	37.4367	540	01/1941	12/2000	59	0.1748	0.1549	0.1034	0.28
11-2483	DU QUOIN 2 S	IL	60	-89.1931	37.9878	420	01/1893	12/2000	106	0.1888	0.1708	0.1965	0.93
11-2502	DWIGHT STATE REFORM	IL	82	-88.4667	41.0833	640	05/1896	12/1956	51	0.1650	0.2186	0.2365	1.22
11-2642	EDELSTEIN	IL	67	-89.6333	40.9333	801	07/1948	09/1983	36	0.2098	0.0964	0.0714	2.01
11-2679	EDWARDSVILLE 1 NE	IL	69	-90.0031	38.8100	500	01/1910	12/2000	86	0.1978	0.2850	0.2370	0.06
11-2687	EFFINGHAM	IL	57	-88.6242	39.1189	625	01/1895	12/2000	95	0.1774	0.2522	0.1687	0.51
11-2736	ELGIN	IL	53	-88.2861	42.0628	763	02/1898	12/2000	93	0.1718	0.1582	0.1430	0.06
11-2931	FAIRFIELD RADIO WFIW	IL	60	-88.3261	38.3797	430	01/1895	12/2000	106	0.1802	0.2502	0.1728	0.15
11-2958	FAIRVIEW	IL	65	-90.1667	40.6333	732	01/1912	10/1948	37	0.1796	0.3585	0.2025	3.31
11-2993	FARMER CITY	IL	56	-88.6508	40.2228	730	07/1948	12/2000	39	0.2193	0.2886	0.2890	1.19
11-3109	FLORA 5 NW	IL	60	-88.5822	38.7156	500	01/1893	12/2000	102	0.1769	0.2009	0.1626	0.07
11-3257	FREEPORT	IL	64	-89.6167	42.3000	781	01/1909	08/1973	65	0.1994	0.2233	0.2153	1.61
11-3262	FREEPORT WASTE WTR PLT	IL	64	-89.6061	42.2953	750	06/1948	12/2000	53	0.1927	0.1746	0.1163	0.79
11-3290	FULTON LOCK & DAM #13	IL	63	-90.1539	41.8981	592	01/1938	12/2000	61	0.1889	0.2074	0.1198	0.50
11-3312	GALENA	IL	63	-90.4406	42.4244	800	01/1896	12/2000	79	0.1832	0.1970	0.1673	0.12

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11-3320	GALESBURG	IL	65	-90.3856	40.9464	771	01/1895	12/2000	89	0.2107	0.3193	0.1892	0.94
11-3335	GALVA	IL	65	-90.0306	41.1856	810	01/1887	12/2000	109	0.1900	0.2836	0.2712	1.19
11-3384	GENESEO	IL	67	-90.1486	41.4511	639	01/1895	12/2000	92	0.2144	0.1957	0.1045	0.90
11-3413	GIBSON CITY 1 E	IL	56	-88.3653	40.4731	750	07/1935	12/2000	65	0.1846	0.3211	0.2424	0.80
11-3455	GLADSTONE DAM 18	IL	67	-91.0242	40.8825	538	01/1938	12/2000	61	0.1734	0.1702	0.1348	0.14
11-3522	GOLCONDA 1 SE	IL	75	-88.4894	37.3789	354	01/1893	09/1980	81	0.1906	0.3071	0.2110	0.56
11-3530	GOLDEN	IL	67	-91.0222	40.1064	718	05/1913	12/2000	87	0.1874	0.1241	0.1268	0.67
11-3572	GRAFTON	IL	69	-90.4342	38.9708	510	04/1894	08/2000	106	0.1800	0.2606	0.2184	0.09
11-3595	GRAND TOWER 2 N	IL	70	-89.5114	37.6567	374	07/1940	12/2000	61	0.2123	0.1766	0.1212	1.80
11-3683	GREENUP 1 E	IL	57	-88.1261	39.2283	545	06/1942	12/2000	58	0.1649	0.2562	0.2065	0.35
11-3693	GREENVILLE 1 E	IL	57	-89.3972	38.9261	580	01/1888	12/2000	107	0.1587	0.1667	0.1345	0.29
11-3717	GRIGGSVILLE	IL	67	-90.7086	39.7378	628	01/1887	12/2000	103	0.2020	0.2919	0.1741	0.92
11-3850	HARDIN	IL	67	-90.6167	39.1500	440	03/1933	10/1974	36	0.2010	0.1308	0.0714	1.00
11-3879	HARRISBURG	IL	60	-88.5244	37.7408	365	01/1898	12/2000	101	0.1873	0.2655	0.1950	0.17
11-3884	HARRISBURG DISPOSAL PL	IL	60	-88.5333	37.7500	360	04/1946	12/1985	40	0.1918	0.2818	0.2037	0.32
11-3930	HAVANA	IL	65	-90.0500	40.3000	440	01/1893	09/1966	73	0.1855	0.3119	0.2487	0.98
11-3940	HAVANA 4 NNE	IL	65	-90.0164	40.3431	460	03/1917	12/2000	84	0.1692	0.2933	0.2137	1.65
11-4013	HENNEPIN POWER PLANT	IL	64	-89.3158	41.3017	460	01/1963	12/2000	37	0.1747	0.3425	0.2552	1.83
11-4017	HENRY	IL	64	-89.3500	41.1097	440	04/1898	10/1950	52	0.1726	0.1892	0.2280	2.34
11-4108	HILLSBORO 2 SSW	IL	67	-89.4833	39.1500	630	04/1895	12/2000	106	0.1684	0.2293	0.1525	0.54
11-4198	HOOPESTON	IL	56	-87.6558	40.4744	710	01/1902	12/2000	98	0.1562	0.1756	0.1461	0.32
11-4317	HUTSONVILLE POWER PLAN	IL	57	-87.6578	39.1333	455	05/1946	12/2000	54	0.1588	0.2699	0.1709	1.31
11-4355	ILLINOIS CITY DAM 16	IL	65	-91.0153	41.4317	550	01/1940	12/2000	59	0.2325	0.2899	0.2126	1.45
11-4442	JACKSONVILLE 2 E	IL	67	-90.2153	39.7353	610	05/1895	12/2000	106	0.1847	0.2081	0.1287	0.08
11-4489	JERSEYVILLE 2 SW	IL	67	-90.3419	39.1053	630	01/1941	12/2000	56	0.1711	0.1965	0.2523	2.73
11-4530	JOLIET BRANDON RD DAM	IL	54	-88.1028	41.5033	543	01/1939	12/2000	62	0.2543	0.4192	0.3413	0.83
11-4535	JOLIET	IL	54	-88.1667	41.5000	594	01/1894	11/1974	81	0.1833	0.2338	0.2339	0.93
11-4603	KANKAKEE SEWAGE PLANT	IL	55	-87.8856	41.1381	640	01/1917	12/2000	84	0.2096	0.2739	0.2000	0.07
11-4655	KEITHSBURG 1 NW	IL	65	-90.9394	41.0994	550	01/1931	12/2000	70	0.1899	0.2050	0.0961	1.00
11-4710	KEWANEE	IL	67	-89.8992	41.2483	780	01/1940	12/2000	57	0.1527	0.1510	0.1126	0.89
11-4805	LACON 1 N	IL	64	-89.4061	41.0414	460	01/1939	12/2000	54	0.1892	0.2743	0.1817	0.19
11-4823	LA HARPE 1 SW	IL	66	-90.9697	40.5822	700	04/1895	12/2000	106	0.2109	0.2434	0.1641	0.11

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
11-4957	LAWRENCEVILLE	IL	57	-87.6928	38.7272	442	06/1942	12/2000	59	0.1557	0.0831	0.0377	1.50
11-5079	LINCOLN	IL	67	-89.3381	40.1519	583	02/1906	12/2000	94	0.2008	0.2015	0.0828	0.83
11-5272	MACKINAW	IL	67	-89.3336	40.5525	710	07/1940	12/2000	58	0.1806	0.1429	0.1607	0.73
11-5280	MACOMB	IL	66	-90.6689	40.4781	610	01/1903	12/2000	93	0.1646	0.1922	0.1549	0.85
11-5326	MARENGO	IL	53	-88.6469	42.2928	815	01/1887	12/1999	108	0.1474	0.1023	0.1362	1.17
11-5334	MARIETTA	IL	67	-90.3892	40.5019	640	07/1948	10/1998	48	0.2080	0.1383	0.1411	1.34
11-5342	MARION 4 NNE	IL	60	-88.8981	37.7747	477	05/1942	12/1997	56	0.2206	0.2984	0.2407	1.78
11-5372	MARSEILLES LOCK	IL	82	-88.7533	41.3286	490	01/1941	12/2000	60	0.1776	0.2444	0.2281	0.49
11-5380	MARSHALL	IL	57	-87.6967	39.3908	640	01/1940	11/2000	39	0.1690	0.1884	0.0554	3.10
11-5405	MASCOUTAH	IL	69	-89.8000	38.4833	430	01/1893	12/1953	61	0.2122	0.3400	0.2129	0.68
11-5413	MASON CITY 1 W	IL	67	-89.6775	40.2003	575	07/1948	12/2000	43	0.1958	0.1511	0.0908	0.47
11-5430	MATTOON	IL	57	-88.3811	39.4844	725	01/1948	12/2000	53	0.1613	0.1202	0.0581	1.01
11-5515	MC LEANSBORO 2 E	IL	60	-88.5425	38.0844	446	01/1893	12/2000	107	0.1971	0.2203	0.1275	0.54
11-5539	MEDORA	IL	67	-90.1392	39.1564	607	06/1942	12/1997	56	0.1945	0.2398	0.0972	1.03
11-5712	MINONK	IL	52	-89.0339	40.9125	750	01/1896	12/2000	103	0.1805	0.2380	0.1543	0.24
11-5751	MOLINE WSO AP	IL	65	-90.5233	41.4653	592	01/1927	12/2000	72	0.1934	0.2531	0.1096	1.15
11-5768	MONMOUTH	IL	67	-90.6392	40.9247	745	01/1894	12/2000	107	0.2054	0.1834	0.1352	0.42
11-5792	MONTICELLO 2	IL	56	-88.5889	40.0308	620	01/1942	12/2000	59	0.1690	0.2109	0.1291	0.58
11-5820	MORRIS	IL	82	-88.4286	41.3542	479	03/1916	09/1981	65	0.1763	0.1615	0.1708	1.42
11-5825	MORRIS 5 N	IL	82	-88.4336	41.3708	524	01/1912	11/2000	64	0.1821	0.2249	0.1459	0.79
11-5833	MORRISON	IL	63	-89.9744	41.8039	603	05/1895	12/2000	106	0.1727	0.1537	0.1620	0.35
11-5846	MORRISONVILLE 4 SE	IL	67	-89.4000	39.3833	640	01/1896	11/1971	76	0.1992	0.3026	0.1995	1.08
11-5888	MOUNT CARMEL	IL	60	-87.7578	38.4106	430	07/1891	12/2000	84	0.1915	0.1583	0.1287	0.54
11-5893	MOUNT CARMEL 3 N	IL	60	-87.7833	38.4500	469	01/1896	12/1976	75	0.1771	0.2086	0.2244	0.81
11-5901	MOUNT CARROLL	IL	63	-89.9842	42.0969	640	05/1887	12/2000	107	0.1863	0.1616	0.1024	0.35
11-5917	MOUNT OLIVE	IL	67	-89.7008	39.0719	690	01/1941	12/2000	59	0.1490	0.1987	0.1751	1.40
11-5927	MOUNT PULASKI	IL	67	-89.2764	40.0047	635	01/1942	12/2000	59	0.1788	0.3091	0.2680	2.54
11-5935	MOUNT STERLING	IL	67	-90.7581	39.9869	720	01/1943	12/2000	58	0.1586	0.1556	0.1568	0.81
11-5943	MT VERNON 3 NE	IL	60	-88.8533	38.3483	490	05/1895	12/2000	106	0.1723	0.2073	0.1107	0.56
11-5950	MOWEAQUA	IL	67	-89.0164	39.6242	615	01/1964	10/1999	36	0.1367	0.1901	0.1096	2.44
11-6011	NASHVILLE 4 NE	IL	60	-89.3078	38.3675	515	01/1896	12/2000	99	0.1700	0.2151	0.1886	0.35
11-6080	NEW BOSTON DAM 17	IL	65	-91.0578	41.1922	548	01/1938	12/2000	61	0.2019	0.2556	0.1800	0.01

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
11-6159	NEWTON 6 SSE	IL	57	-88.1183	38.9136	510	01/1912	12/2000	80	0.1560	0.1569	0.1485	0.73
11-6200	NORMAL	IL	56	-88.9497	40.5492	800	02/1895	12/2000	106	0.1765	0.2590	0.1607	0.72
11-6446	OLNEY	IL	57	-88.0836	38.7006	480	01/1890	12/2000	110	0.1859	0.2386	0.1988	0.78
11-6492	OREGON POWER PLANT	IL	82	-89.3333	42.0167	702	01/1909	12/1955	47	0.1728	0.1956	0.1694	0.44
11-6526	OTTAWA 4 SW	IL	82	-88.9106	41.3283	525	01/1889	12/2000	110	0.1934	0.2893	0.2054	0.86
11-6558	PALESTINE	IL	57	-87.6419	38.9986	470	01/1892	12/2000	108	0.1699	0.2120	0.1544	0.03
11-6579	PANA	IL	67	-89.0242	39.3722	700	01/1890	12/2000	106	0.1891	0.2690	0.2306	1.15
11-6610	PARIS WATERWORKS	IL	A1	-87.6933	39.6356	680	4/1893	12/2000	107	0.1930	0.2802	0.2083	1.00
11-6616	PARK FOREST	IL	55	-87.6800	41.4933	710	01/1940	12/2000	61	0.2030	0.2839	0.2046	0.24
11-6661	PAW PAW 1 E	IL	82	-88.9989	41.7122	950	01/1913	12/2000	85	0.1966	0.2496	0.1831	0.17
11-6670	PAYSON	IL	67	-91.2447	39.8242	720	06/1948	12/1996	47	0.1669	0.0637	0.0659	1.53
11-6711	PEORIA WSO AIRPORT	IL	67	-89.6839	40.6675	650	01/1893	12/2000	108	0.1837	0.2539	0.1541	0.45
11-6725	PEOTONE	IL	55	-87.7858	41.3269	720	07/1940	12/2000	61	0.2259	0.2987	0.2252	0.23
11-6751	PERU	IL	64	-89.1333	41.3333	-999	03/1917	08/1950	34	0.1861	0.3115	0.2491	0.84
11-6753	PERU	IL	64	-89.1072	41.3503	620	04/1901	12/2000	96	0.1817	0.1541	0.1102	0.78
11-6760	PETERSBURG 3 SSW	IL	67	-89.8642	39.9878	600	07/1940	12/2000	44	0.2247	0.2154	0.1363	1.26
11-6819	PIPER CITY	IL	52	-88.1828	40.7569	670	07/1940	12/2000	42	0.1948	0.2592	0.1695	0.22
11-6861	PLEASANT HILL	IL	67	-90.8667	39.4500	469	01/1941	12/1975	35	0.2162	0.2261	0.1105	1.03
11-6910	PONTIAC	IL	52	-88.6389	40.8853	650	01/1903	12/2000	98	0.1970	0.2473	0.1502	0.31
11-6973	PRAIRIE DUROCHER 1 WSW	IL	80	-90.0981	38.0814	395	01/1950	12/1995	45	0.1747	0.1929	0.1411	0.47
11-7004	PRINCEVILLE	IL	67	-89.7800	40.9314	735	01/1929	12/2000	72	0.1869	0.1480	0.1493	0.50
11-7067	QUINCY	IL	67	-91.4000	39.9500	600	01/1901	12/1976	76	0.1852	0.1518	0.0745	0.53
11-7072	QUINCY FAA AIRPORT	IL	67	-91.1919	39.9369	769	02/1943	12/2000	58	0.1919	0.2151	0.1587	0.08
11-7077	QUINCY DAM 21	IL	67	-91.4281	39.9058	483	05/1937	12/2000	60	0.2062	0.2677	0.1450	0.77
11-7082	QUINCY MEMORIAL BRIDGE	IL	67	-91.4147	39.9325	508	01/1910	08/1992	81	0.1896	0.1347	0.1044	0.42
11-7150	RANTOUL	IL	56	-88.1594	40.3131	740	01/1893	12/2000	81	0.1857	0.3056	0.2408	0.47
11-7157	RED BUD 5 SE	IL	80	-89.9283	38.1853	430	01/1948	12/2000	53	0.1750	0.1887	0.0877	0.43
11-7336	ROBERTS 3 N	IL	52	-88.1833	40.6667	741	06/1911	10/1968	58	0.1712	0.2167	0.1805	0.37
11-7354	ROCHELLE	IL	82	-89.0708	41.9108	775	01/1924	12/2000	75	0.2067	0.3019	0.2521	0.31
11-7375	ROCKFORD	IL	82	-89.0833	42.2833	741	01/1893	12/1956	58	0.2385	0.3127	0.2548	1.67
11-7377	ROCKFORD 6 ENE	IL	82	-88.9833	42.3000	879	05/1950	11/1984	35	0.2453	0.3815	0.3082	2.14
11-7382	ROCKFORD WSO AP	IL	82	-89.0931	42.1928	730	02/1943	12/2000	57	0.2014	0.2665	0.1794	0.43

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11-7391	ROCK ISLAND L&D 15	IL	65	-90.5644	41.5194	568	05/1937	12/2000	60	0.2160	0.2955	0.2364	0.63
11-7487	ROSICLARE 5 NW	IL	75	-88.4122	37.4747	400	06/1942	12/2000	59	0.2010	0.2297	0.1248	0.97
11-7551	RUSHVILLE	IL	67	-90.5608	40.1158	660	01/1890	12/2000	105	0.1702	0.2084	0.1441	0.29
11-7603	STE MARIE MISSION HOSP	IL	57	-88.0242	38.9344	500	01/1947	12/2000	54	0.1423	0.2920	0.2523	3.27
11-7636	SALEM	IL	57	-88.9461	38.6453	550	07/1915	12/2000	86	0.1756	0.1126	0.0513	1.40
11-7859	SHAWNEETOWN NEW TOWN	IL	60	-88.1336	37.6978	350	01/1912	12/2000	85	0.1599	0.2064	0.1586	0.67
11-7952	SIDELL 5 NW	IL	56	-87.8767	39.9803	675	01/1946	12/2000	55	0.1620	0.1431	0.0933	0.73
11-8147	SPARTA 3 N	IL	80	-89.7167	38.1167	535	01/1893	12/2000	107	0.1825	0.2135	0.1652	0.17
11-8179	SPRINGFIELD WSO AP	IL	67	-89.6839	39.8447	594	01/1901	12/2000	100	0.1827	0.2277	0.1613	0.15
11-8184	SPRINGFIELD WB CITY	IL	67	-89.6500	39.8000	633	07/1879	12/1955	76	0.1807	0.2581	0.1997	0.67
11-8293	STOCKTON 1 N	IL	63	-89.9958	42.4006	970	01/1944	12/2000	57	0.1658	0.1491	0.1518	0.69
11-8353	STREATOR 3 SE	IL	64	-88.8158	41.0908	610	01/1895	12/2000	93	0.1735	0.1753	0.1066	0.87
11-8491	TAYLORVILLE	IL	67	-89.2689	39.5519	620	07/1941	10/1972	32	0.1919	0.2693	0.1386	0.82
11-8604	TISKILWA 2 SE	IL	64	-89.4667	41.2667	640	05/1895	09/1990	96	0.1767	0.2274	0.1649	0.12
11-8630	TOULON	IL	67	-89.9078	41.0586	770	05/1942	10/1975	34	0.1724	0.2162	0.1131	0.60
11-8684	TUSCOLA	IL	56	-88.2900	39.7950	655	03/1893	12/2000	107	0.1687	0.1993	0.1503	0.16
11-8740	URBANA	IL	56	-88.2406	40.0842	721	01/1889	12/2000	112	0.1529	0.1173	0.1587	1.16
11-8756	UTICA STARVED ROCK DAM	IL	82	-88.9858	41.3242	460	01/1941	12/2000	60	0.1820	0.2083	0.1443	0.62
11-8781	VANDALIA	IL	57	-89.0922	38.9703	540	01/1932	12/2000	44	0.1454	0.1226	0.1160	1.62
11-8860	VIRDEN 1 N	IL	67	-89.7689	39.5061	675	04/1941	12/2000	60	0.1528	0.1852	0.1631	1.03
11-8870	VIRGINIA	IL	67	-90.2100	39.9450	620	06/1963	12/2000	38	0.1535	0.1220	0.1133	0.97
11-8916	WALNUT	IL	64	-89.5983	41.5539	690	01/1893	12/2000	107	0.1803	0.3103	0.2159	0.79
11-8976	WARSAW	IL	67	-91.4333	40.3500	489	01/1905	09/1962	58	0.1610	0.2155	0.1307	0.84
11-8990	WASHINGTON	IL	67	-89.4372	40.6953	755	07/1948	10/1998	50	0.1975	0.2197	0.1406	0.15
11-9002	WATERLOO	IL	69	-90.1628	38.3267	629	01/1912	08/2000	88	0.2151	0.2872	0.1744	0.73
11-9010	SHABBONA 5 NNE	IL	54	-88.7561	41.7650	790	01/1943	12/1996	32	0.2251	0.2851	0.1438	1.00
11-9021	WATSEKA 2 NW	IL	52	-87.7556	40.7928	620	01/1895	12/2000	100	0.1976	0.2978	0.1698	0.82
11-9029	WAUKEGAN 2 WNW	IL	53	-87.8828	42.3492	700	01/1923	12/2000	78	0.1548	0.0813	0.0931	1.19
11-9040	WAYNE CITY 1 N	IL	60	-88.5833	38.3500	440	01/1947	12/1987	36	0.1942	0.2706	0.1333	1.01
11-9090	WENONA	IL	64	-89.0667	41.0667	690	07/1948	12/1989	40	0.1596	0.1543	0.1670	1.17
11-9221	WHEATON 3 SE	IL	54	-88.0728	41.8128	680	01/1936	12/2000	65	0.2173	0.3733	0.2532	1.05
11-9241	WHITE HALL 1 E	IL	67	-90.3794	39.4411	580	01/1888	12/2000	107	0.1776	0.2173	0.1699	0.22

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11-9354	WINDSOR	IL	57	-88.5917	39.4397	690	01/1904	12/2000	97	0.1822	0.1202	0.1168	1.51
12-0076	ALBION 5 E	IN	52	-85.3333	41.4000	981	01/1917	12/1971	55	0.1846	0.1888	0.0977	0.50
12-0132	ALPINE 2 NE	IN	45	-85.1583	39.5736	850	01/1949	10/1998	50	0.1917	0.2810	0.1741	1.02
12-0177	ANDERSON QUARTZ PLANT	IN	45	-85.7175	40.1122	845	05/1895	12/2000	106	0.1470	0.1951	0.1023	2.15
12-0200	ANGOLA	IN	52	-84.9900	41.6397	1010	01/1920	12/2000	78	0.1795	0.1938	0.1963	0.49
12-0331	ATTICA 2 E	IN	58	-87.1964	40.2839	727	07/1948	12/2000	47	0.1869	0.2527	0.1753	0.02
12-0334	AUBURN	IN	52	-85.0500	41.3333	875	07/1896	08/1988	45	0.1548	0.0849	0.0929	1.54
12-0482	BATESVILLE WATER WORKS	IN	45	-85.2186	39.2969	970	07/1948	10/1998	51	0.1643	0.2576	0.2684	1.88
12-0545	BEDFORD	IN	60	-86.5000	38.8500	669	01/1939	08/1978	40	0.1793	0.2335	0.1490	0.17
12-0550	BEDFORD 4 SW	IN	60	-86.5217	38.8397	550	01/1945	12/2000	56	0.1700	0.2247	0.1820	0.29
12-0676	BERNE	IN	45	-84.9553	40.6603	860	01/1910	12/2000	91	0.1537	0.2005	0.1572	0.62
12-0784	BLOOMINGTON	IN	58	-86.5214	39.1742	830	01/1896	12/2000	104	0.1655	0.2970	0.1909	1.46
12-0824	BLUFFTON	IN	52	-85.1667	40.7833	865	01/1897	12/1968	68	0.1649	0.2319	0.1781	0.81
12-0830	BLUFFTON 1 N	IN	52	-85.1733	40.7478	825	01/1950	12/2000	48	0.2099	0.3074	0.1515	1.61
12-0831	BLUFFTON WATERWORKS	IN	52	-85.1667	40.7333	840	01/1896	12/1957	59	0.1826	0.1833	0.1324	0.09
12-0852	BOONVILLE	IN	60	-87.2736	38.0303	400	01/1898	12/2000	42	0.1878	0.1715	0.0927	0.66
12-0877	BOWLING GREEN 3 NE	IN	58	-86.9717	39.4097	690	05/1946	12/2000	54	0.1742	0.2860	0.1922	0.70
12-0922	BRAZIL	IN	58	-87.1242	39.5108	680	07/1948	10/1998	51	0.1926	0.1858	0.2281	1.80
12-1030	BROOKVILLE	IN	45	-85.0128	39.4239	630	01/1925	12/2000	74	0.1773	0.1308	0.1043	0.48
12-1197	BUTLERVILLE	IN	58	-85.5500	39.0500	732	01/1893	12/1956	54	0.1960	0.2948	0.2160	0.19
12-1229	CAMBRIDGE CITY	IN	45	-85.1833	39.8667	1000	01/1893	12/2000	108	0.1454	0.1502	0.1534	0.64
12-1256	CANNELTON	IN	61	-86.7072	37.8994	402	01/1928	12/2000	71	0.2010	0.2589	0.2158	0.22
12-1415	CHALMERS	IN	52	-86.8814	40.6628	700	07/1948	10/1998	47	0.1808	0.1253	0.1348	0.79
12-1425	CHARLESTOWN ORD PLANT	IN	46	-85.7000	38.4833	550	06/1962	12/2000	38	0.1766	0.2530	0.1027	1.37
12-1628	CLINTON 2 W	IN	58	-87.4392	39.6592	605	01/1954	12/2000	46	0.1944	0.2851	0.1456	0.52
12-1719	COLLEGEVILLE ST JOSEPH	IN	52	-87.1500	40.9167	669	01/1900	12/1969	70	0.1761	0.2408	0.1683	0.32
12-1734	COLUMBIA CITY	IN	52	-85.4833	41.1500	889	01/1922	09/1963	41	0.1654	0.0201	0.0741	2.88
12-1739	COLUMBIA CITY	IN	52	-85.4897	41.1450	850	02/1908	11/2000	80	0.1899	0.2071	0.1641	0.06
12-1747	COLUMBUS	IN	58	-85.9211	39.1978	621	01/1893	12/2000	108	0.1926	0.2648	0.2061	0.07
12-1772	CONNERSVILLE	IN	45	-85.6667	39.6667	-999	01/1893	12/1923	31	0.2030	0.2687	0.2461	2.33
12-1843	COVINGTON 4 SW	IN	58	-87.4500	40.1167	620	01/1926	11/1981	55	0.1807	0.2212	0.0920	0.62
12-1869	CRANE NAVAL DEPOT	IN	60	-86.8350	38.8725	730	05/1942	12/2000	59	0.1866	0.2070	0.1352	0.14

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12-1873	CRAWFORDSVILLE 2 NW	IN	45	-86.9289	39.9664	778	07/1948	12/2000	50	0.1732	0.0958	0.0504	1.45
12-1882	CRAWFORDSVILLE POWER P	IN	45	-86.8997	40.0489	669	01/1894	12/1981	79	0.1830	0.2017	0.2250	1.24
12-1998	CYPRESS DAM 48	IN	60	-87.6667	37.8333	371	01/1925	12/1974	50	0.1562	0.1886	0.1807	1.07
12-2096	DECATUR 1 N	IN	52	-84.9294	40.8481	820	01/1932	12/2000	69	0.1832	0.1400	0.0754	0.76
12-2149	DELPHI	IN	52	-86.6819	40.5458	671	01/1893	12/2000	108	0.1894	0.2317	0.1844	0.06
12-2309	DUBOIS S IND FORAGE FR	IN	60	-86.7000	38.4558	690	01/1955	12/2000	46	0.2024	0.2364	0.1256	0.92
12-2549	EDWARDSPORT POWER PLAN	IN	57	-87.2333	38.8000	459	05/1923	12/1982	60	0.1771	0.1577	0.1161	0.44
12-2605	ELLISTON	IN	60	-86.9369	39.0311	590	01/1912	12/2000	87	0.1873	0.3194	0.2220	0.85
12-2638	ELWOOD	IN	52	-85.8386	40.2897	840	06/1948	12/2000	53	0.1920	0.1806	0.1600	0.34
12-2660	ENGLISH 4 S	IN	60	-86.4683	38.2789	510	07/1969	12/2000	30	0.1489	0.2742	0.1444	2.79
12-2725	EVANS LANDING	IN	47	-86.0000	38.0000	430	01/1926	09/1975	50	0.1500	0.3043	0.2715	2.02
12-2731	EVANSVILLE	IN	60	-87.5783	37.9647	380	01/1903	12/2000	84	0.1751	0.2388	0.2139	0.41
12-2738	EVANSVILLE WSO AP	IN	60	-87.5203	38.0431	400	01/1897	12/2000	104	0.1784	0.2140	0.1832	0.10
12-2813	FARMERSBURG 3 SW	IN	57	-87.3833	39.2500	571	02/1899	12/1951	53	0.1791	0.1833	0.1161	0.58
12-2825	FARMLAND 5 NNW	IN	45	-85.1483	40.2539	965	01/1893	12/2000	101	0.1694	0.1852	0.1023	0.62
12-2882	FISHERS 2 N	IN	45	-86.0203	39.9844	800	06/1937	12/2000	64	0.1360	0.1131	0.1334	1.22
12-3027	FORT WAYNE DISPOSAL PL	IN	52	-85.1167	41.1000	740	01/1945	12/1989	43	0.1645	0.2108	0.1482	0.69
12-3037	FORT WAYNE WSO AP	IN	52	-85.2056	41.0061	791	04/1897	12/2000	95	0.1846	0.2266	0.1884	0.10
12-3062	FOWLER	IN	52	-87.3167	40.6167	820	01/1928	11/1971	43	0.1806	0.2782	0.1360	1.42
12-3082	FRANKFORT DISPOSAL PLA	IN	52	-86.5067	40.2986	824	01/1914	12/2000	87	0.1928	0.2311	0.1280	0.40
12-3095	FRANKLIN	IN	45	-86.0667	39.5167	771	01/1937	12/1970	33	0.1549	0.0644	0.1192	1.22
12-3213	GARY	IN	55	-87.3833	41.6167	600	06/1936	12/1978	43	0.1907	0.1711	0.1024	1.21
12-3418	GOSHEN COLLEGE	IN	52	-85.8825	41.5575	875	06/1914	12/2000	86	0.1844	0.2178	0.1715	0.02
12-3513	GREENCASTLE 1 E	IN	58	-86.7783	39.6283	760	01/1917	12/2000	84	0.1920	0.2451	0.1577	0.04
12-3527	GREENFIELD	IN	45	-85.7611	39.7858	865	01/1904	12/2000	96	0.1673	0.2271	0.1780	0.32
12-3547	GREENSBURG	IN	45	-85.4892	39.3475	935	05/1896	12/2000	103	0.1723	0.1958	0.1180	0.39
12-3777	HARTFORD CITY 5 SSW	IN	45	-85.2892	40.4356	942	05/1946	12/2000	51	0.1727	0.2770	0.1868	1.06
12-3915	HENRYVILLE STATE FORES	IN	58	-85.7667	38.5667	591	02/1912	11/1970	59	0.1642	0.2813	0.1810	1.26
12-4008	HOBART 2 WNW	IN	55	-87.2881	41.5422	640	07/1919	12/1999	81	0.1989	0.2621	0.1580	0.52
12-4168	HUNTINGBURG	IN	60	-86.9500	38.2667	522	01/1908	09/1957	50	0.1777	0.1306	0.1019	0.65
12-4176	HUNTINGTON	IN	52	-85.5000	40.8833	801	01/1894	12/2000	103	0.2001	0.2364	0.1419	0.40
12-4259	INDIANAPOLIS WSFO AP	IN	45	-86.2789	39.7317	790	01/1932	12/2000	69	0.1693	0.2128	0.1536	0.21

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
12-4264	INDIANAPOLIS MONUMT CI	IN	45	-86.1667	39.7667	794	01/1897	12/1963	67	0.1735	0.1651	0.1298	0.08
12-4272	INDIANAPOLIS SE SIDE	IN	45	-86.0678	39.7164	845	01/1952	12/2000	49	0.1440	0.1035	0.1038	1.00
12-4286	INDIANAPOLIS ZOO	IN	45	-86.1806	39.7681	710	07/1948	12/2000	50	0.1630	0.1354	0.1974	1.03
12-4364	JASONVILLE 1 E	IN	57	-87.1833	39.1667	615	07/1948	12/1996	41	0.1606	0.2617	0.1657	1.06
12-4372	JASPER	IN	60	-86.9408	38.3861	460	01/1961	12/2000	40	0.1994	0.1817	0.0835	1.31
12-4382	JEFFERSONVILLE	IN	60	-85.7500	38.2833	459	01/1893	12/1973	81	0.1920	0.2072	0.1715	0.16
12-4407	JOHNSON EXPERIMENT FAR	IN	60	-87.7500	38.2667	440	05/1936	12/1979	44	0.1750	0.2166	0.2179	0.62
12-4497	KENDALLVILLE	IN	52	-85.2614	41.4428	975	07/1948	10/1998	44	0.1753	0.0214	0.1161	4.01
12-4527	KENTLAND	IN	52	-87.4353	40.7592	695	01/1940	12/1996	56	0.2313	0.3433	0.1592	3.48
12-4642	KNIGHTSTOWN	IN	45	-85.4878	39.8075	997	01/1947	12/2000	49	0.1538	0.1912	0.1874	0.48
12-4662	KOKOMO POST OFFICE	IN	52	-86.1758	40.4583	820	01/1897	12/2000	92	0.2045	0.2380	0.2078	0.68
12-4715	LAFAYETTE 5 S	IN	45	-86.9028	40.2964	735	03/1954	12/2000	47	0.1562	0.0557	0.0767	1.42
12-4730	LAGRANGE SEWAGE PLANT	IN	52	-85.4142	41.6508	895	01/1906	12/2000	94	0.1851	0.2690	0.1581	0.57
12-4837	LA PORTE	IN	55	-86.7297	41.6117	845	01/1948	12/2000	53	0.2047	0.3058	0.1924	0.55
12-4900	LEAVENWORTH DAM 44	IN	60	-86.3333	38.1833	420	01/1926	12/1971	46	0.1745	0.1139	0.1989	2.54
12-4908	LEBANON WATERWORKS	IN	52	-86.4750	40.0517	950	07/1948	10/1998	51	0.1704	0.2195	0.1500	0.45
12-4973	LEWISVILLE	IN	45	-85.3483	39.8061	1065	07/1948	10/1998	49	0.1709	0.2421	0.2144	0.60
12-5050	LIBERTY 3 SSE	IN	45	-84.9208	39.5903	990	07/1957	12/2000	44	0.2231	0.2461	0.2125	3.76
12-5117	LOGANSPORT CICOTT ST	IN	52	-86.3878	40.7478	600	07/1891	12/2000	106	0.2059	0.2065	0.1187	0.86
12-5122	LOGANSPORT RADIO WSAL	IN	52	-86.3500	40.7500	630	01/1956	12/1989	33	0.1719	0.3491	0.2555	2.65
12-5174	LOWELL	IN	55	-87.4178	41.2647	665	07/1963	12/2000	38	0.1831	0.2244	0.2117	0.60
12-5237	MADISON	IN	45	-85.3942	38.7369	460	01/1893	12/2000	107	0.1535	0.1820	0.1238	0.79
12-5322	MARENGO	IN	60	-86.3397	38.3756	580	01/1893	12/1968	56	0.1837	0.2391	0.1875	0.05
12-5337	MARION 2 N	IN	52	-85.6586	40.5800	790	01/1893	12/2000	108	0.1986	0.2539	0.1604	0.30
12-5407	MARTINSVILLE 2 SW	IN	45	-86.4517	39.4042	610	01/1923	12/2000	77	0.1777	0.2069	0.1591	0.08
12-5435	MAUZY	IN	45	-85.3333	39.6167	1050	01/1893	09/1948	56	0.1772	0.1852	0.0924	0.73
12-5535	MEDARYVILLE STATE NURS	IN	55	-86.9014	41.1589	695	07/1948	10/1998	48	0.2337	0.2390	0.1595	0.39
12-5656	MILAN WATERWORKS	IN	45	-85.1333	39.1167	991	02/1902	11/1961	60	0.1683	0.2270	0.1837	0.30
12-5815	MONROEVILLE 3 ENE	IN	52	-84.8836	40.9867	795	05/1940	08/2000	60	0.1910	0.1623	0.1497	0.50
12-5837	MONTICELLO	IN	52	-86.7622	40.7550	685	01/1911	12/2000	88	0.1661	0.1378	0.1228	0.58
12-6001	MOUNT VERNON WATERWORK	IN	60	-87.8956	37.9286	357	01/1889	10/2000	111	0.1820	0.2533	0.1710	0.16
12-6020	MUNCIE BALL STATE UNIV	IN	45	-85.4225	40.2194	940	01/1921	12/2000	78	0.1675	0.2580	0.1826	0.83

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12-6023	MUNCIE	IN	45	-85.3497	40.1825	960	01/1947	12/2000	53	0.2064	0.2483	0.1866	1.45
12-6151	NEWBURGH LOCK & DAM	IN	60	-87.3744	37.9325	380	01/1928	12/2000	73	0.1841	0.1983	0.1652	0.07
12-6164	NEW CASTLE	IN	45	-85.3350	39.8686	1070	01/1950	12/2000	51	0.1327	0.1667	0.1687	1.67
12-6179	NEW HARMONY	IN	60	-87.9481	38.1342	390	01/1934	12/1989	55	0.1654	0.0877	0.0909	1.42
12-6340	NOBLESVILLE MORSE	IN	52	-86.0519	40.0714	800	02/1914	12/2000	84	0.1559	0.2408	0.2321	2.11
12-6435	NORTH VERNON 2 SW	IN	58	-85.5997	39.0017	740	01/1938	12/2000	60	0.2008	0.1883	0.0855	1.24
12-6465	NOTRE DAME MOREAU SEM	IN	52	-86.2333	41.7000	732	04/1912	12/1953	41	0.1741	0.1493	0.1329	0.34
12-6542	OGDEN DUNES	IN	55	-87.1833	41.6167	610	01/1952	12/1988	37	0.2453	0.2831	0.1269	1.29
12-6580	BEDFORD	IN	60	-86.5519	38.8894	650	01/1918	12/2000	83	0.1529	0.2071	0.1269	1.31
12-6705	PAOLI	IN	60	-86.4858	38.5556	560	03/1898	12/2000	103	0.1901	0.1647	0.0659	1.28
12-6830	PERRYSVILLE 4 WNW	IN	58	-87.5064	40.0739	634	01/1926	12/2000	74	0.1748	0.2400	0.1253	0.44
12-6872	PETERSBURG 61 BRIDGE	IN	59	-87.2922	38.5081	485	01/1935	12/2000	66	0.1564	0.1258	0.1657	1.33
12-6989	PLYMOUTH	IN	52	-86.3364	41.3383	815	01/1906	12/2000	94	0.1815	0.2732	0.1469	0.98
12-7125	PRINCETON 1 W	IN	59	-87.5906	38.3567	480	01/1893	12/2000	108	0.2039	0.3138	0.2016	1.32
12-7298	RENSSELAER	IN	52	-87.1564	40.9356	650	01/1970	12/2000	30	0.1806	0.1296	0.0971	0.58
12-7362	RICHMOND WATERWORKS	IN	45	-84.8500	39.8500	971	07/1896	11/1968	73	0.1802	0.1976	0.1772	0.21
12-7370	RICHMOND WTRWRKS 2 NNE	IN	45	-84.8833	39.8833	1015	07/1948	12/2000	52	0.1513	0.1564	0.2131	1.07
12-7482	ROCHESTER	IN	52	-86.2094	41.0658	770	04/1904	12/2000	86	0.1916	0.1981	0.1721	0.22
12-7522	ROCKVILLE	IN	58	-87.2269	39.7594	693	01/1893	12/2000	106	0.1890	0.2210	0.2287	0.84
12-7547	ROME	IN	47	-86.5333	37.9333	-999	05/1903	12/1938	36	0.1695	0.1582	0.1391	0.33
12-7601	ROYAL CENTER	IN	52	-86.5089	40.8628	720	04/1918	10/1998	61	0.1771	0.0542	0.1283	2.88
12-7646	RUSHVILLE SEWAGE PLANT	IN	45	-85.4528	39.6042	960	03/1901	12/2000	99	0.1632	0.1517	0.1150	0.24
12-7724	SAINT MEINRAD	IN	60	-86.8092	38.1642	510	01/1960	12/2000	41	0.1773	0.2455	0.1849	0.16
12-7747	SALAMONIA	IN	45	-84.8667	40.3833	981	01/1898	12/1975	77	0.1849	0.2183	0.2284	1.20
12-7755	SALEM	IN	60	-86.0889	38.6111	800	01/1897	12/2000	99	0.1794	0.2165	0.1440	0.09
12-7783	SANDBORN	IN	57	-87.1833	38.8833	460	01/1950	12/1984	33	0.1747	0.2195	0.1896	0.25
12-7875	SCOTTSBURG	IN	58	-85.7850	38.6886	570	05/1894	12/2000	107	0.1797	0.2482	0.1892	0.20
12-7930	SEYMOUR HIGHWAY GARAGE	IN	58	-85.8608	38.9617	595	07/1948	10/1998	48	0.1951	0.2000	0.0776	1.05
12-7935	SEYMOUR 1 N	IN	58	-85.9822	38.9822	570	02/1893	12/2000	106	0.1804	0.2852	0.1873	0.41
12-7991	SHELBY	IN	55	-87.3425	41.1828	640	01/1949	12/1991	43	0.1864	0.2063	0.1626	0.54
12-7999	SHELBYVILLE	IN	45	-85.7917	39.5283	750	01/1893	12/2000	102	0.1616	0.1867	0.1235	0.47
12-8036	SHOALS HIWAY 50 BRIDGE	IN	60	-86.7978	38.6728	550	01/1911	12/2000	90	0.1795	0.1682	0.1576	0.29

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12-8187	SOUTH BEND WSO AIRPORT	IN	52	-86.3331	41.7072	773	01/1894	12/2000	105	0.1672	0.1870	0.1279	0.48
12-8290	SPENCER	IN	58	-86.7703	39.2836	550	05/1946	12/2000	55	0.1678	0.2378	0.2202	1.12
12-8352	SPURGEON 2 N	IN	59	-87.2500	38.2500	500	07/1948	11/1994	46	0.2056	0.3250	0.2738	1.14
12-8698	TELL CITY	IN	61	-86.7747	37.9531	400	01/1938	12/2000	63	0.1846	0.2506	0.1487	0.18
12-8723	TERRE HAUTE 8 S	IN	57	-87.4081	39.4708	507	01/1955	12/2000	43	0.1842	0.1945	0.1390	0.67
12-8725	TERRE HAUTE	IN	57	-87.3000	39.4500	575	01/1897	08/1954	58	0.1742	0.1460	0.1162	0.41
12-8784	TIPTON 5 SW	IN	52	-86.1086	40.2233	895	07/1948	12/2000	52	0.2002	0.1991	0.1029	0.80
12-8967	UNIONTOWN LOCK & DAM	IN	60	-87.9931	37.7953	340	01/1928	12/2000	71	0.1649	0.1664	0.1169	0.51
12-8999	VALPARAISO WATER WORKS	IN	55	-87.0378	41.5114	800	04/1893	12/2000	99	0.2157	0.3561	0.2934	1.32
12-9040	VEEDERSBURG	IN	58	-87.2667	40.1167	679	01/1900	11/1952	53	0.1799	0.2214	0.1490	0.14
12-9069	VERSAILLES WATERWORKS	IN	45	-85.2453	39.0717	939	07/1948	10/1998	50	0.1569	0.1720	0.1400	0.28
12-9080	VEVAY	IN	45	-85.0761	38.7436	495	01/1885	12/2000	71	0.1678	0.1273	0.1023	0.37
12-9113	VINCENNES 5 NE	IN	57	-87.4878	38.7386	450	01/1939	12/2000	62	0.1659	0.1591	0.1305	0.17
12-9138	WABASH	IN	52	-85.8208	40.7869	730	01/1923	12/2000	75	0.1725	0.0986	0.0854	0.96
12-9174	WALDRON 2 W	IN	45	-85.6964	39.4539	825	01/1951	12/1997	46	0.1655	0.1401	0.1190	0.18
12-9222	WANATAH 2 WNW	IN	55	-86.9300	41.4436	735	01/1961	12/2000	40	0.1754	0.3404	0.2027	2.70
12-9240	WARSAW	IN	52	-85.8700	41.2389	810	01/1947	12/2000	51	0.2306	0.2420	0.0885	3.80
12-9253	WASHINGTON	IN	57	-87.1369	38.6128	500	01/1897	12/1999	102	0.1665	0.2242	0.1873	0.14
12-9271	WATERLOO	IN	52	-85.0453	41.4931	940	01/1938	12/2000	53	0.2074	0.3039	0.2567	1.13
12-9300	WAVELAND 2 NE	IN	58	-87.0372	39.8778	781	07/1948	12/2000	31	0.1942	0.2542	0.2143	0.17
12-9424	WEST LAFAYETTE FCWOS	IN	52	-86.9333	40.4167	599	01/1946	12/2000	49	0.1968	0.1922	0.1506	0.32
12-9427	WEST LAFAYETTE PURDUE	IN	52	-86.9167	40.4167	620	01/1897	08/1953	57	0.1859	0.1778	0.1128	0.25
12-9430	WEST LAFAYETTE 6 NW	IN	52	-86.9919	40.4750	715	01/1897	12/2000	103	0.1750	0.1958	0.1106	0.47
12-9511	WHEATFIELD 4 NNW	IN	55	-87.0578	41.1947	665	01/1917	12/2000	82	0.1707	0.2501	0.1832	1.36
12-9557	WHITESTOWN	IN	52	-86.3447	39.9978	941	01/1901	12/2000	100	0.1768	0.3047	0.2534	1.39
12-9570	WHITING	IN	55	-87.4833	41.6500	620	01/1910	12/1961	51	0.1855	0.2545	0.3309	2.90
12-9605	WILLIAMS	IN	60	-86.6472	38.8014	500	01/1921	12/2000	80	0.1723	0.1876	0.1723	0.28
12-9670	WINAMAC	IN	52	-86.5872	41.0264	690	04/1897	12/2000	92	0.1819	0.1801	0.0943	0.50
12-9678	WINCHESTER AIRPORT 3E	IN	45	-84.9208	40.1714	1110	06/1942	12/2000	59	0.1907	0.2618	0.2164	0.97
13-0213	ANAMOSA 1 NW	IA	62	-91.3000	42.1167	805	05/1937	12/2000	63	0.2255	0.2560	0.1300	1.14
13-0389	AUGUSTA	IA	66	-91.2833	40.7500	548	01/1937	11/1978	40	0.1626	0.1363	0.1822	1.44
13-0600	BELLE PLAINE	IA	62	-92.2944	41.8889	810	06/1890	12/2000	111	0.2042	0.2715	0.1836	0.05

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13-0608	BELLEVUE LOCK & DAM 12	IA	63	-90.4233	42.2614	603	05/1937	12/2000	61	0.1507	0.0610	0.1079	2.04
13-0753	BLOOMFIELD 1 WNW	IA	67	-92.4394	40.7597	812	01/1907	12/2000	81	0.1864	0.2671	0.2118	0.81
13-0793	BONAPARTE_7_NE	IA	66	-91.7667	40.7667	571	01/1893	12/1938	46	0.2372	0.3943	0.3318	2.08
13-1060	BURLINGTON RADIO KBUR	IA	66	-91.1667	40.8167	703	01/1949	12/2000	52	0.2094	0.3277	0.1908	0.51
13-1063	BURLINGTON AIRPORT	IA	66	-91.1192	40.7808	692	07/1897	12/2000	93	0.2107	0.2723	0.1447	0.51
13-1257	CASCADE	IA	63	-91.0133	42.2975	850	07/1942	12/2000	55	0.1485	0.2004	0.2215	2.72
13-1300	CEDAR FALLS	IA	62	-92.4431	42.5378	763	01/1930	12/1962	33	0.2033	0.3219	0.2033	0.47
13-1314	CEDAR RAPIDS AP	IA	62	-91.7086	41.8844	840	06/1953	12/2000	45	0.1652	0.2000	0.2425	2.05
13-1319	CEDAR RAPIDS NO 1	IA	62	-91.5856	42.0394	850	01/1892	12/2000	109	0.2120	0.3033	0.1958	0.25
13-1324	CEDAR RAPIDS 2	IA	62	-91.6667	41.9667	751	01/1905	12/1965	60	0.1941	0.3842	0.2470	2.30
13-1528	CLARENCE	IA	63	-91.0667	41.8833	840	01/1934	12/1977	43	0.1826	0.1672	0.1739	0.12
13-1635	CLINTON 1	IA	65	-90.2639	41.7947	585	05/1891	12/2000	110	0.1920	0.2096	0.1890	0.67
13-1640	CLINTON 2	IA	65	-90.2167	41.8333	600	07/1904	10/1985	82	0.2118	0.2232	0.1405	0.54
13-1731	COLUMBUS JUNCT 2 SSW	IA	65	-91.3742	41.2567	670	01/1901	12/2000	100	0.1939	0.2387	0.1775	0.08
13-1954	CRESCO 1 NE	IA	62	-92.0939	43.3894	1255	01/1937	12/2000	64	0.1973	0.1929	0.1513	0.58
13-2068	DAVNPORT	IA	65	-90.6333	41.5000	646	01/1896	12/1947	52	0.1706	0.1461	0.1139	2.37
13-2110	DECORAH	IA	62	-91.7953	43.3042	860	01/1894	12/2000	107	0.2095	0.2931	0.1693	0.32
13-2112	DECORAH 2 S	IA	62	-91.7833	43.2833	879	01/1896	10/1950	55	0.2171	0.3297	0.1981	0.60
13-2235	DE WITT	IA	63	-90.5667	41.8167	685	01/1955	12/2000	45	0.1809	0.1836	0.1377	0.28
13-2299	DONNELLSON	IA	66	-91.5650	40.6433	705	01/1939	12/2000	60	0.1791	0.2461	0.2091	0.54
13-2311	DORCHESTER	IA	62	-91.5058	43.4708	747	04/1947	12/2000	52	0.1862	0.2234	0.1532	0.14
13-2364	DUBUQUE LOCK & DAM 11	IA	63	-90.6458	42.5406	620	05/1937	12/2000	63	0.1679	0.1979	0.1751	0.91
13-2367	DUBUQUE WSO AP	IA	63	-90.7036	42.3978	1056	01/1949	12/2000	51	0.2168	0.3108	0.2853	1.70
13-2369	DUBUQUE RIVER	IA	63	-90.7000	42.4000	581	01/1896	12/1951	56	0.1735	0.1194	0.0614	1.17
13-2603	ELKADER 5 SSW	IA	62	-91.4453	42.7914	785	02/1893	12/2000	94	0.1838	0.2678	0.1785	0.35
13-2789	FAIRFIELD	IA	67	-91.9553	41.0214	740	01/1894	12/2000	101	0.1476	0.1503	0.1282	1.15
13-2864	FAYETTE	IA	62	-91.8108	42.8531	1050	01/1893	12/2000	105	0.1787	0.2658	0.1950	0.47
13-3007	FORT MADISON	IA	66	-91.3325	40.6239	530	01/1893	12/2000	74	0.2116	0.3243	0.2158	0.26
13-3517	GUTTENBERG L & D 10	IA	62	-91.1158	42.7992	624	05/1937	12/2000	63	0.1857	0.2640	0.1486	0.59
13-4049	INDEPENDENCE 5 ENE	IA	62	-91.8878	42.4756	1025	01/1956	12/2000	40	0.1930	0.1966	0.1227	0.41
13-4052	INDEPENDENCE	IA	62	-91.9014	42.5069	903	02/1892	12/1980	89	0.2130	0.2014	0.1209	1.07
13-4101	IOWA CITY 1 S	IA	63	-91.5328	41.6489	640	02/1892	12/2000	109	0.2003	0.2524	0.1679	0.39

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
13-4116	IOWA CITY RALSTON CREE	IA	63	-91.4667	41.6833	-999	01/1949	12/1982	33	0.2123	0.2179	0.1456	0.49
13-4131	IOWA CITY RALSTON CREE	IA	63	-91.5167	41.6833	-999	01/1949	10/1982	34	0.1792	0.1188	0.1659	0.68
13-4381	KEOKUK	IA	67	-91.3767	40.3969	527	07/1891	12/2000	102	0.1825	0.2064	0.1381	0.04
13-4389	KEOSAUQUA STATE PARK	IA	66	-91.9825	40.7292	625	01/1893	12/2000	108	0.2250	0.2945	0.1927	0.30
13-4394	KEOSAUQUA	IA	66	-91.9500	40.7167	630	01/1937	12/1975	39	0.2413	0.2491	0.1210	1.83
13-4620	LANSING	IA	62	-91.2161	43.3633	643	06/1896	12/2000	95	0.1662	0.0929	0.0881	2.27
13-4700	LE CLAIRE	IA	65	-90.3500	41.6000	581	02/1893	12/1954	62	0.1772	0.2259	0.1250	1.00
13-4705	LE CLAIRE L & D 14	IA	65	-90.3956	41.5697	577	01/1941	12/2000	60	0.2053	0.2859	0.1799	0.26
13-4963	LOWDEN	IA	63	-90.9300	41.8564	715	06/1962	12/2000	36	0.1987	0.2318	0.3001	1.79
13-5086	MANCHESTER #2	IA	62	-91.4517	42.4731	990	01/1893	12/2000	98	0.2297	0.2587	0.1982	1.56
13-5131	MAQUOKETA 3 S	IA	63	-90.7489	42.0494	762	01/1897	12/2000	90	0.2045	0.2219	0.1571	0.19
13-5732	MORSE	IA	63	-91.4333	41.7500	751	01/1949	12/1978	30	0.2100	0.3183	0.2628	1.32
13-5796	MOUNT PLEASANT 1 SSW	IA	66	-91.5647	40.9486	730	01/1893	12/2000	107	0.1870	0.2984	0.1950	0.64
13-5837	MUSCATINE	IA	65	-91.0717	41.4078	549	01/1936	12/2000	65	0.2276	0.2812	0.2225	1.17
13-5842	MUSCATINE 2	IA	65	-91.0500	41.2300	551	01/1905	12/1981	74	0.2141	0.2549	0.1553	0.43
13-5952	NEW HAMPTON 1 E	IA	62	-92.3122	43.0575	1160	04/1897	12/2000	102	0.2104	0.2476	0.1981	0.51
13-6076	NORTH ENGLISH	IA	63	-92.0725	41.5119	797	01/1949	12/1997	45	0.1777	0.1873	0.1895	0.23
13-6200	OELWEIN	IA	62	-91.9131	42.6467	1010	05/1923	12/2000	76	0.2137	0.3325	0.2297	0.50
13-6225	OLIN	IA	63	-91.1333	42.0000	751	03/1898	12/1940	42	0.1999	0.2449	0.1325	0.68
13-6391	OTTUMWA	IA	67	-92.4333	41.0167	650	01/1896	12/1964	67	0.1633	0.1226	0.1082	0.63
13-6766	POSTVILLE	IA	62	-91.5581	43.0906	1190	04/1893	12/1999	65	0.1902	0.3034	0.2254	0.45
13-7678	SIGOURNEY	IA	67	-92.1975	41.3328	800	02/1896	12/2000	105	0.1785	0.2132	0.2240	1.28
13-7855	SPILLVILLE	IA	62	-91.9536	43.2053	1080	01/1949	10/1998	50	0.1782	0.2593	0.2253	0.58
13-7955	STOCKPORT	IA	66	-91.8333	40.8333	751	01/1902	12/1947	46	0.2399	0.4149	0.2898	1.37
13-8009	STRAWBERRY POINT	IA	62	-91.5353	42.6842	1200	01/1949	10/1998	50	0.1920	0.2427	0.1348	0.32
13-8266	TIPTON 4 NE	IA	63	-91.0833	41.8206	770	01/1893	12/2000	100	0.1935	0.1847	0.1274	0.13
13-8315	TRAER	IA	62	-92.4728	42.1869	950	01/1949	10/1998	49	0.1863	0.2205	0.1273	0.36
13-8339	TRIPOLI	IA	62	-92.2575	42.8133	960	01/1947	12/2000	50	0.2106	0.2685	0.1480	0.36
13-8568	VINTON	IA	62	-92.0078	42.1703	850	01/1942	12/2000	58	0.2079	0.3471	0.2497	0.73
13-8668	WAPELLO	IA	65	-91.1908	41.1764	590	07/1898	12/2000	82	0.1857	0.1989	0.1932	1.13
13-8688	WASHINGTON	IA	65	-91.7069	41.2828	690	01/1893	12/2000	108	0.2095	0.2833	0.2030	0.19
13-8706	WATERLOO WSO AP	IA	62	-92.4011	42.5544	868	01/1895	12/2000	106	0.1968	0.2705	0.1998	0.04

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13-8742	WAUCOMA	IA	62	-92.0314	43.0567	1049	01/1955	12/2000	44	0.1917	0.2430	0.1532	0.11
13-8755	WAUKON	IA	62	-91.4764	43.2725	1280	01/1935	12/2000	64	0.1983	0.2681	0.1605	0.16
13-8771	WAVERLY	IA	62	-92.4667	42.7333	942	01/1896	08/1946	50	0.1520	0.2260	0.1559	2.14
13-9067	WILLIAMSBURG	IA	63	-92.0133	41.6714	850	01/1916	12/2000	84	0.2042	0.1854	0.1614	0.36
15-0063	ALBANY 4 N	KY	47	-85.1411	36.6897	930	01/1952	12/2000	47	0.1461	0.1183	0.1356	0.97
15-0155	ANCHORAGE	KY	46	-85.5333	38.2667	732	01/1901	12/1981	77	0.1832	0.3213	0.1945	0.71
15-0254	ASHLAND DAM 29	KY	31	-82.6133	38.4536	560	07/1887	12/2000	114	0.1457	0.2185	0.2152	0.59
15-0381	BARBOURVILLE WATER WOR	KY	32	-83.8819	36.8825	990	01/1949	12/2000	52	0.1525	0.1191	0.1252	0.34
15-0389	BARDSTOWN	KY	47	-85.4667	37.8000	640	01/1897	09/1950	50	0.1671	0.3188	0.2293	1.11
15-0397	BARDSTOWN 5 E	KY	47	-85.3847	37.8194	780	01/1951	12/2000	46	0.1560	0.2137	0.1325	0.47
15-0402	BARDWELL 2 E	KY	74	-88.9947	36.8828	410	01/1965	12/1999	35	0.1506	0.0913	0.1266	0.84
15-0422	BARREN RIVER RESERVOIR	KY	48	-86.1247	36.8978	620	01/1964	12/2000	37	0.1631	0.2322	0.1197	0.87
15-0450	HARLAN	KY	33	-83.3303	36.8583	1164	01/1949	12/2000	52	0.1546	0.1428	0.1557	0.96
15-0481	BEATYVILLE	KY	32	-83.7000	37.6000	650	01/1903	07/1933	31	0.1526	0.1852	0.0663	0.74
15-0490	BEAVER DAM	KY	61	-86.8764	37.4125	441	04/1903	12/2000	94	0.1668	0.1697	0.1372	0.53
15-0584	BELTON 6 SW	KY	61	-87.0500	37.1000	660	01/1949	12/1998	50	0.2167	0.3508	0.2098	1.55
15-0611	BENTON	KY	75	-88.3364	36.8581	365	01/1949	10/1998	49	0.1895	0.1469	0.1665	1.59
15-0630	BERNHEIM FOREST	KY	46	-85.6572	37.9161	550	05/1940	12/2000	55	0.1834	0.3065	0.1830	0.54
15-0757	BLANDVILLE_*	KY	74	-88.9667	36.9000	445	03/1894	12/1927	34	0.1495	-0.0043	0.0227	2.88
15-0904	BOWLING GREEN	KY	47	-86.4278	36.9983	481	01/1924	12/2000	72	0.1738	0.2381	0.2009	0.23
15-0909	BOWLING GREEN FAA AP	KY	47	-86.4239	36.9647	528	01/1893	12/2000	105	0.1732	0.2535	0.1402	0.47
15-0940	BRADFORDSVILLE	KY	47	-85.1517	37.4950	660	03/1962	12/2000	36	0.1428	0.1629	0.1254	0.92
15-0978	BRENT DAM 36	KY	45	-84.4167	39.0500	502	01/1926	12/1962	37	0.1949	0.2261	0.2097	1.19
15-1046	BROWNSVILLE LOCK 6	KY	47	-86.2667	37.2000	410	01/1917	08/1961	45	0.1613	0.1867	0.2487	1.68
15-1080	BUCKHORN	KY	32	-83.3833	37.3500	936	01/1961	10/1998	37	0.1765	0.1489	0.1116	0.71
15-1120	BURDINE 2 NE	KY	33	-82.5833	37.2167	1560	08/1948	10/1998	47	0.1702	0.3192	0.2170	0.60
15-1137	BURKESVILLE 2 W	KY	47	-85.4000	36.7833	600	01/1952	11/2000	49	0.1614	0.1550	0.1645	0.42
15-1156	BURNSIDE	KY	47	-84.6167	36.9833	712	01/1897	12/1952	54	0.1370	0.1959	0.0574	3.73
15-1206	CADIZ LOCK E	KY	61	-87.9667	36.7667	381	06/1902	12/1964	32	0.1787	0.1709	0.1293	0.24
15-1227	RUMSEY LOCK 2	KY	61	-87.2667	37.5317	402	01/1949	12/2000	52	0.1927	0.2762	0.2599	0.99
15-1256	CAMPBELLSVILLE 2 SSW	KY	47	-85.3667	37.3167	781	03/1945	12/1989	45	0.1807	0.1786	0.1688	0.73
15-1294	CANEYVILLE 1 W	KY	47	-86.5008	37.4183	580	01/1958	12/2000	42	0.1693	0.2152	0.1415	0.09

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
15-1345	CARROLLTON LOCK 1	KY	45	-85.1456	38.6583	450	01/1917	12/2000	84	0.1741	0.2056	0.1941	0.26
15-1576	CLAY CITY WATER WORKS	KY	32	-83.9333	37.8667	630	06/1955	12/2000	45	0.1589	0.1786	0.0420	1.15
15-1631	CLINTON 4 S	KY	74	-88.9608	36.6267	350	01/1949	10/1998	47	0.1710	0.1289	0.1554	0.61
15-1663	COBB	KY	61	-87.7678	36.9825	465	01/1958	12/2000	40	0.1667	0.3918	0.2579	2.97
15-1704	COLLEGE HILL LOCK 11	KY	32	-84.1000	37.7833	610	01/1924	12/1981	58	0.1438	0.2645	0.2432	1.33
15-1855	COVINGTON WSO AIRPORT	KY	45	-84.6717	39.0431	869	04/1947	12/2000	54	0.1754	0.2014	0.1253	0.30
15-1964	CUMBERLAND	KY	33	-83.0000	36.9667	1460	04/1962	12/2000	32	0.1701	0.1327	0.1578	0.97
15-1998	CYNTHIANA 2	KY	46	-84.3031	38.3769	700	01/1918	12/2000	80	0.1497	0.2119	0.1601	0.99
15-2040	DANVILLE	KY	32	-84.7708	37.6528	900	03/1933	12/2000	68	0.1574	0.2125	0.2122	0.28
15-2053	DAVELLA	KY	31	-82.6000	37.7833	725	01/1949	10/1998	47	0.1635	0.0982	0.0995	1.12
15-2072	DAWSON SPRINGS	KY	61	-87.6881	37.1594	460	03/1967	12/2000	33	0.1874	0.1842	0.1224	0.26
15-2180	DEWEY DAM	KY	31	-82.7333	37.7333	689	01/1952	12/2000	35	0.2025	0.3352	0.2892	2.24
15-2214	DIX DAM	KY	32	-84.7167	37.8000	870	01/1939	12/2000	62	0.1651	0.2344	0.1261	0.34
15-2358	DUNDEE	KY	61	-86.7769	37.5806	450	02/1941	12/2000	60	0.1738	0.1441	0.0951	0.49
15-2407	EARLINGTON	KY	61	-87.5167	37.2667	420	01/1893	09/1948	56	0.1830	0.3374	0.2318	0.87
15-2409	EASTERN KENTUCKY UNIV	KY	46	-84.3333	37.7500	1000	01/1897	12/2000	102	0.1516	0.2396	0.2746	2.24
15-2469	EDMONTON 3 W	KY	48	-85.6500	36.9833	780	01/1893	07/1977	63	0.1941	0.3408	0.2591	0.76
15-2500	ELIZABETHTWN KSP PST 4	KY	47	-85.8306	37.7117	780	01/1897	12/2000	100	0.1623	0.2161	0.1606	0.05
15-2528	ELKHORN CITY	KY	33	-82.3500	37.3000	900	01/1952	11/1998	38	0.1633	0.3752	0.2047	2.31
15-2548	ELKTON 3 E	KY	47	-87.1000	36.8000	665	01/1958	11/1998	41	0.1668	0.2577	0.2087	0.28
15-2698	EUBANK	KY	32	-84.6500	37.2667	1181	06/1893	12/1941	49	0.1640	0.0653	0.1343	1.32
15-2775	FALMOUTH	KY	46	-84.3250	38.6753	650	01/1889	12/2000	110	0.1783	0.2124	0.1803	0.13
15-2791	FARMERS 2 S	KY	31	-83.5500	38.1167	680	01/1906	12/2000	94	0.1514	0.1885	0.1292	0.28
15-2825	FISHTRAP RESERVOIR	KY	32	-82.4167	37.4333	718	01/1970	12/2000	31	0.1430	0.1663	0.0420	1.22
15-2903	FLEMINGSBURG 2 N	KY	46	-83.7333	38.4500	940	03/1925	12/2000	67	0.1663	0.2732	0.1914	0.53
15-2953	FORD LOCK 1O	KY	46	-84.2631	37.8953	557	01/1924	12/1980	57	0.1544	0.2178	0.2324	1.20
15-2961	FORDS FERRY DAM 5O	KY	61	-88.1000	37.4667	361	01/1897	12/1980	60	0.1922	0.2426	0.1734	0.02
15-3028	FRANKFORT LOCK 4	KY	46	-84.8817	38.2350	500	04/1895	12/2000	106	0.1612	0.1577	0.1094	1.06
15-3036	FRANKLIN 1 E	KY	47	-86.5681	36.7233	720	01/1893	12/2000	90	0.1944	0.1759	0.1452	1.62
15-3046	FREEBURN 2 SW	KY	31	-82.1667	37.5500	732	01/1952	12/1988	34	0.1508	0.1229	0.0637	1.01
15-3052	FRENCHBURG 1 SW	KY	32	-83.6667	37.9500	920	01/1942	12/2000	52	0.1372	0.2920	0.1917	1.75
15-3112	GAMALIEL	KY	47	-85.8000	36.6333	810	01/1957	12/2000	39	0.1589	0.1999	0.2860	2.78

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15-3194	GEORGETOWN WATER WORKS	KY	46	-84.5622	38.2103	888	01/1942	12/2000	56	0.1653	0.1872	0.1575	0.41
15-3203	GEST LOCK 3	KY	46	-84.8819	38.4169	490	01/1924	12/2000	77	0.2112	0.3601	0.2199	1.23
15-3223	GILBERTSVILLE KY DAM	KY	75	-88.2678	37.0147	360	01/1945	12/1999	50	0.2045	0.2439	0.1827	0.74
15-3241	GLASGOW	KY	47	-85.9000	36.9833	680	03/1921	11/1981	51	0.1593	0.2182	0.1818	0.12
15-3246	GLASGOW WKAY	KY	47	-85.9072	37.0014	770	04/1953	12/2000	47	0.1434	0.2001	0.2170	1.10
15-3252	GLENDALE	KY	47	-85.9067	37.6011	710	01/1952	12/2000	47	0.1855	0.1915	0.1247	0.68
15-3295	GOLDEN POND 8 N	KY	61	-88.0139	36.8964	400	04/1953	12/1999	47	0.1665	0.2050	0.0624	1.34
15-3358	GRANT DAM 38	KY	45	-84.8333	38.9833	502	01/1925	10/1962	38	0.1886	0.2488	0.1416	0.75
15-3391	GRAYSON 3 SW	KY	31	-82.9747	38.2922	700	02/1925	12/2000	58	0.1466	0.1147	0.1738	1.35
15-3398	GRAYSON RESERVOIR	KY	31	-82.9919	38.2525	715	07/1969	12/2000	32	0.1484	0.0670	0.1048	1.55
15-3430	GREENSBURG	KY	48	-85.5022	37.2592	590	01/1889	12/2000	112	0.1517	0.2630	0.1713	0.94
15-3443	GREENUP DAM 3O	KY	31	-82.8500	38.6167	541	01/1920	11/1998	46	0.1805	0.2313	0.1971	0.36
15-3451	GREENVILLE 2 W	KY	61	-87.2167	37.1833	550	01/1917	07/1985	64	0.2165	0.3129	0.2398	0.65
15-3652	HARTFORD 6 N	KY	61	-86.9000	37.5333	430	01/1939	10/1988	50	0.1567	0.2474	0.1400	0.94
15-3712	HAZARD STATE POLICE	KY	32	-83.1817	37.2472	1328	01/1914	12/2000	77	0.1492	0.1951	0.2120	0.44
15-3714	HAZARD WATERWORKS	KY	32	-83.1817	37.2472	880	02/1950	12/2000	51	0.1735	0.3125	0.1924	1.02
15-3741	HEIDELBERG	KY	32	-83.7667	37.5500	665	01/1924	12/2000	76	0.1513	0.2494	0.1645	0.43
15-3762	HENDERSON 7 SSW	KY	60	-87.6272	37.7661	430	01/1931	12/2000	70	0.1889	0.2556	0.1615	0.24
15-3816	HICKMAN 1 E	KY	74	-89.1667	36.5667	381	01/1951	12/1980	30	0.2174	0.1113	0.0626	3.54
15-3837	HIGH BRIDGE LOCK 7	KY	32	-84.7167	37.8167	540	05/1902	12/1995	91	0.1321	0.0827	0.0913	1.16
15-3929	HODGENVILLE-LINCOLN NP	KY	47	-85.7350	37.5317	788	08/1948	12/2000	38	0.1632	0.1987	0.0796	1.11
15-3994	HOPKINSVILLE	KY	61	-87.5206	36.8492	520	05/1896	12/2000	104	0.1631	0.2018	0.1504	0.57
15-4093	HYDEN	KY	32	-83.3667	37.1500	970	04/1940	12/2000	46	0.1667	0.3188	0.2094	1.12
15-4165	IRVINGTON	KY	47	-86.2833	37.8833	591	01/1898	12/1973	76	0.1763	0.2896	0.2119	0.55
15-4180	IVEL	KY	32	-82.6667	37.5667	656	01/1949	12/2000	40	0.1308	0.1520	0.1943	1.14
15-4196	JACKSON	KY	32	-83.3833	37.5500	745	01/1902	12/1983	62	0.1428	0.2704	0.2093	1.13
15-4255	JEREMIAH 1 S	KY	33	-82.9367	37.1617	1100	04/1940	12/2000	59	0.1945	0.3373	0.2484	1.11
15-4359	JUNCTION_CITY	KY	32	-84.7667	37.5833	323	01/1893	06/1931	38	0.1776	0.2274	0.1739	0.34
15-4369	KEENE 1 SSW	KY	46	-84.6597	37.9397	870	05/1941	12/2000	59	0.1635	0.1711	0.0937	1.23
15-4601	LAGRANGE STATE POLICE	KY	46	-85.4000	38.3833	850	04/1939	12/2000	52	0.1713	0.2573	0.1258	0.98
15-4620	LANCASTER	KY	32	-84.5706	37.6172	1020	01/1926	12/2000	72	0.1607	0.1757	0.1920	0.17
15-4703	LEITCHFIELD 2 N	KY	47	-86.2892	37.5108	620	01/1896	12/2000	105	0.1765	0.2304	0.1511	0.16

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
15-4746	LEXINGTON WSO AIRPORT	KY	46	-84.6058	38.0408	980	01/1897	12/2000	104	0.1923	0.2273	0.2167	0.50
15-4755	LIBERTY	KY	47	-84.9328	37.2508	870	04/1941	12/2000	59	0.1740	0.2253	0.1331	0.25
15-4825	LITTLE HICKMAN LOCK 8	KY	32	-84.5833	37.7500	522	01/1924	12/1981	58	0.1306	0.0909	0.1329	1.13
15-4848	LLOYD GREENUP DAM	KY	31	-82.8628	38.6439	537	01/1962	12/2000	39	0.1961	0.2527	0.1621	0.96
15-4857	LOCKPORT LOCK 2	KY	46	-84.9764	38.4333	490	01/1924	12/2000	77	0.2085	0.3827	0.1995	1.92
15-4893	LONDON 5 SSE	KY	32	-84.0833	37.1475	1282	01/1949	10/1998	42	0.1826	0.1118	0.2529	2.63
15-4898	LONDON FAA AIRPORT	KY	32	-84.0769	37.0872	1188	01/1955	12/2000	44	0.1512	0.1963	0.2284	0.59
15-4943	LOUISA LOCK 3	KY	31	-82.6167	38.1167	581	01/1913	09/1951	38	0.1527	0.1814	0.1034	0.56
15-4948	LOUISA 5 W	KY	31	-82.6947	38.1250	753	01/1939	12/2000	60	0.1610	0.2934	0.1661	1.22
15-4949	LOUISVILLE	KY	46	-85.7667	38.2333	462	01/1895	12/1981	87	0.1728	0.2459	0.1920	0.11
15-4954	LOUISVILLE WSO AIRPORT	KY	46	-85.7392	38.1811	488	01/1948	12/2000	53	0.2070	0.3617	0.2528	1.21
15-4955	LOUISVILLE UPPER GAGE	KY	46	-85.8000	38.2833	440	06/1948	12/2000	53	0.1929	0.2222	0.0983	1.20
15-4967	LOVELACEVILLE	KY	74	-88.8314	36.9692	370	04/1925	12/2000	75	0.1935	0.1945	0.1590	0.78
15-5002	LUCAS	KY	48	-86.0333	36.8833	741	04/1941	12/1976	32	0.1837	0.2842	0.2058	0.14
15-5067	MADISONVILLE	KY	61	-87.5244	37.3467	440	01/1947	12/2000	53	0.2244	0.2972	0.2738	1.18
15-5097	MAMMOTH CAVE PARK	KY	47	-86.0869	37.1828	790	01/1935	12/2000	66	0.1530	0.2225	0.2392	0.98
15-5111	MANCHESTER 4 W	KY	32	-83.8167	37.1500	870	01/1949	12/2000	52	0.1463	0.1650	0.0652	0.75
15-5150	MARION 1 NE	KY	61	-88.0658	37.3442	540	01/1905	12/2000	46	0.1681	0.0804	0.0601	1.34
15-5232	MAYFIELD 2 S	KY	75	-88.6333	36.7000	361	03/1902	12/1955	43	0.1498	0.1661	0.1492	1.19
15-5233	MAYFIELD RADIO WNGO	KY	75	-88.6406	36.7581	380	01/1944	10/2000	57	0.1794	0.2864	0.2232	0.44
15-5243	MAYSVILLE SEWAGE PLANT	KY	46	-83.7872	38.6869	515	02/1896	12/2000	103	0.1641	0.2272	0.2058	0.42
15-5389	MIDDLESBORO	KY	33	-83.7333	36.6333	1180	01/1893	12/2000	98	0.1683	0.2320	0.2137	0.03
15-5407	MIDWAY	KY	46	-84.6833	38.1500	771	01/1941	12/1977	37	0.1617	0.1656	0.0875	1.41
15-5438	MILLERSTOWN	KY	47	-86.0500	37.4500	600	04/1940	07/1985	45	0.1820	0.1607	0.2130	2.23
15-5524	MONTICELLO 3 NE	KY	47	-84.8275	36.8672	979	04/1936	12/2000	65	0.1721	0.1299	0.1037	0.80
15-5555	MOREHEAD 3 NW	KY	31	-83.4833	38.2167	830	01/1949	10/1998	45	0.1659	0.2588	0.2218	0.27
15-5640	MOUNT STERLING 1 NW	KY	46	-83.9333	38.0583	960	01/1893	12/2000	99	0.1577	0.2243	0.1744	0.57
15-5648	MOUNT VERNON	KY	32	-84.3333	37.3500	1160	01/1939	12/2000	52	0.1368	0.1958	0.2018	0.83
15-5684	MUNFORDVILLE 7 NW	KY	47	-85.9503	37.3347	680	01/1925	12/2000	63	0.1626	0.1742	0.1152	0.27
15-5694	MURRAY	KY	75	-88.3081	36.6125	527	04/1926	12/2000	71	0.1647	0.1941	0.1693	0.34
15-5834	NOLIN LAKE RESERVOIR	KY	47	-86.2492	37.2792	680	04/1964	12/2000	37	0.1857	0.3030	0.1418	1.48
15-6028	ONEIDA	KY	32	-83.6500	37.2667	760	01/1958	12/2000	43	0.1334	0.1894	0.1339	0.75

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
15-6033	ONEONTA DAM 35	KY	46	-84.3000	38.9667	512	01/1922	12/1962	41	0.1973	0.2585	0.2494	0.82
15-6091	OWENSBORO 3 W	KY	61	-87.1500	37.7667	405	01/1897	10/1998	100	0.1716	0.2196	0.1275	0.24
15-6094	OWENSBORO 3 E	KY	61	-87.0664	37.7908	400	01/1928	12/2000	65	0.1645	0.1353	0.0397	1.20
15-6110	PADUCAH WSO	KY	74	-88.7742	37.0564	413	01/1950	12/2000	51	0.1820	0.2048	0.1794	0.62
15-6115	PADUCAH 5 FIRE STN	KY	75	-88.6167	37.1000	341	01/1893	12/1969	75	0.1867	0.2428	0.1756	0.05
15-6136	PAINTSVILLE 1 E	KY	31	-82.7833	37.8167	630	01/1933	12/2000	66	0.1809	0.2207	0.1122	0.78
15-6155	PARADISE STEAM PLANT	KY	61	-86.9778	37.2592	402	01/1961	12/2000	40	0.2124	0.2336	0.1372	1.31
15-6357	PIKEVILLE W Z L K	KY	32	-82.5167	37.4833	685	01/1900	12/1998	84	0.1885	0.2318	0.1932	0.84
15-6384	PINEVILLE	KY	33	-83.7100	36.7650	1005	03/1940	12/1998	35	0.1798	0.2918	0.1861	0.79
15-6580	PRINCETON EXP STN	KY	61	-87.8672	37.1244	497	01/1897	12/2000	91	0.1795	0.1575	0.0857	0.57
15-6624	QUICKSAND	KY	32	-83.3667	37.5333	840	01/1926	12/2000	31	0.1687	0.1847	0.1550	0.11
15-6679	RAVENNA LOCK 12	KY	32	-83.9500	37.6667	630	01/1924	12/1980	57	0.1673	0.2059	0.1682	0.07
15-6882	ROCHESTER FERRY	KY	61	-86.8939	37.2164	410	02/1954	12/2000	45	0.2200	0.3248	0.2040	1.36
15-6988	ROUGH RIVER DAM	KY	47	-86.5044	37.6178	560	04/1962	12/2000	39	0.1946	0.2770	0.1590	1.15
15-7039	RUMSEY LOCK 2	KY	61	-87.2667	37.5333	381	06/1903	09/1956	54	0.1639	0.2912	0.1323	1.42
15-7049	RUSSELLVILLE	KY	61	-86.8883	36.8550	570	01/1917	12/2000	74	0.2047	0.2858	0.1683	0.73
15-7074	SADIEVILLE WATER WORKS	KY	46	-84.6836	38.4078	945	01/1949	10/1998	49	0.1706	0.2183	0.2655	1.55
15-7121	SALVISA LOCK 6	KY	46	-84.8167	37.9333	489	01/1924	12/1980	57	0.1668	0.1534	0.1497	0.80
15-7129	SALYERSVILLE 1 W	KY	32	-83.0833	37.7500	910	01/1949	12/1993	42	0.1823	0.1964	0.2071	0.71
15-7134	SALYERSVILLE	KY	32	-83.0167	37.7333	920	01/1953	12/1998	46	0.1871	0.3392	0.1602	1.99
15-7211	SCOTT_*	KY	45	-84.5500	38.9667	900	06/1897	12/1930	34	0.1252	0.1035	0.1602	2.06
15-7215	SCOTTSVILLE	KY	48	-86.2258	36.7458	774	01/1946	12/2000	55	0.1509	0.3631	0.3572	1.59
15-7234	SEBREE 1 E	KY	61	-87.5222	37.6031	480	04/1943	12/2000	57	0.1574	0.2261	0.1489	0.81
15-7324	SHELBYVILLE 1 E	KY	46	-85.2000	38.2000	730	01/1893	12/2000	108	0.1854	0.2767	0.1606	0.33
15-7334	SHEPHERDSVILLE	KY	46	-85.6242	38.0544	580	01/1937	12/2000	56	0.2017	0.2651	0.2400	0.71
15-7473	SMITHFIELD 4 S	KY	46	-85.2861	38.3333	850	01/1949	10/1998	50	0.1998	0.4541	0.3316	4.41
15-7510	SOMERSET 2 N	KY	47	-84.6167	37.1167	1050	01/1943	12/2000	58	0.1827	0.3086	0.1980	0.88
15-7604	SPRINGFIELD	KY	47	-85.2342	37.6939	760	01/1940	12/2000	61	0.1783	0.2464	0.1253	0.62
15-7677	STEARNS 2 S	KY	47	-84.4833	36.6667	1220	05/1936	12/2000	52	0.1128	0.1502	0.1577	3.90
15-7800	SUMMER SHADE	KY	48	-85.7067	36.8861	864	01/1949	12/2000	52	0.1706	0.3289	0.1939	0.63
15-7948	TAYLORSVILLE	KY	46	-85.3714	38.0144	500	04/1902	12/2000	87	0.1758	0.2501	0.1668	0.15
15-8070	TOMPKINSVILLE 9 NW	KY	47	-85.7081	36.8136	1060	01/1947	12/2000	44	0.1702	0.2309	0.2230	0.51

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15-8179	TYRONE LOCK 5	KY	46	-84.8500	38.0333	522	01/1924	10/1981	58	0.1662	0.2115	0.1809	0.27
15-8246	VALLEY VIEW LOCK 9	KY	46	-84.4500	37.8500	571	01/1924	12/1980	57	0.1666	0.2026	0.1868	0.34
15-8259	VANCEBURG	KY	31	-83.3333	38.5833	522	05/1896	12/1980	67	0.1572	0.1450	0.1796	0.81
15-8446	WARSAW MARKLAND DAM	KY	45	-84.9672	38.7744	466	01/1901	12/2000	100	0.1785	0.2722	0.1325	1.65
15-8486	WAYNESBURG 7 NE	KY	32	-84.6000	37.4167	1260	05/1941	12/1998	58	0.1989	0.2944	0.2601	2.04
15-8551	WEST LIBERTY	KY	32	-83.2667	37.9167	830	01/1941	12/2000	59	0.1615	0.2913	0.2234	0.83
15-8709	WILLIAMSBURG	KY	47	-84.1500	36.7333	940	01/1897	12/2000	103	0.1572	0.2096	0.1812	0.17
15-8714	WILLIAMSTOWN 5 WSW	KY	46	-84.6106	38.6586	940	05/1902	12/2000	99	0.1830	0.2272	0.1020	1.01
15-8724	WILLOW LOCK 13	KY	32	-83.8333	37.6000	650	01/1924	12/1980	57	0.1632	0.1712	0.0768	0.58
15-8824	WOODBURY	KY	47	-86.6353	37.1842	465	02/1917	12/1999	83	0.1803	0.2788	0.1886	0.46
18-0015	ABERDEEN PHILLIPS FLD	MD	8	-76.1697	39.4717	57	06/1919	12/2000	74	0.2278	0.3589	0.1739	1.32
18-0185	ANNAPOLIS US NAVAL ACA	MD	1	-76.4833	38.9833	10	01/1897	12/1975	70	0.2286	0.4019	0.2692	0.69
18-0193	ANNAPOLIS POLICE BRKS	MD	1	-76.5075	38.9936	25	04/1951	12/2000	42	0.2268	0.4409	0.2695	1.52
18-0335	ASSATEAGUE IS NATL SEA	MD	1	-75.2128	38.0722	10	01/1969	12/2000	31	0.2193	0.3819	0.2671	0.51
18-0465	BALTIMORE WSO ARPT	MD	8	-76.6833	39.1667	156	07/1945	12/2000	56	0.1866	0.2337	0.1592	0.40
18-0470	BALTIMORE WSO CITY	MD	8	-76.6167	39.2833	14	01/1893	12/2000	105	0.2103	0.1962	0.1210	0.97
18-0700	BELTSVILLE	MD	8	-76.9314	39.0303	145	05/1941	12/2000	58	0.2268	0.3290	0.1913	0.34
18-0705	BELTSVILLE PLANT STN 5	MD	8	-76.9500	39.0167	98	01/1949	09/1978	30	0.2100	0.3720	0.2046	1.17
18-0732	BENSON POLICE BARRACKS	MD	8	-76.3833	39.5000	365	04/1892	12/1994	103	0.1764	0.2976	0.1878	1.24
18-0915	BLACKWATER REFUGE	MD	1	-76.1333	38.4333	10	08/1941	11/1976	34	0.2633	0.3590	0.2128	1.47
18-1032	BOYDS 2 NW	MD	8	-77.3333	39.2167	580	01/1920	12/1990	67	0.1970	0.3415	0.2320	0.43
18-1125	BRIGHTON DAM	MD	8	-77.0097	39.1911	330	08/1948	12/1990	43	0.2080	0.3271	0.2690	0.52
18-1385	CAMBRIDGE WATER TRMT P	MD	1	-76.0667	38.5667	10	01/1893	12/1990	89	0.2115	0.2643	0.2190	0.30
18-1530	CATOCTIN MOUNTAIN PARK	MD	18	-77.4831	39.6453	1610	01/1968	12/2000	33	0.1916	0.2462	0.1778	0.02
18-1627	CENTREVILLE	MD	1	-76.0667	39.0500	59	02/1953	09/1985	33	0.2375	0.2371	0.0837	1.60
18-1710	CHELTENHAM 1 NW	MD	1	-76.8500	38.7333	230	05/1901	09/1956	56	0.2650	0.3639	0.2799	1.67
18-1750	CHESTERTOWN	MD	1	-76.0519	39.2167	40	01/1894	12/2000	84	0.2109	0.3119	0.2582	0.41
18-1790	CHEWSVILLE-BRIDGEPOR	MD	19	-77.6667	39.6500	571	01/1899	12/1972	74	0.1725	0.2747	0.2383	0.46
18-1862	CLARKSVILLE 3 NNE	MD	8	-76.9286	39.2553	370	01/1968	12/2000	31	0.2024	0.4297	0.3653	1.96
18-1890	CLEAR SPRING 1 ENE	MD	19	-77.9000	39.6667	581	01/1899	12/1960	47	0.2266	0.2553	0.1825	1.69
18-1980	COLEMAN 3 WNW	MD	1	-76.1333	39.3500	79	01/1899	09/1971	70	0.1843	0.1867	0.1060	0.82
18-1995	COLLEGE PARK	MD	8	-76.9500	38.9833	90	01/1894	12/1995	101	0.1979	0.2671	0.1634	0.16

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18-2060	CONOWINGO DAM	MD	8	-76.1756	39.6558	40	01/1936	12/2000	57	0.2040	0.2508	0.2412	1.79
18-2215	CRISFIELD SOMERS COVE	MD	1	-75.8667	37.9833	8	01/1939	12/1990	49	0.1901	0.1799	0.1022	0.72
18-2282	CUMBERLAND 2	MD	19	-78.7556	39.6417	730	07/1891	12/2000	110	0.1801	0.2185	0.1690	0.05
18-2325	DALECARLIA RESVR DC	MD	8	-77.1131	38.9400	150	08/1945	12/2000	56	0.1938	0.2685	0.1517	0.39
18-2523	DENTON 2 E	MD	1	-75.8000	38.8833	49	01/1894	12/1988	72	0.2028	0.3303	0.2603	0.51
18-2700	EASTON POLICE BARRACKS	MD	1	-76.0669	38.7428	40	04/1892	09/1977	86	0.2254	0.3286	0.1835	0.41
18-2770	EDGEMONT	MD	18	-77.5500	39.6667	905	01/1939	09/1995	57	0.2166	0.3163	0.1731	0.52
18-2860	ELKTON	MD	7	-75.8333	39.6167	39	07/1927	10/1976	50	0.1986	0.1059	0.0893	1.83
18-2905	EMMITSBURG	MD	18	-77.3500	39.6833	722	01/1893	12/1955	49	0.1705	0.1809	0.0387	1.60
18-2906	EMMITSBURG 2 SE	MD	8	-77.2903	39.6811	416	05/1956	12/2000	45	0.2265	0.4028	0.2773	0.46
18-3230	FORT GEORGE G MEADE	MD	8	-76.7500	39.1000	141	02/1942	08/1975	34	0.2348	0.2044	0.0574	2.60
18-3348	FREDERICK POLICE BRKS	MD	8	-77.4389	39.4161	380	04/1892	12/2000	98	0.1718	0.2336	0.1610	0.95
18-3355	FREDERICK 3 E	MD	8	-77.3667	39.4000	385	01/1949	12/1989	41	0.2376	0.3625	0.2177	0.60
18-3415	FROSTBURG 2	MD	20	-78.9333	39.6667	2170	01/1939	12/2000	61	0.2145	0.2620	0.1289	1.63
18-3675	GLENN DALE BELL STN	MD	8	-76.8033	38.9692	150	01/1921	12/2000	80	0.2041	0.1961	0.1227	0.77
18-3795	GRANTSVILLE	MD	20	-79.1500	39.7000	2382	01/1895	09/1971	69	0.1910	0.2987	0.2230	0.03
18-3855	GREAT FALLS	MD	8	-77.2500	39.0000	200	04/1892	09/1950	57	0.1917	0.3237	0.2359	0.44
18-3975	HAGERSTOWN	MD	19	-77.7333	39.6500	660	01/1948	10/1993	46	0.2184	0.3400	0.1936	1.08
18-4030	HANCOCK	MD	19	-78.1775	39.6969	384	01/1921	12/1997	77	0.1863	0.2596	0.1600	0.07
18-4780	KEEDYSVILLE	MD	19	-77.7000	39.4833	420	01/1905	12/1959	55	0.1972	0.2538	0.1240	0.37
18-5080	LA PLATA 1 W	MD	1	-77.0000	38.5333	140	01/1920	08/1998	75	0.2259	0.3937	0.2012	1.52
18-5111	LAUREL 3 W	MD	8	-76.9003	39.0847	400	04/1895	12/2000	102	0.1742	0.1828	0.0961	1.12
18-5865	MECHANICSVILLE 5 NE	MD	1	-76.6992	38.4617	100	01/1939	12/2000	56	0.2142	0.1834	0.1234	0.62
18-5894	MERRILL	MD	20	-79.0833	39.6000	1790	05/1951	12/1995	45	0.1794	0.2982	0.2386	0.10
18-5985	MILLINGTON 1 SE	MD	1	-75.8700	39.2739	30	01/1899	12/2000	97	0.2278	0.3784	0.2378	0.52
18-6350	NATIONAL ARBORETUM DC	MD	8	-76.9700	38.9133	50	08/1948	12/2000	53	0.2160	0.2315	0.1370	0.60
18-6620	OAKLAND 1 SE	MD	20	-79.3950	39.3983	2420	05/1893	12/2000	100	0.1827	0.2389	0.1487	0.49
18-6770	OWINGS FERRY LANDING	MD	1	-76.6667	38.6833	160	01/1917	12/1997	79	0.2146	0.3128	0.1564	0.67
18-6844	PARKTON 2 SW	MD	8	-76.7000	39.6333	600	01/1931	12/1986	54	0.2205	0.2751	0.1803	0.31
18-6980	PERRY POINT	MD	8	-76.0667	39.5500	39	08/1936	12/1978	43	0.2064	0.2606	0.1554	0.15
18-7010	PICARDY	MD	19	-78.5167	39.5500	1030	04/1927	12/1972	44	0.1868	0.2782	0.2281	0.30
18-7140	POCOMOKE CITY	MD	1	-75.5500	38.0667	20	04/1894	12/1978	62	0.2113	0.3348	0.2693	0.45

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
18-7272	POTOMAC FILTER PLANT	MD	8	-77.2542	39.0400	270	04/1962	12/2000	39	0.2035	0.3434	0.2705	0.40
18-7325	PRINCE FREDERICK 1 N	MD	1	-76.5833	38.5500	141	01/1939	12/1976	37	0.2270	0.2342	0.1500	0.37
18-7330	PRINCESS ANNE	MD	1	-75.6822	38.2122	20	07/1894	12/2000	102	0.2231	0.2983	0.1975	0.04
18-7700	ROCK HALL	MD	1	-76.2333	39.1333	20	01/1921	12/1966	45	0.1916	0.2544	0.2150	0.61
18-7705	ROCKVILLE 1 NE	MD	8	-77.1486	39.1008	440	01/1908	12/2000	64	0.2105	0.2791	0.1760	0.07
18-7806	ROYAL OAK 2 SSW	MD	1	-76.1897	38.7144	10	08/1948	12/2000	53	0.2109	0.2903	0.2216	0.11
18-8000	SALISBURY	MD	1	-75.5892	38.3650	10	04/1906	12/2000	93	0.2439	0.2967	0.1440	1.05
18-8005	SALISBURY FAA ARPT	MD	1	-75.5103	38.3406	48	07/1948	12/2000	53	0.1592	0.1184	0.0902	2.29
18-8065	SAVAGE RIVER DAM	MD	20	-79.1400	39.5103	1495	01/1947	12/2000	54	0.2328	0.3315	0.2416	1.06
18-8315	SINES DEEP CREEK	MD	31	-79.4117	39.5242	2040	01/1929	10/1985	56	0.2063	0.3672	0.2152	2.39
18-8380	SNOW HILL 4 N	MD	1	-75.3789	38.2364	30	03/1916	12/2000	82	0.2149	0.2545	0.1702	0.06
18-8405	SOLOMONS	MD	1	-76.4536	38.3186	12	04/1892	12/1983	92	0.2462	0.3356	0.2158	0.57
18-8720	TAKOMA PARK BALT AVE	MD	8	-77.0167	38.9833	322	01/1900	12/1948	46	0.1796	0.2573	0.1672	0.66
18-8855	TONOLOWAY	MD	19	-78.2500	39.6667	551	05/1924	12/1956	33	0.1911	0.2852	0.2134	0.21
18-8877	TOWSON	MD	8	-76.5667	39.3833	390	07/1907	12/1995	76	0.2467	0.4539	0.2530	2.14
18-9030	UNIONVILLE	MD	8	-77.1833	39.4500	430	07/1940	11/1996	57	0.2373	0.3851	0.2906	0.77
18-9035	U S SOLDIERS HOME DC	MD	8	-77.0167	38.9333	230	08/1948	12/1977	30	0.2430	0.2939	0.1372	1.54
18-9070	UPPER MARLBORO 3 NNW	MD	8	-76.7767	38.8653	100	05/1956	12/2000	43	0.2030	0.2263	0.0797	1.20
18-9140	VIENNA	MD	1	-75.8211	38.4875	10	07/1949	12/2000	52	0.2141	0.2869	0.1172	1.12
18-9409	WESTERNPORT UPRC	MD	20	-79.0500	39.4833	951	01/1895	12/1975	81	0.1880	0.3935	0.2676	1.14
18-9440	WESTMINSTER POLICE BRK	MD	8	-76.9667	39.5500	765	01/1939	12/1998	59	0.2381	0.3926	0.2752	0.59
18-9570	WILLIAMSPORT	MD	19	-77.8358	39.6039	360	01/1939	12/1975	36	0.1892	0.0833	0.0626	1.66
18-9750	WOODSTOCK	MD	8	-76.8667	39.3333	460	01/1893	10/1999	105	0.1707	0.1981	0.1298	1.06
20-0032	ADRIAN 2 NNE	MI	52	-84.0158	41.9164	760	07/1887	12/2000	112	0.1702	0.2373	0.1820	0.54
20-0094	ALBION	MI	52	-84.7731	42.2469	940	01/1915	12/2000	84	0.1867	0.1914	0.1574	0.08
20-0128	ALLEGAN 5 NE	MI	50	-85.7894	42.5797	750	01/1889	12/2000	107	0.2055	0.2886	0.2323	0.86
20-0146	ALMA	MI	49	-84.6667	43.3833	760	06/1887	12/2000	113	0.1887	0.3861	0.3292	1.14
20-0230	ANN ARBOR UNIV OF MICH	MI	52	-83.7108	42.2947	900	01/1880	12/2000	120	0.1666	0.2326	0.1845	0.71
20-0552	BATTLE CREEK 5 NW	MI	52	-85.2631	42.3678	930	01/1895	12/2000	105	0.1727	0.1595	0.1600	0.46
20-0710	BENTON HARBOR ARPT	MI	51	-86.4222	42.1292	628	06/1887	12/2000	111	0.1783	0.2771	0.2659	1.69
20-0735	BERRIEN SPRINGS 5 W	MI	51	-86.4369	41.9647	750	01/1948	11/1996	49	0.2148	0.2004	0.1158	0.74
20-0864	BLOOMINGDALE	MI	50	-85.9625	42.3842	725	04/1904	12/2000	93	0.2115	0.3504	0.2752	0.55

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
20-1299	CARO REGIONAL CENTER	MI	49	-83.3919	43.4839	690	01/1928	12/1995	68	0.1989	0.2689	0.2898	0.59
20-1476	CHARLOTTE	MI	52	-84.8258	42.5503	902	01/1902	12/2000	98	0.1619	0.1558	0.1143	0.71
20-1675	COLDWATER ST SCHOOL	MI	52	-84.9925	41.9622	984	03/1897	12/2000	104	0.1984	0.2725	0.1703	0.39
20-1680	COLDWATER WATER WORKS	MI	52	-85.0183	41.9400	950	01/1948	12/1997	44	0.2237	0.3258	0.2333	1.77
20-1704	COLOMA 3 NNW	MI	51	-86.3167	42.2333	700	07/1948	12/1995	44	0.2090	0.1819	0.1369	0.57
20-2015	DEARBORN	MI	41	-83.2314	42.3167	605	01/1953	12/2000	47	0.1558	0.2776	0.2273	1.97
20-2102	DETROIT CITY AIRPORT	MI	41	-83.0083	42.4072	625	01/1939	12/1974	35	0.1896	0.1506	0.1521	0.84
20-2103	DETROIT METRO WSO AP	MI	41	-83.3308	42.2314	631	03/1897	12/2000	98	0.1906	0.2770	0.2365	0.44
20-2250	DOWAGIAC 1 W	MI	52	-86.1317	41.9844	740	06/1939	12/2000	62	0.1857	0.3190	0.1651	1.78
20-2392	E_Lansing_MAC(MSU)	MI	52	-84.2800	42.4400	0	04/1863	12/1909	47	0.2026	0.1928	0.1570	0.63
20-2395	EAST LANSING 4 S	MI	52	-84.4850	42.6742	880	05/1910	12/2000	90	0.1609	0.1558	0.1051	0.83
20-2437	EATON RAPIDS HAMLIN BR	MI	52	-84.6500	42.5167	870	01/1942	12/2000	58	0.1629	0.1506	0.1555	0.80
20-2445	EAU CLAIRE 4 NE	MI	52	-86.2419	42.0136	870	05/1924	12/2000	77	0.1786	0.2790	0.1936	0.65
20-2846	FLINT WSO AP	MI	52	-83.7494	42.9667	770	01/1893	12/2000	107	0.2037	0.2939	0.2363	0.72
20-3290	GRAND HAVEN FIRE DEPT	MI	51	-86.2244	43.0622	620	01/1933	12/2000	65	0.1985	0.2851	0.2119	0.32
20-3295	GRAND HAVEN WASTEWTR P	MI	51	-86.2047	43.0608	605	07/1948	10/1998	47	0.2243	0.2951	0.2362	0.27
20-3306	GRAND LEDGE 1NW	MI	52	-84.7622	42.7631	800	01/1942	12/1999	57	0.1825	0.2765	0.1922	0.46
20-3333	GRAND RAPIDS WSO ARPT	MI	52	-85.5239	42.8825	803	01/1948	12/2000	52	0.1881	0.1590	0.0567	1.27
20-3429	GREENVILLE	MI	52	-85.2422	43.2025	882	01/1913	12/2000	85	0.1984	0.3106	0.2252	0.66
20-3477	GROSSE POINTE FARMS	MI	41	-82.8892	42.4078	613	01/1948	12/2000	53	0.2045	0.2875	0.1661	0.56
20-3504	GULL LAKE EXPERIMENT F	MI	52	-85.3847	42.3942	910	04/1929	12/2000	72	0.1688	0.2386	0.1991	0.70
20-3661	HASTINGS	MI	52	-85.2833	42.6500	820	01/1889	12/2000	102	0.1803	0.2067	0.1727	0.08
20-3823	HILLSDALE	MI	52	-84.6411	41.9353	1080	01/1892	12/2000	106	0.1934	0.2321	0.2519	1.41
20-3858	HOLLAND HOPE COLLEGE	MI	51	-86.1167	42.7833	610	06/1905	12/2000	95	0.1938	0.2638	0.2287	0.39
20-3947	HOWELL WWTP	MI	52	-83.9322	42.5936	917	01/1892	12/2000	95	0.1834	0.1936	0.1400	0.04
20-4078	IONIA 1 WNW	MI	52	-85.0778	42.9531	805	01/1939	12/2000	58	0.2063	0.2157	0.1162	0.93
20-4150	JACKSON FAA ARPT	MI	52	-84.4594	42.2597	998	03/1897	12/2000	104	0.1638	0.2201	0.1733	0.77
20-4155	JACKSON 4 N	MI	52	-84.4167	42.2833	950	07/1948	10/1998	48	0.1770	0.2588	0.2417	0.95
20-4244	KALAMAZOO STATE HOSP	MI	52	-85.6000	42.2833	950	01/1892	12/1994	100	0.1915	0.2645	0.2436	0.73
20-4320	KENT CITY 2 SW	MI	50	-85.7717	43.1994	840	06/1919	12/2000	81	0.2338	0.3851	0.2811	0.68
20-4641	LANSING WSO AIRPORT	MI	52	-84.5789	42.7803	841	01/1948	12/2000	48	0.1848	0.3025	0.2663	1.24
20-4655	LAPEER	MI	52	-83.3075	43.0608	820	02/1916	12/2000	84	0.1696	0.3037	0.2345	1.69

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
20-4944	LOWELL	MI	52	-85.3394	42.9289	640	05/1915	12/2000	80	0.1809	0.2129	0.1693	0.05
20-5450	MILAN 4 ESE	MI	52	-83.6186	42.0664	670	03/1945	12/2000	55	0.1658	0.2548	0.1785	1.07
20-5452	MILFORD GM PROVING GRO	MI	52	-83.6844	42.5794	990	01/1931	12/2000	69	0.2168	0.2938	0.2160	1.14
20-5488	MILLINGTON 3 SW	MI	49	-83.4792	43.2836	820	01/1941	12/2000	60	0.2014	0.3532	0.3547	0.51
20-5558	MONROE WATERWORKS	MI	41	-83.3942	41.9139	590	03/1917	12/2000	83	0.1668	0.1795	0.1916	0.70
20-5567	MONTAGUE 4 NW	MI	51	-86.4175	43.4614	650	01/1950	12/2000	49	0.2141	0.2621	0.2177	0.17
20-5569	MONTAGUE 2 N	MI	51	-86.3500	43.4500	669	07/1948	12/1977	30	0.2080	0.2679	0.1257	2.05
20-5712	MUSKEGON WSO AIRPORT	MI	51	-86.2367	43.1711	625	06/1896	12/2000	105	0.2216	0.2996	0.1829	0.74
20-5803	NEWAYGO HARDY DAM	MI	52	-85.6333	43.4833	761	01/1908	10/1974	67	0.1835	0.1593	0.0748	0.78
20-5807	NEW BALTIMORE 5 SW	MI	41	-82.8044	42.6503	570	01/1897	12/2000	100	0.1987	0.2646	0.1707	0.20
20-5892	NILES 1 NW	MI	52	-86.2658	41.8406	650	01/1948	12/2000	53	0.1992	0.2292	0.1043	0.99
20-6300	OWOSSO 3 NNW	MI	52	-84.1800	43.0161	730	01/1896	12/2000	103	0.1888	0.2144	0.2194	0.72
20-6303	OXFORD	MI	52	-83.2569	42.8094	1040	01/1896	12/2000	69	0.1999	0.3156	0.2513	0.91
20-6404	PAW PAW	MI	50	-85.9000	42.2167	712	01/1925	12/1964	30	0.1946	0.3466	0.2009	1.19
20-6658	PONTIAC STATE HOSPITAL	MI	52	-83.2556	42.6389	890	06/1894	09/1998	96	0.2089	0.2185	0.1600	0.76
20-6680	PORT HURON SEWAGE PLAN	MI	41	-82.4194	42.9750	590	01/1931	12/2000	69	0.1649	0.2784	0.1594	2.06
20-7097	ROMEO 5 W	MI	52	-83.0167	42.8167	801	01/1942	12/1973	32	0.1775	0.0782	0.0312	1.83
20-7217	SAGINAW CONSUMERS PWR	MI	49	-83.9667	43.4500	600	03/1955	09/1987	33	0.2570	0.4211	0.2774	1.45
20-7253	ST CHARLES	MI	49	-84.1667	43.3000	600	01/1944	12/1996	50	0.2040	0.2146	0.1561	1.82
20-7280	ST JOHNS	MI	52	-84.5542	43.0114	743	01/1939	12/2000	62	0.2159	0.3206	0.2661	1.65
20-7350	SANDUSKY	MI	49	-82.8192	43.4194	774	02/1909	12/2000	71	0.1887	0.3201	0.3229	0.34
20-7690	SOUTH HAVEN	MI	51	-86.2833	42.4000	620	01/1896	12/1998	103	0.1984	0.2850	0.2143	0.31
20-8184	THREE RIVERS	MI	52	-85.6336	41.9422	810	01/1939	12/2000	62	0.1678	0.1753	0.1150	0.50
20-9006	WILLIAMSTON	MI	52	-84.2503	42.7103	895	02/1943	12/2000	50	0.1789	0.2119	0.1658	0.07
20-9188	YALE	MI	52	-82.8028	43.1439	820	01/1939	12/2000	59	0.1849	0.2715	0.1369	1.04
20-9218	YPSILANTI	MI	52	-83.6253	42.2475	780	01/1892	12/2000	80	0.2035	0.3501	0.2486	1.31
22-0008	ABBEVILLE	MS	77	-89.5008	34.5011	406	01/1943	12/2000	56	0.1669	0.1822	0.1506	0.52
22-0021	ABERDEEN	MS	77	-88.5214	33.8297	198	01/1894	12/2000	105	0.1728	0.1900	0.1829	0.35
22-0039	ACKERMAN	MS	79	-89.1625	33.3050	552	02/1940	12/2000	61	0.2412	0.3499	0.1776	1.88
22-0237	ARKABUTLA DAM	MS	76	-90.1336	34.7497	240	01/1948	12/2000	53	0.1574	0.1011	0.1354	0.58
22-0290	ASHLAND 2 SW	MS	76	-89.1767	34.8328	640	01/1943	12/2000	58	0.1453	0.1050	0.0979	0.40
22-0378	BALDWYN	MS	77	-88.6394	34.4833	360	02/1940	12/2000	60	0.1815	0.2366	0.1446	0.34

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22-0488	BATESVILLE 2 SW	MS	77	-89.9806	34.3061	220	02/1891	12/2000	110	0.1816	0.2634	0.1953	0.39
22-0656	BELMONT	MS	77	-88.1994	34.4772	612	05/1943	12/1998	35	0.2113	0.3941	0.3055	5.67
22-0660	BELZONI	MS	78	-90.4836	33.1978	110	04/1930	12/2000	71	0.1860	0.1784	0.1312	0.18
22-0841	BLACK HAWK	MS	78	-90.0167	33.3333	259	02/1954	12/1987	34	0.1535	0.1037	0.1453	1.16
22-0891	BLUFF LAKE	MS	79	-88.7931	33.2781	230	01/1942	12/2000	59	0.2027	0.2958	0.2032	0.10
22-0955	BOONEVILLE	MS	76	-88.5700	34.6686	490	01/1896	12/2000	104	0.1763	0.2485	0.1727	0.52
22-1111	BROOKSVILLE EXP STN	MS	79	-88.5636	33.2597	292	01/1949	12/2000	52	0.1889	0.2778	0.2011	0.34
22-1152	BRUCE 2 W	MS	77	-89.3736	33.9917	270	05/1946	12/2000	55	0.1973	0.1595	0.1380	0.87
22-1262	BYHALIA	MS	76	-89.6833	34.8667	320	05/1909	12/1995	52	0.1607	0.1524	0.0711	0.67
22-1314	CALHOUN CITY 2 NW	MS	77	-89.3158	33.8586	255	01/1944	12/2000	57	0.2017	0.1667	0.0882	1.94
22-1460	CARROLLTON	MS	77	-89.8256	33.5322	300	03/1945	09/1997	51	0.2074	0.2545	0.1581	0.72
22-1606	CHARLESTON 1 N	MS	77	-90.0681	34.0039	180	01/1910	11/2000	67	0.1741	0.2005	0.1872	0.29
22-1707	CLARKSDALE	MS	74	-90.5572	34.1864	173	01/1917	12/2000	84	0.1773	0.1427	0.1012	0.12
22-1738	CLEVELAND	MS	74	-90.7333	33.7333	140	01/1912	12/1988	75	0.1721	0.1936	0.0789	1.27
22-1743	CLEVELAND 3 N	MS	74	-90.7128	33.7942	140	04/1956	12/2000	45	0.1848	0.1979	0.0856	1.05
22-1804	COFFEEVILLE	MS	77	-89.6714	33.9803	241	01/1944	12/2000	57	0.1876	0.2870	0.1742	0.72
22-1880	COLUMBUS LUXAPALLILA	MS	A2	-88.3856	33.4686	145	4/1897	12/2000	104	0.2180	0.3421	0.2648	1.00
22-1962	CORINTH CITY	MS	76	-88.5228	34.9175	385	01/1899	12/2000	101	0.1638	0.2803	0.1617	2.12
22-2046	CRAWFORD 5 W	MS	79	-88.7061	33.2783	253	03/1940	12/2000	61	0.1767	0.3154	0.2392	1.87
22-2160	DANCY	MS	77	-89.0500	33.6667	290	06/1942	12/1989	48	0.1930	0.1650	0.1651	0.58
22-2722	ELLIOTT 1 SW	MS	77	-89.7636	33.6789	290	01/1939	12/2000	61	0.1962	0.2860	0.1943	0.61
22-2773	ENID DAM	MS	77	-89.9058	34.1600	300	01/1944	12/2000	57	0.1800	0.2381	0.1217	0.86
22-2896	EUPORA 2 E	MS	77	-89.2356	33.5625	440	03/1927	12/2000	73	0.1944	0.2379	0.1067	1.26
22-3208	FULTON 3 W	MS	77	-88.4569	34.2614	350	01/1909	12/2000	91	0.1951	0.2565	0.1419	0.61
22-3605	GREENVILLE	MS	74	-91.0669	33.3842	132	04/1897	12/2000	104	0.1782	0.1710	0.1560	0.26
22-3614	GREENWOOD	MS	77	-90.1833	33.5167	92	01/1935	12/1979	45	0.2038	0.1750	0.1732	0.93
22-3627	GREENWOOD FAA AIRPORT	MS	77	-90.0867	33.4964	133	01/1898	12/2000	99	0.1786	0.1782	0.1631	0.23
22-3645	GRENADA 5 NNE	MS	77	-89.7842	33.8803	280	05/1909	12/2000	89	0.1980	0.1920	0.1688	0.37
22-3975	HERNANDO	MS	76	-89.9853	34.8161	380	05/1893	12/2000	105	0.1742	0.1804	0.1613	0.25
22-4001	HICKORY FLAT	MS	76	-89.1825	34.6261	400	01/1943	12/2000	58	0.1816	0.1978	0.1849	0.71
22-4129	HOLCOMB	MS	77	-89.9833	33.7667	240	03/1945	09/1974	30	0.1917	0.1961	0.2403	1.51
22-4173	HOLLY SPRINGS 4 N	MS	76	-89.4347	34.8219	483	04/1897	12/2000	104	0.1498	0.1701	0.1169	0.59

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
22-4265	HOUSTON	MS	77	-89.0083	33.9278	273	01/1942	12/2000	56	0.1778	0.2046	0.1085	0.89
22-4377	INDEPENDENCE 1 W	MS	76	-89.8214	34.6989	345	01/1958	12/2000	43	0.1667	0.2123	0.1800	0.25
22-4776	KOSCIUSKO	MS	78	-89.5797	33.0583	410	01/1893	12/2000	104	0.1789	0.1935	0.1131	1.57
22-4816	LAFAYETTE SPRINGS	MS	77	-89.2564	34.3044	450	01/1944	12/1999	53	0.1951	0.2279	0.1206	0.76
22-4842	LAKE CORMORANT 1 W	MS	76	-90.2119	34.9044	205	01/1940	12/2000	61	0.1473	0.1268	0.1345	0.24
22-4869	LAMBERT 5 E	MS	74	-90.3058	34.2017	155	01/1943	12/1997	55	0.1802	0.1631	0.1425	0.19
22-5062	LEXINGTON 2 NNW	MS	78	-90.0628	33.1383	313	01/1944	12/2000	57	0.1657	0.0951	0.1110	0.57
22-5247	LOUISVILLE	MS	79	-89.0711	33.1353	581	02/1891	07/2000	109	0.1927	0.2743	0.1697	0.40
22-5361	MACON 2 E	MS	79	-88.5586	33.1544	250	06/1948	12/2000	46	0.1740	0.1184	0.1588	0.89
22-5366	MACON 2 NE	MS	79	-88.5333	33.1333	190	02/1894	10/1972	79	0.1842	0.1205	0.0829	0.97
22-5897	MINTER CITY 1 NE	MS	77	-90.2686	33.7186	140	01/1956	12/2000	44	0.1689	0.2475	0.1960	0.70
22-6009	MOORHEAD	MS	77	-90.5094	33.4519	117	04/1913	12/2000	87	0.2109	0.2881	0.1838	1.08
22-6084	MOUNT PLEASANT	MS	76	-89.5619	34.9056	430	01/1943	12/2000	58	0.1445	0.1640	0.1138	0.87
22-6256	NEW ALBANY	MS	77	-89.0022	34.4739	380	01/1943	12/2000	57	0.1891	0.2369	0.1395	0.37
22-6351	NITTA YUMA	MS	78	-90.8500	33.0333	112	01/1955	12/1986	32	0.2251	0.2470	0.2015	1.83
22-6515	OKOLONA	MS	77	-88.7500	34.0000	322	01/1895	09/1986	77	0.1950	0.2897	0.1759	0.73
22-7066	PLEASANT HILL	MS	76	-89.9119	34.8989	355	01/1947	12/2000	54	0.1294	0.0823	0.1555	1.32
22-7106	PONTOTOC	MS	77	-88.9928	34.2547	503	01/1893	12/2000	106	0.1991	0.1934	0.1451	0.47
22-7111	PONTOTOC EXP STN	MS	77	-89.0000	34.1500	405	05/1953	12/2000	48	0.1942	0.2120	0.1704	0.11
22-7467	RIPLEY	MS	76	-88.9486	34.7356	520	01/1899	12/2000	68	0.1988	0.2714	0.1431	1.36
22-7582	ROSEDALE	MS	74	-91.0167	33.8500	151	01/1908	12/1981	71	0.1782	0.1158	0.0979	0.31
22-7807	SARAH 3 SE	MS	76	-90.1833	34.5333	335	05/1943	12/2000	58	0.1650	0.2266	0.1728	0.42
22-7815	SARDIS DAM	MS	77	-89.7903	34.3961	230	01/1941	12/2000	55	0.1833	0.2940	0.1908	0.88
22-7820	SAREPTA 1 NNE	MS	77	-89.2947	34.1200	365	01/1948	10/1998	50	0.1769	0.1712	0.1300	0.48
22-7886	SCOTT	MS	74	-91.0833	33.6000	141	06/1918	12/1977	60	0.1926	0.1973	0.1623	0.77
22-7921	SENATOBIA	MS	76	-89.9592	34.6314	240	01/1943	12/2000	58	0.2030	0.2237	0.1044	1.78
22-8145	SLEDGE 2 N	MS	76	-90.2153	34.4372	170	03/1945	12/2000	55	0.1783	0.2487	0.1605	0.55
22-8374	STATE UNIVERSITY	MS	79	-88.7822	33.4692	185	01/1892	12/2000	107	0.1929	0.2039	0.1472	0.15
22-8445	STONEVILLE EXP STN	MS	74	-90.9108	33.4311	127	01/1915	12/2000	85	0.1815	0.1964	0.1761	0.56
22-8591	SWAN LAKE	MS	77	-90.3214	33.8472	145	04/1905	12/1999	52	0.1829	0.1978	0.1256	0.42
22-8792	TIBBEE	MS	79	-88.6331	33.5378	210	01/1959	12/2000	42	0.2040	0.2175	0.1347	0.48
22-8998	TUNICA 2	MS	76	-90.3683	34.7281	206	01/1935	12/2000	64	0.1821	0.1770	0.1421	0.52

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
22-9000	TUPELO	MS	77	-88.7167	34.2500	279	01/1900	12/1968	64	0.1918	0.2707	0.2202	0.62
22-9003	TUPELO WSO ARPT	MS	77	-88.7697	34.2667	361	06/1948	12/2000	53	0.1714	0.1160	0.2035	2.31
22-9079	UNIVERSITY	MS	77	-89.5358	34.3803	380	02/1893	12/2000	101	0.1893	0.2564	0.1735	0.21
22-9114	VAIDEN 1 SSW	MS	78	-89.7539	33.3253	404	04/1948	12/2000	53	0.1848	0.1212	0.0868	1.44
22-9154	VANCE 1 SW	MS	74	-90.3667	34.0667	151	03/1945	10/1985	38	0.1814	0.1735	0.0623	1.23
22-9159	VAN VLEET	MS	77	-88.8858	33.9761	330	05/1943	12/2000	58	0.1488	0.1677	0.1892	1.99
22-9400	WATER VALLEY 1 NNE	MS	77	-89.6311	34.1583	310	01/1893	12/2000	108	0.1634	0.2556	0.1486	1.38
22-9743	WINONA 5 E	MS	77	-89.6353	33.4881	390	01/1953	12/2000	47	0.1617	0.2270	0.2091	1.15
23-0022	ADVANCE 1 S	MO	71	-89.9058	37.0956	360	01/1939	12/2000	61	0.2008	0.3060	0.1815	1.21
23-0088	ALLEY SPRING RGR STN	MO	70	-91.4439	37.1528	700	08/1948	12/2000	49	0.1743	0.2142	0.2648	1.93
23-0127	ALTON	MO	71	-91.3044	36.6300	810	03/1940	12/2000	47	0.1751	0.2310	0.2124	0.32
23-0179	ANNAPOLIS 3 SW	MO	70	-90.7667	37.3000	591	01/1939	12/1978	36	0.1547	0.1806	0.1634	0.85
23-0224	ARCADIA	MO	70	-90.6181	37.6325	1010	01/1893	07/2000	103	0.2031	0.2469	0.1242	1.41
23-0357	AUXVASSE 4 SSW	MO	67	-91.9167	38.9667	860	06/1944	12/1979	35	0.1919	0.2560	0.1329	0.62
23-0539	BELLEVIEW	MO	70	-90.7800	37.6900	1085	01/1937	09/2000	62	0.1776	0.0957	0.0692	0.49
23-0595	BERNIE	MO	72	-89.9717	36.6717	300	01/1945	12/2000	56	0.1748	0.1447	0.1447	0.72
23-0668	BIRCH TREE	MO	70	-91.5000	36.9833	1001	01/1894	10/1968	74	0.1496	0.1732	0.1497	1.26
23-0735	BLOOMFIELD	MO	72	-89.9308	36.8908	440	01/1945	12/2000	56	0.1701	0.1994	0.2195	1.52
23-0856	BOWLING GREEN 2 NE	MO	67	-91.1778	39.3656	710	02/1931	11/2000	68	0.1901	0.1474	0.1110	0.28
23-1101	BUNKER	MO	70	-91.1939	37.5139	1200	01/1940	12/2000	57	0.1810	0.0875	0.0659	0.58
23-1275	CANTON L AND D 20	MO	67	-91.5158	40.1433	490	01/1932	12/2000	68	0.2089	0.2093	0.1644	0.57
23-1283	CAP AU GRIS L & D 25	MO	69	-90.6886	39.0031	450	01/1949	10/1998	42	0.1706	0.2279	0.1411	0.49
23-1289	CAPE GIRARDEAU FAA AIR	MO	70	-89.5706	37.2253	336	06/1960	12/2000	39	0.2042	0.3154	0.1523	2.21
23-1291	CAPE GIRARDEAU MO STAT	MO	70	-89.5333	37.3167	489	01/1910	11/1960	48	0.1880	0.1714	0.1582	0.26
23-1296	CAPE GIRARDEAU	MO	70	-89.5300	37.3061	300	01/1910	12/1968	59	0.1776	0.1105	0.1721	0.81
23-1364	CARUTHERSVILLE	MO	74	-89.6642	36.1686	270	01/1893	12/2000	106	0.1638	0.1303	0.1170	0.09
23-1467	CENTERVILLE	MO	70	-90.9644	37.4367	840	01/1939	01/1999	60	0.1657	0.2059	0.2098	0.67
23-1482	CENTRALIA	MO	67	-92.1419	39.1678	892	01/1939	12/2000	62	0.1919	0.1813	0.1323	0.07
23-1540	CHARLESTON	MO	72	-89.3536	36.9272	330	05/1951	12/2000	48	0.2096	0.2421	0.1290	1.69
23-1674	CLEARWATER DAM	MO	70	-90.7756	37.1319	660	01/1947	12/2000	53	0.1619	0.1436	0.2015	0.91
23-1791	COLUMBIA WSO AP	MO	67	-92.2183	38.8169	893	01/1890	12/2000	90	0.1906	0.2743	0.1747	0.61
23-1870	COOK STATION	MO	70	-91.4333	37.8167	991	01/1944	12/1984	41	0.1632	0.1281	0.0801	0.82

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
23-1980	CRANE MOUNTAIN	MO	70	-90.6333	37.4500	951	06/1940	12/1973	34	0.1781	0.1109	0.0381	1.29
23-2004	CROCKER	MO	69	-92.2667	37.9500	1089	07/1911	10/1973	37	0.1970	0.3583	0.2575	0.86
23-2220	DE SOTO	MO	70	-90.5058	38.1228	701	01/1944	09/2000	50	0.1742	0.1340	0.1009	0.18
23-2235	DEXTER	MO	72	-89.9667	36.8000	381	01/1924	12/1985	62	0.1513	0.2154	0.1527	1.47
23-2289	DONIPHAN	MO	71	-90.8125	36.6206	330	04/1904	12/2000	97	0.1689	0.2626	0.2105	0.83
23-2302	DORA	MO	70	-92.2328	36.7797	990	01/1964	12/2000	34	0.1805	0.1641	0.1775	0.30
23-2482	EDINA	MO	67	-92.1678	40.1692	780	01/1931	12/2000	69	0.2164	0.2569	0.1765	0.89
23-2547	ELLINGTON	MO	70	-90.9700	37.2333	730	06/1939	12/2000	57	0.1789	0.1124	0.1031	0.16
23-2591	ELSBERRY 1 S	MO	67	-90.7847	39.1506	450	01/1931	12/2000	69	0.1612	0.2092	0.1119	0.98
23-2809	FARMINGTON	MO	70	-90.4103	37.7922	928	01/1907	12/2000	84	0.1739	0.2457	0.2153	0.67
23-2850	FESTUS	MO	70	-90.4000	38.2667	600	01/1961	12/2000	35	0.1516	0.0427	0.0619	1.25
23-2881	FISK 1 N	MO	71	-90.2033	36.7828	330	01/1931	12/1980	47	0.2064	0.2565	0.2395	0.58
23-3038	FREDERICKTOWN	MO	70	-90.3086	37.5739	719	07/1923	12/2000	77	0.1817	0.2609	0.1872	0.59
23-3043	FREEDOM	MO	69	-91.6900	38.4647	745	07/1962	12/2000	39	0.1725	0.2621	0.2498	0.45
23-3079	FULTON	MO	67	-91.9300	38.8581	870	02/1893	12/2000	106	0.1778	0.1806	0.1011	0.26
23-3290	GORIN	MO	67	-92.0833	40.2500	702	01/1893	12/1941	49	0.2055	0.2661	0.2202	1.10
23-3451	GREENVILLE 6 N	MO	70	-90.4500	37.2000	490	01/1922	12/1993	70	0.1897	0.2576	0.1840	0.59
23-3463	GREGORY LANDING	MO	67	-91.4261	40.2744	510	01/1951	12/1985	35	0.2048	0.1480	0.1753	1.67
23-3596	HANNIBAL 1 N	MO	67	-91.3500	39.7000	489	04/1892	12/1964	71	0.1804	0.2755	0.1770	0.81
23-3601	HANNIBAL WATER WORKS	MO	67	-91.3719	39.7233	712	01/1902	12/2000	99	0.1954	0.2187	0.1281	0.19
23-3793	HERMANN	MO	69	-91.4233	38.7039	540	07/1892	12/2000	108	0.2039	0.3129	0.2405	0.16
23-4019	HOUSTON 3 E	MO	70	-91.9483	37.3411	1293	01/1893	12/2000	78	0.1731	0.1421	0.1504	0.06
23-4226	JACKSON	MO	70	-89.6678	37.3781	440	01/1893	12/2000	107	0.1702	0.1421	0.1476	0.06
23-4271	JEFFERSON CITY WATER P	MO	69	-92.1833	38.5833	670	01/1891	12/2000	108	0.1964	0.2682	0.2077	0.05
23-4291	JEROME	MO	69	-91.9769	37.9233	710	01/1905	06/2000	75	0.1598	0.2214	0.1692	0.60
23-4301	JEWETT 7 E	MO	70	-90.3631	37.3656	620	01/1956	12/1996	40	0.1712	0.1255	0.1116	0.10
23-4349	KAHOKA	MO	67	-91.7333	40.4167	689	01/1931	12/1982	46	0.2101	0.2702	0.2619	2.45
23-4417	KENNETT RADIO KBOA	MO	72	-90.0750	36.2253	270	03/1953	12/2000	48	0.2157	0.2921	0.2124	1.83
23-4625	KOSHKONONG	MO	70	-91.6500	36.6000	961	06/1900	07/1960	61	0.1926	0.2122	0.1726	0.44
23-4637	LA BELLE	MO	67	-91.9228	40.1231	770	03/1931	12/2000	69	0.1892	0.1756	0.1191	0.07
23-4919	LICKING 4 N	MO	70	-91.8831	37.5544	1180	01/1937	12/2000	64	0.1777	0.2758	0.2384	1.06
23-5050	LONG BRANCH RESERVOIR	MO	67	-92.5064	39.7506	820	01/1949	12/2000	50	0.2110	0.1576	0.0791	1.15

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
23-5093	LOUISIANA STARKS NURSE	MO	67	-91.0667	39.4333	466	01/1898	12/1984	82	0.1946	0.2612	0.1659	0.42
23-5098	LOUISIANA	MO	67	-91.0464	39.4514	512	01/1898	12/2000	101	0.1850	0.2423	0.1823	0.32
23-5130	LURAY	MO	66	-91.8781	40.4892	740	01/1961	12/2000	34	0.2067	0.1561	0.2116	1.82
23-5175	MACON	MO	67	-92.4667	39.7167	860	01/1900	12/1983	83	0.1726	0.1440	0.1104	0.27
23-5183	MADISON 2 W	MO	68	-92.0306	39.4725	800	04/1934	12/2000	55	0.2083	0.2802	0.1780	1.00
23-5207	MALDEN MUNICIPAL AP	MO	72	-89.9894	36.5994	290	01/1949	12/2000	49	0.1569	0.1281	0.1097	1.10
23-5253	MARBLE HILL	MO	71	-89.9664	37.3036	390	01/1894	12/2000	106	0.1829	0.2630	0.1652	1.06
23-5319	MARTINSBURG	MO	67	-91.6500	39.1000	810	06/1944	12/1985	42	0.1805	0.2761	0.1397	1.19
23-5415	MC CREDIE EXPERIMENT S	MO	67	-91.9000	38.9500	850	01/1949	10/1998	48	0.2202	0.2522	0.1310	1.19
23-5492	MEMPHIS	MO	66	-92.1667	40.4608	770	01/1931	12/2000	65	0.2192	0.2736	0.1595	0.38
23-5541	MEXICO	MO	67	-91.8861	39.1756	802	01/1893	12/2000	106	0.2004	0.2459	0.1380	0.43
23-5671	MOBERLY	MO	68	-92.4369	39.4194	840	07/1936	12/2000	62	0.2283	0.2984	0.2135	1.00
23-5708	MONROE CITY	MO	67	-91.7333	39.6500	720	01/1927	12/1988	62	0.1594	0.0927	0.0838	1.10
23-5762	MOREHOUSE	MO	72	-89.7000	36.8500	302	01/1926	12/1971	46	0.1788	0.0801	0.0628	2.19
23-5834	MOUNTAIN GROVE 2 N	MO	70	-92.2636	37.1528	1450	04/1901	12/2000	100	0.1695	0.1936	0.1760	0.23
23-6009	NEW FLORENCE 2	MO	69	-91.4500	38.9167	870	01/1949	08/1989	38	0.1799	0.2638	0.2540	0.31
23-6045	NEW MADRID	MO	72	-89.5325	36.5869	302	01/1897	12/2000	101	0.1896	0.2650	0.1909	0.28
23-6438	OWENSVILLE	MO	69	-91.5000	38.3500	942	01/1924	12/1978	54	0.1806	0.1993	0.1224	0.67
23-6468	PACIFIC 1 S	MO	69	-90.7328	38.4469	645	01/1917	04/1999	75	0.2001	0.4005	0.3692	2.29
23-6493	PALMYRA	MO	67	-91.5267	39.8053	646	01/1893	12/2000	91	0.1925	0.1931	0.1103	0.18
23-6509	PARIS 1 W	MO	68	-92.0039	39.4142	767	01/1931	12/2000	53	0.2173	0.2270	0.0625	1.00
23-6532	PARMA	MO	72	-89.8161	36.6125	280	01/1921	12/1998	73	0.1748	0.2191	0.1926	0.27
23-6633	PERRY 1 E	MO	67	-91.6667	39.4333	710	01/1931	08/1982	47	0.2009	0.1772	0.1047	0.38
23-6641	PERRYVILLE WATER PLANT	MO	80	-89.9200	37.7342	502	01/1940	12/2000	58	0.1704	0.1491	0.0827	0.82
23-6791	POPLAR BLUFF	MO	71	-90.4056	36.7578	370	01/1915	12/2000	86	0.1799	0.1913	0.1679	0.41
23-6804	PORTAGEVILLE	MO	72	-89.6997	36.4136	280	03/1952	12/2000	48	0.1947	0.2247	0.1817	0.41
23-6934	PUXICO	MO	71	-90.1500	36.9333	400	06/1944	12/1994	43	0.2366	0.3165	0.2338	1.72
23-6970	QULIN	MO	72	-90.2253	36.5836	322	01/1945	12/2000	56	0.1722	0.1638	0.1378	0.28
23-7094	REYNOLDS	MO	70	-91.0794	37.4008	1240	07/1941	12/1985	41	0.1825	0.0788	0.1009	0.51
23-7122	RICHWOODS	MO	69	-90.8333	38.1500	807	02/1937	12/1981	43	0.1933	0.3295	0.2466	0.41
23-7214	ROBY	MO	70	-92.1333	37.5000	1401	07/1941	09/1978	38	0.1740	0.2112	0.1194	0.78
23-7263	ROLLA UNI OF MISSOURI	MO	69	-91.7758	37.9572	1167	01/1893	12/2000	104	0.1895	0.2348	0.1640	0.23

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
23-7300	ROSEBUD	MO	69	-91.3756	38.4506	960	02/1941	12/2000	53	0.2121	0.3473	0.3112	0.76
23-7309	ROUND SPRING RANGER ST	MO	70	-91.4278	37.2597	818	01/1940	12/1995	56	0.2004	0.1833	0.1807	1.20
23-7397	ST CHARLES	MO	69	-90.5169	38.8147	467	01/1893	12/2000	108	0.1777	0.2401	0.1808	0.13
23-7452	ST LOUIS SCIENCE CTR	MO	69	-90.2706	38.6314	540	01/1912	12/2000	79	0.2426	0.2820	0.2239	2.57
23-7455	ST LOUIS WSCMO AIRPORT	MO	69	-90.3736	38.7525	531	01/1948	12/2000	53	0.1724	0.2410	0.2300	0.34
23-7506	SALEM	MO	70	-91.5364	37.6331	1200	01/1904	12/2000	95	0.1764	0.2571	0.1876	0.63
23-7578	SAVERTON L & D 22	MO	67	-91.2494	39.6361	472	01/1939	12/2000	62	0.1723	0.1183	0.0958	0.53
23-7720	SHELBINA	MO	67	-92.0456	39.6989	740	01/1893	12/2000	93	0.2025	0.2572	0.1899	0.56
23-7728	SHELBYVILLE	MO	67	-92.0333	39.8000	751	03/1932	12/1972	41	0.1825	0.1774	0.1454	0.08
23-7770	SIKESTON	MO	72	-89.6000	36.8667	302	01/1895	12/1958	52	0.1891	0.2781	0.1597	0.99
23-7772	SIKESTON POWER STATION	MO	72	-89.6231	36.8775	310	01/1951	12/2000	44	0.1792	0.1356	0.1336	0.88
23-7780	SILOAM SPRINGS	MO	70	-92.0694	36.8144	1180	06/1940	12/2000	58	0.1792	0.2590	0.1235	1.58
23-8043	STEELVILLE 2 N	MO	69	-91.3706	38.0053	700	01/1919	12/2000	67	0.1536	0.2125	0.3076	2.83
23-8051	STEFFENVILLE	MO	67	-91.8872	39.9714	690	01/1893	12/2000	107	0.1804	0.2191	0.1349	0.18
23-8171	SULLIVAN 3 SE	MO	69	-91.1528	38.2147	940	01/1936	12/2000	58	0.2119	0.2602	0.1327	1.17
23-8184	SUMMERSVILLE	MO	70	-91.6533	37.1778	1180	04/1940	12/2000	61	0.1687	0.1650	0.1274	0.22
23-8313	TECUMSEH	MO	70	-92.2567	36.5886	600	01/1942	12/2000	56	0.1907	0.1261	0.1039	0.47
23-8412	TOPAZ 4 NE	MO	70	-92.2000	36.9667	1102	06/1939	12/1968	30	0.1748	0.0272	0.0029	1.82
23-8456	TROY	MO	69	-91.0000	38.9500	560	03/1931	12/2000	70	0.1852	0.3018	0.1839	0.57
23-8515	UNION	MO	69	-91.0042	38.4444	540	01/1917	12/2000	84	0.2071	0.3311	0.2983	0.54
23-8561	VALLEY PARK	MO	69	-90.4922	38.5572	531	01/1917	12/2000	84	0.1895	0.2466	0.2265	0.18
23-8569	VAN BUREN	MO	71	-91.0106	36.9986	496	02/1937	12/1984	46	0.1796	0.2090	0.2085	0.40
23-8571	VAN BUREN RANGER STN	MO	71	-91.0186	36.9753	1000	01/1964	12/1994	31	0.1766	0.3742	0.3499	3.31
23-8577	VANDALIA	MO	67	-91.4833	39.3167	764	01/1945	12/2000	50	0.1783	0.1538	0.1012	0.21
23-8614	VICHY FAA AIRPORT	MO	69	-91.7694	38.1275	1102	01/1944	12/2000	48	0.1705	0.1339	0.1212	1.67
23-8620	VIENNA 2 WNW	MO	69	-91.9811	38.2017	770	01/1962	12/2000	37	0.1920	0.3468	0.2035	1.23
23-8700	WAPPAPELLO DAM	MO	71	-90.2836	36.9231	410	01/1939	08/2000	62	0.2203	0.3514	0.2721	0.91
23-8725	WARRENTON 1 N	MO	69	-91.1386	38.8350	827	01/1893	12/2000	102	0.1750	0.2661	0.2021	0.23
23-8777	WAYNESVILLE 2 W	MO	70	-92.2319	37.8133	890	07/1941	12/2000	58	0.1474	0.1432	0.1088	1.61
23-8805	WELDON SPRING WILDLIFE	MO	69	-90.6828	38.6989	584	06/1957	12/2000	42	0.1923	0.2824	0.0894	2.10
23-8880	WEST PLAINS	MO	70	-91.8347	36.7425	1010	01/1939	12/2000	62	0.1660	0.0417	0.0778	0.63
23-8984	WILLIAMSVILLE	MO	71	-90.5586	36.9708	510	02/1924	12/2000	77	0.1781	0.2566	0.2378	0.36

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
23-8995	WILLOW SPRG RADIO KUKU	MO	70	-91.9914	36.9811	1310	01/1895	12/2000	92	0.1691	0.1468	0.1745	0.29
23-9178	ZALMA 4 E	MO	71	-90.0106	37.1564	420	01/1937	12/2000	64	0.1976	0.2113	0.2116	0.68
28-0311	ATLANTIC CITY WSO AP	NJ	1	-74.5672	39.4494	60	05/1903	12/2000	97	0.2427	0.3889	0.2835	0.72
28-0325	ATLANTIC CITY MARINA	NJ	1	-74.4333	39.3833	10	01/1939	12/2000	61	0.2445	0.2972	0.1963	0.56
28-0346	AUDUBON	NJ	1	-75.0833	39.8833	39	01/1942	12/1989	48	0.1922	0.1712	0.1337	0.77
28-0690	BELLEPLAIN	NJ	1	-74.8431	39.2483	30	03/1922	12/2000	79	0.2193	0.2746	0.1887	0.03
28-0734	BELVIDERE BRIDGE	NJ	7	-75.0836	40.8292	263	01/1897	12/2000	104	0.1880	0.2518	0.1443	0.35
28-0907	BOONTON 2 SE	NJ	7	-74.4033	40.8922	280	01/1893	09/1998	98	0.1632	0.2082	0.1628	0.69
28-0927	BOUND BROOK 1 W	NJ	6	-74.5750	40.5603	50	01/1897	12/2000	103	0.1862	0.2367	0.2032	0.45
28-1028	BRIDGETON 1 NE	NJ	1	-75.2000	39.4667	112	01/1893	12/1957	63	0.2198	0.2974	0.2038	0.01
28-1211	BURLINGTON	NJ	1	-74.8667	40.0833	12	07/1907	10/1977	70	0.1677	0.2390	0.1472	1.49
28-1327	CANISTEAR RESERVOIR	NJ	7	-74.4817	41.1086	1100	01/1941	12/2000	60	0.1775	0.2413	0.1549	0.32
28-1335	CANOE BROOK	NJ	6	-74.3539	40.7436	180	01/1931	12/2000	70	0.2079	0.2789	0.1949	0.08
28-1343	CANTON	NJ	1	-75.4167	39.4667	20	07/1902	12/1973	38	0.1781	0.1195	0.0244	2.09
28-1351	CAPE MAY 3 W	NJ	1	-74.9358	38.9536	20	01/1894	12/2000	96	0.2089	0.3375	0.2516	0.32
28-1582	CHARLOTTEBURG	NJ	7	-74.4233	41.0347	760	04/1893	12/2000	108	0.1867	0.2354	0.2220	0.63
28-1590	CHATHAM	NJ	6	-74.3667	40.7500	190	03/1903	12/1962	59	0.1680	0.2810	0.2461	1.96
28-1598	CHATSWORTH	NJ	1	-74.5333	39.8167	102	01/1941	12/1978	34	0.1954	0.2668	0.1254	0.88
28-1708	CLAYTON	NJ	1	-75.1000	39.6500	121	01/1897	12/1961	51	0.2364	0.2911	0.2562	0.97
28-2023	CRANFORD	NJ	6	-74.3000	40.6500	75	01/1897	12/2000	102	0.2171	0.3383	0.2003	0.84
28-2130	CULVERS LAKE	NJ	18	-74.7833	41.1667	761	04/1902	12/1953	52	0.1629	0.1614	0.0979	0.76
28-2768	ESSEX FELLS SEWAGE PLA	NJ	6	-74.2858	40.8314	350	01/1946	11/2000	54	0.1965	0.2536	0.2208	0.14
28-3029	FLEMINGTON 5 NNW	NJ	7	-74.8831	40.5631	260	03/1898	12/2000	102	0.1784	0.2601	0.2348	0.64
28-3102	FORTESCUE	NJ	1	-75.1667	39.2333	10	08/1945	12/1976	31	0.2388	0.3573	0.3339	1.86
28-3181	FREEHOLD	NJ	1	-74.2511	40.3142	194	01/1931	12/2000	58	0.2080	0.2638	0.1660	0.08
28-3291	GLASSBORO	NJ	1	-75.0953	39.7358	100	05/1948	12/1997	39	0.1968	0.3005	0.2595	0.78
28-3516	GREENWOOD LAKE	NJ	6	-74.3244	41.1386	470	01/1941	12/2000	60	0.1878	0.2632	0.1840	0.85
28-3662	HAMMONTON 2 NNE	NJ	1	-74.8072	39.6442	90	01/1896	08/1990	76	0.2007	0.3575	0.1981	1.19
28-3935	HIGH POINT PARK	NJ	18	-74.6714	41.3061	1520	01/1957	12/2000	34	0.1536	0.1961	0.1188	1.32
28-3951	HIGHTSTOWN 2 W	NJ	1	-74.5642	40.2650	100	01/1893	12/2000	104	0.2058	0.2678	0.2058	0.15
28-4229	INDIAN MILLS 2 W	NJ	1	-74.7883	39.8144	100	05/1901	12/2000	100	0.1967	0.2167	0.1626	0.35
28-4339	JERSEY CITY	NJ	6	-74.0572	40.7419	135	01/1906	12/1996	89	0.2078	0.2929	0.1360	2.00

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28-4635	LAMBERTVILLE	NJ	7	-74.9472	40.3667	68	01/1900	12/2000	99	0.1833	0.1780	0.1073	0.58
28-4700	LAURELTON 1 E	NJ	1	-74.1167	40.0667	20	06/1901	04/1961	55	0.2072	0.2289	0.1791	0.27
28-4736	LAYTON 2	NJ	18	-74.8667	41.2500	400	01/1901	12/1969	66	0.1893	0.3626	0.2395	1.24
28-4887	LITTLE FALLS WATER CO	NJ	6	-74.2261	40.8858	150	01/1904	12/2000	96	0.2224	0.3914	0.2826	1.41
28-4931	LODI	NJ	6	-74.0833	40.8667	50	03/1897	09/1993	89	0.1827	0.3285	0.3203	1.97
28-4987	LONG BRANCH OAKHURST	NJ	1	-74.0047	40.2797	30	01/1908	12/2000	90	0.1778	0.1975	0.1438	0.91
28-5003	LONG VALLEY	NJ	7	-74.7789	40.7875	550	01/1930	12/2000	70	0.1816	0.2862	0.1828	0.32
28-5104	MAHWAH	NJ	6	-74.1667	41.1000	249	01/1957	12/1987	31	0.2015	0.1975	0.2320	1.79
28-5346	MAYS LANDING	NJ	1	-74.7469	39.4506	20	08/1944	12/2000	57	0.2227	0.3181	0.2670	0.50
28-5503	MIDLAND PARK	NJ	6	-74.1453	40.9939	210	07/1945	12/2000	55	0.1989	0.2698	0.2213	0.06
28-5581	MILLVILLE FAA AIRPORT	NJ	1	-75.0783	39.3661	70	03/1947	12/2000	51	0.2043	0.3546	0.3549	2.59
28-5597	MILTON	NJ	7	-74.5333	41.0167	951	01/1941	12/1971	31	0.1517	0.2983	0.2273	2.36
28-5728	MOORESTOWN	NJ	7	-74.9697	39.9511	45	01/1893	12/2000	107	0.1958	0.2142	0.1305	0.38
28-5769	MORRIS PLAINS 1 W	NJ	7	-74.5000	40.8333	400	07/1941	12/1989	49	0.1850	0.2642	0.2266	0.38
28-6026	NEWARK WSO AIRPORT	NJ	6	-74.1694	40.7158	7	01/1897	12/2000	93	0.1953	0.2632	0.2362	0.22
28-6055	NEW BRUNSWICK 3 SE	NJ	6	-74.4364	40.4719	86	01/1897	12/2000	104	0.2176	0.2679	0.1364	1.07
28-6146	NEW MILFORD	NJ	6	-74.0158	40.9611	12	01/1919	12/2000	82	0.1985	0.2401	0.1974	0.14
28-6177	NEWTON ST PAULS ABBEY	NJ	7	-74.7592	41.0553	605	01/1893	12/1999	101	0.1959	0.3209	0.2092	0.26
28-6460	OAK RIDGE RESERVOIR	NJ	7	-74.4989	41.0042	880	01/1941	12/2000	60	0.1734	0.2382	0.1663	0.32
28-6843	PEMBERTON 3 S	NJ	1	-74.6828	39.9708	60	04/1902	12/2000	72	0.2107	0.2446	0.1731	0.10
28-6974	PHILLIPSBURG	NJ	7	-75.1833	40.6833	180	02/1903	12/1976	73	0.2136	0.2763	0.2223	1.16
28-7079	PLAINFIELD	NJ	6	-74.4025	40.6036	90	01/1893	12/2000	107	0.2153	0.3050	0.1658	0.93
28-7301	POTTERSVILLE 2 NNW	NJ	7	-74.7322	40.7369	365	01/1957	12/2000	44	0.2000	0.3818	0.2648	0.94
28-7328	PRINCETON WATER WORKS	NJ	6	-74.6667	40.3333	59	07/1941	11/1986	45	0.1891	0.2171	0.1855	0.48
28-7393	RAHWAY	NJ	6	-74.2569	40.6006	20	01/1940	12/1995	55	0.2220	0.2249	0.1459	0.92
28-7545	RIDGEFIELD	NJ	6	-74.0167	40.8333	79	03/1916	12/1959	42	0.1887	0.1941	0.1685	0.76
28-7587	RINGWOOD	NJ	6	-74.2683	41.0917	305	01/1902	12/2000	61	0.2268	0.4037	0.2806	1.70
28-7825	RUNYON	NJ	6	-74.3333	40.4333	20	04/1907	12/1957	37	0.2349	0.3329	0.1756	1.34
28-7869	SANDY HOOK LIGHTBOAT S	NJ	1	-74.0167	40.4667	23	01/1904	12/1958	47	0.1812	0.1394	0.0424	1.70
28-7936	SEABROOK FARMS	NJ	1	-75.2200	39.4872	90	06/1949	12/2000	36	0.2460	0.2735	0.1321	1.17
28-8051	SHILOH	NJ	1	-75.3000	39.4667	121	06/1958	12/1987	30	0.2212	0.2119	0.2025	1.16
28-8194	SOMERVILLE	NJ	7	-74.6531	40.6153	134	01/1893	12/2000	104	0.1948	0.2386	0.1417	0.29

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
28-8402	SPLIT ROCK POND	NJ	7	-74.4667	40.9667	800	08/1948	09/1998	50	0.1523	0.0924	0.1812	3.05
28-8423	SPRINGFIELD	NJ	6	-74.3364	40.6964	90	05/1948	12/1995	47	0.1918	0.2548	0.2520	0.57
28-8644	SUSSEX	NJ	7	-74.5708	41.2258	450	01/1893	12/2000	101	0.1937	0.2459	0.2010	0.22
28-8816	TOMS RIVER	NJ	1	-74.2167	39.9500	100	01/1893	12/2000	74	0.1941	0.2140	0.1332	0.39
28-8878	TRENTON 2	NJ	7	-74.7667	40.2333	112	01/1893	12/1958	50	0.1603	0.0748	0.1447	2.29
28-8883	TRENTON WSO CITY	NJ	7	-74.7667	40.2167	190	01/1897	09/1981	84	0.1865	0.1986	0.1915	0.54
28-8899	TUCKERTON 1 S	NJ	1	-74.3500	39.6000	20	05/1898	12/1994	90	0.2235	0.3576	0.2467	0.26
28-9135	VINELAND	NJ	1	-75.0000	39.4833	112	02/1893	12/1958	55	0.2028	0.2636	0.1372	0.44
28-9187	WANAQUE RAYMOND DAM	NJ	6	-74.2933	41.0444	245	07/1945	12/2000	54	0.1929	0.3366	0.2524	0.99
28-9271	WATCHUNG	NJ	6	-74.4164	40.6622	260	06/1948	12/1995	47	0.2134	0.2459	0.1779	0.24
28-9363	WERTSVILLE	NJ	6	-74.8169	40.4297	220	01/1957	12/2000	39	0.2276	0.3562	0.3326	3.17
28-9608	WEST WHARTON	NJ	7	-74.6000	40.9000	679	04/1959	10/1990	31	0.1657	0.3123	0.2967	2.45
28-9832	WOODCLIFF LAKE	NJ	6	-74.0425	41.0139	103	07/1919	12/2000	81	0.1876	0.1931	0.2142	1.07
28-9910	WOODSTOWN 2 NW	NJ	1	-75.1644	39.5461	98	01/1939	12/1999	59	0.2206	0.3453	0.2006	0.44
30-0023	ADDISON	NY	16	-77.2339	42.1197	980	02/1893	12/2000	97	0.1661	0.1662	0.0970	0.86
30-0055	ALBION 2 NE	NY	15	-78.1667	43.2722	440	01/1939	12/2000	51	0.1777	0.2877	0.2509	0.71
30-0085	ALFRED	NY	16	-77.7856	42.2608	1770	01/1893	12/2000	99	0.1893	0.2050	0.1891	0.23
30-0093	ALLEGANY STATE PARK	NY	30	-78.7500	42.1008	1500	01/1925	12/2000	76	0.1825	0.2000	0.1032	0.75
30-0159	AMSTERDAM LOCK 1O	NY	17	-74.1333	42.9167	279	01/1903	12/1958	32	0.1626	0.0295	0.1484	2.29
30-0183	ANGELICA	NY	15	-77.9889	42.3017	1445	01/1890	12/2000	110	0.1849	0.2288	0.1691	0.06
30-0220	ARCADE	NY	30	-78.4167	42.5333	1580	01/1943	10/1995	52	0.1706	0.2943	0.2356	0.48
30-0254	ARKVILLE 2 W	NY	18	-74.6500	42.1333	1310	05/1948	12/2000	53	0.1529	0.2620	0.2735	2.01
30-0321	AUBURN	NY	16	-76.5444	42.9322	770	08/1897	12/1993	86	0.2048	0.2017	0.1391	0.76
30-0331	AURORA RESEARCH FARM	NY	16	-76.6500	42.7333	830	01/1957	12/2000	43	0.1884	0.1409	0.1496	0.97
30-0343	AVON	NY	15	-77.7556	42.9200	545	01/1896	12/2000	97	0.1831	0.3093	0.2806	1.28
30-0360	BAINBRIDGE 2 E	NY	17	-75.4500	42.2833	994	01/1910	12/1992	78	0.1340	0.0439	0.1727	2.01
30-0379	BALDWINSVILLE	NY	16	-76.3333	43.1500	379	01/1893	11/2000	85	0.1579	0.2029	0.1785	0.70
30-0412	BARKER 4 NE	NY	30	-78.4833	43.3667	279	06/1941	12/1975	35	0.1934	0.3071	0.2738	1.14
30-0443	BATAVIA	NY	30	-78.1692	43.0303	913	06/1911	12/2000	89	0.1856	0.2027	0.1615	0.50
30-0448	BATH	NY	16	-77.3500	42.3500	1120	08/1953	11/2000	47	0.1790	0.2506	0.2781	0.70
30-0511	BEDFORD HILLS	NY	84	-73.7167	41.2333	430	07/1899	04/1977	78	0.2067	0.3274	0.1924	0.76
30-0687	BINGHAMTON WSO AP	NY	17	-75.9814	42.2078	1600	01/1948	12/2000	53	0.1748	0.1472	0.0784	0.73

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30-0691	BINGHAMTON WB CITY	NY	17	-75.9167	42.1000	909	01/1926	08/1968	41	0.1656	0.1830	0.2192	0.45
30-0766	BOLIVAR	NY	15	-78.2064	42.1225	1790	04/1896	09/1999	66	0.1720	0.2725	0.2607	1.07
30-0785	BOONVILLE 2 SSW	NY	16	-75.3711	43.4394	1540	01/1950	12/2000	51	0.1565	0.1538	0.1343	0.77
30-0870	BREWERTON LOCK 23	NY	16	-76.2000	43.2333	377	01/1932	11/2000	69	0.1980	0.3692	0.3345	0.70
30-0921	BRISTOL SPRINGS	NY	15	-77.3833	42.7000	1201	01/1932	12/1966	34	0.1721	0.2509	0.1499	0.55
30-0929	BROADALBIN	NY	17	-74.1981	43.0508	840	08/1939	12/2000	62	0.1565	0.1645	0.1906	0.28
30-0937	BROCKPORT	NY	15	-77.9333	43.2000	535	01/1900	12/1992	86	0.1637	0.2491	0.2038	0.47
30-1012	BUFFALO WSCMO AP	NY	30	-78.7358	42.9408	705	01/1922	12/2000	79	0.1952	0.2914	0.2226	0.71
30-1032	BURDETT 1 NE	NY	16	-76.8333	42.4167	1030	01/1932	12/1966	35	0.2786	0.4999	0.4443	5.79
30-1093	CAIRO	NY	18	-74.0167	42.3167	302	01/1924	12/1962	39	0.2083	0.1701	0.0881	1.43
30-1095	CAIRO 4 NW	NY	18	-74.0333	42.3167	490	08/1963	12/2000	38	0.2306	0.4016	0.2803	0.89
30-1110	CAMDEN 2 NW	NY	16	-75.8472	43.3189	580	08/1946	12/1995	45	0.1878	0.2997	0.1466	1.61
30-1144	CANAJOHARIE	NY	17	-74.5833	42.9167	302	01/1932	12/1976	45	0.1719	0.0971	0.0985	0.75
30-1152	CANANDAIGUA 3 S	NY	15	-77.2808	42.8450	720	01/1943	12/2000	58	0.1551	0.1043	0.1175	1.14
30-1160	CANASTOTA 1 SW	NY	17	-75.7667	43.0833	410	01/1932	12/1982	51	0.1584	0.1738	0.1090	0.58
30-1168	CANDOR	NY	17	-76.3133	42.1947	920	01/1945	12/2000	54	0.1999	0.2926	0.2132	0.80
30-1173	CANISTEO 1 SW	NY	16	-77.6167	42.2667	1155	06/1949	12/2000	52	0.1830	0.1789	0.2104	0.77
30-1207	CARMEL	NY	84	-73.6833	41.4333	530	01/1888	10/1995	87	0.1903	0.2037	0.1867	0.17
30-1265	CAYUGA LOCK NO 1	NY	15	-76.7333	42.9500	380	01/1932	12/2000	69	0.1651	0.2628	0.2528	1.11
30-1413	CHEMUNG	NY	17	-76.6333	42.0000	822	01/1939	12/2000	62	0.1520	0.1935	0.2538	1.05
30-1424	CHEPACHET	NY	17	-75.1108	42.9097	1320	07/1953	12/2000	45	0.1889	0.2339	0.1744	0.26
30-1436	CHERRY VALLEY 2 NNE	NY	17	-74.7333	42.8167	1360	05/1914	12/2000	86	0.1684	0.2725	0.1574	0.83
30-1492	CINCINNATUS	NY	16	-75.8947	42.5436	1050	01/1937	12/1999	62	0.1933	0.3161	0.2320	0.25
30-1521	CLARYVILLE	NY	18	-74.5667	41.9167	1653	05/1948	12/2000	40	0.1708	0.2616	0.1423	1.12
30-1580	CLYDE LOCK 26	NY	15	-76.8378	43.0589	392	01/1932	12/2000	69	0.1608	0.1724	0.1999	1.17
30-1593	COBLESKILL	NY	17	-74.4833	42.6833	900	05/1948	12/1985	37	0.1743	0.2041	0.1960	0.12
30-1603	COHOCTON SCS	NY	15	-77.5000	42.4667	1460	01/1941	11/1970	30	0.1688	0.0455	0.0251	2.11
30-1623	COLDEN 1 N	NY	30	-78.6831	42.6631	1025	01/1958	12/2000	43	0.1856	0.1817	0.0487	1.91
30-1752	COOPERSTOWN	NY	17	-74.9283	42.7150	1200	01/1890	12/2000	111	0.1749	0.2739	0.2079	0.30
30-1787	CORNING	NY	16	-77.0667	42.1333	1140	01/1933	12/2000	51	0.2371	0.3325	0.2094	1.71
30-1799	CORTLAND	NY	16	-76.1833	42.6000	1129	01/1893	12/2000	108	0.2009	0.3456	0.2889	0.29
30-1974	DANSVILLE	NY	15	-77.7175	42.5656	660	07/1917	12/2000	81	0.1667	0.1206	0.1189	0.68

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
30-1987	DAVENPORT 2 E	NY	17	-74.8000	42.4667	1350	05/1948	12/1993	41	0.1679	0.2845	0.0796	3.33
30-2036	DELHI 2 SE	NY	18	-74.9000	42.2500	1440	06/1924	12/2000	68	0.2167	0.4296	0.3001	1.30
30-2045	DELTA	NY	17	-75.4333	43.2667	561	01/1932	08/1976	45	0.1915	0.1158	0.0530	1.71
30-2060	DEPOSIT	NY	17	-75.4275	42.0633	1000	07/1962	12/2000	39	0.1963	0.3607	0.2404	1.34
30-2079	DE RUYTER 4 N	NY	17	-75.8833	42.8167	1302	01/1903	12/1983	75	0.1640	0.0778	0.1167	0.84
30-2129	DOBBS FERRY ARDSLEY	NY	84	-73.8344	41.0072	200	10/1945	12/2002	57	0.1882	0.2563	0.2042	0.04
30-2137	DOLGEVILLE	NY	17	-74.7667	43.0833	685	01/1921	12/1993	73	0.1605	0.2808	0.2759	1.13
30-2454	EAST SIDNEY	NY	17	-75.2333	42.3333	1155	04/1950	10/1998	47	0.1922	0.2223	0.1617	0.39
30-2526	EDMESTON	NY	17	-75.2500	42.6833	1180	05/1948	12/1989	42	0.1509	0.3037	0.3081	2.20
30-2582	ELLENVILLE	NY	18	-74.4000	41.7167	350	07/1945	12/2000	56	0.2123	0.2968	0.1839	0.23
30-2610	ELMIRA	NY	17	-76.8000	42.1000	844	01/1893	12/2000	107	0.1756	0.2175	0.1489	0.12
30-2720	FAIRFIELD	NY	17	-74.9000	43.1500	1460	01/1926	11/1981	50	0.1381	0.1895	0.1952	1.03
30-2760	FARMINGDALE 2 NE	NY	84	-73.4333	40.7500	79	12/1916	11/1956	30	0.1717	0.2815	0.2286	0.76
30-2829	FISHS EDDY	NY	18	-75.1833	41.9667	1020	04/1953	12/2000	43	0.1677	0.2177	0.1810	0.45
30-2917	FORESTPORT 1 W	NY	16	-75.2167	43.4333	1132	05/1942	09/1978	35	0.2076	0.2492	0.2070	0.39
30-2953	FORT PLAIN	NY	17	-74.6228	42.9383	305	05/1948	10/1998	50	0.1568	0.2261	0.1362	0.86
30-3010	FRANKFORT	NY	17	-75.1167	43.0667	410	01/1932	10/1997	66	0.1744	0.2303	0.1575	0.14
30-3025	FRANKLINVILLE	NY	30	-78.4633	42.3297	1590	01/1932	12/2000	64	0.1555	0.1131	0.1310	0.92
30-3033	FREDONIA	NY	29	-79.2286	42.4494	760	01/1914	12/2000	86	0.1906	0.3263	0.2836	0.67
30-3050	FREEVILLE 2 NE	NY	16	-76.3333	42.5167	1050	06/1948	12/2000	52	0.2032	0.1564	0.1253	1.27
30-3065	FRIENDSHIP 7 SW	NY	15	-78.2333	42.1333	1640	01/1969	12/2000	32	0.1503	0.1711	0.1452	0.86
30-3076	FROST VALLEY	NY	18	-74.5500	41.9667	1841	05/1948	12/1980	33	0.1537	0.0639	0.1381	2.67
30-3087	FULTON	NY	15	-76.4267	43.3247	405	01/1932	11/1978	47	0.1548	0.2858	0.2751	2.06
30-3138	GARDINER 1 W	NY	6	-74.1500	41.6833	320	01/1957	10/1987	31	0.1790	0.3032	0.2564	1.27
30-3144	GARDNERVILLE	NY	7	-74.4872	41.3458	460	01/1957	12/2000	44	0.1754	0.3023	0.2702	1.27
30-3177	GENEVA EXPERIMENT STN	NY	15	-77.0000	42.8833	591	01/1913	12/1968	56	0.1904	0.2925	0.2195	0.44
30-3184	GENEVA RESEARCH FARM	NY	15	-77.0303	42.8778	718	05/1948	12/2000	52	0.1815	0.2137	0.1877	0.22
30-3259	GLENHAM	NY	84	-73.9333	41.5167	275	02/1932	08/1996	65	0.1986	0.2551	0.2447	0.25
30-3319	GLOVERSVILLE	NY	17	-74.3592	43.0492	810	05/1892	12/2000	107	0.1456	0.0609	0.1015	1.06
30-3354	GOWANDA PSYCHIATRIC CT	NY	29	-78.9333	42.4833	870	01/1946	12/1996	48	0.1831	0.3479	0.2731	0.42
30-3365	GRAHAMSVILLE	NY	18	-74.5333	41.8500	960	05/1948	12/1999	51	0.1788	0.1188	0.0506	1.18
30-3373	GRAND GORGE	NY	18	-74.4833	42.3667	1362	05/1948	11/1977	30	0.1835	0.2750	0.2306	0.22

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
30-3444	GREENE	NY	17	-75.7667	42.3167	920	01/1911	12/2000	65	0.1863	0.2407	0.2051	0.30
30-3507	GRIFFISS AFB	NY	17	-75.4000	43.2333	519	05/1948	08/1995	48	0.1620	0.1221	0.2031	0.99
30-3722	HASKINVILLE	NY	16	-77.5675	42.4206	1650	01/1898	12/1999	102	0.1701	0.2247	0.2254	0.39
30-3773	HEMLOCK	NY	15	-77.6083	42.7747	902	05/1898	12/2000	102	0.1871	0.2253	0.1461	0.19
30-3839	HIGH FALLS	NY	18	-74.1333	41.8333	141	01/1927	11/1967	41	0.1877	0.2785	0.1890	0.17
30-3889	HINCKLEY 2 SW	NY	17	-75.1500	43.3000	114	01/1928	12/1992	65	0.1789	0.1699	0.1592	0.22
30-3916	HOFFMEISTER	NY	17	-74.7333	43.3833	1880	01/1921	12/1964	44	0.1744	0.1797	0.1515	0.06
30-3970	HOPE	NY	17	-74.2478	43.3117	880	06/1931	12/1998	68	0.1502	0.2241	0.1783	0.68
30-3983	HORNELL ALMOND DAM	NY	16	-77.7000	42.3500	1325	05/1948	12/2000	51	0.1764	0.2006	0.1689	0.17
30-4070	HUNTS CORNERS	NY	17	-76.1278	42.4325	1300	05/1948	10/1998	48	0.1678	0.2143	0.2108	0.17
30-4174	ITHACA CORNELL UNIV	NY	16	-76.4500	42.4500	960	01/1890	12/2000	110	0.1988	0.2248	0.1876	0.25
30-4182	JACKSONBURG	NY	17	-74.9167	43.0167	390	01/1932	09/1963	32	0.1436	0.1250	0.1304	0.68
30-4207	JAMESTOWN 4 NE	NY	30	-79.1525	42.1183	1250	07/1948	12/2000	42	0.1810	0.2341	0.1295	0.54
30-4208	JAMESTOWN WATER WORKS	NY	30	-79.2333	42.1167	1390	01/1926	12/1973	46	0.1786	0.1659	0.1270	0.60
30-4473	KORTRIGHT 2	NY	17	-74.8000	42.4167	1730	01/1961	12/1993	32	0.1374	0.0077	0.0783	1.98
30-4715	LEWISTON 1 N	NY	30	-79.0500	43.1833	331	06/1935	11/1972	38	0.1624	0.1546	0.2206	1.45
30-4731	LIBERTY 1 NE	NY	18	-74.7333	41.8000	1549	02/1898	12/2000	73	0.1648	0.1734	0.1688	0.65
30-4767	LINDEN	NY	30	-78.1667	42.8833	1122	01/1932	12/1964	33	0.1574	0.1287	0.1569	0.82
30-4772	LINDLEY	NY	16	-77.1333	42.0500	1040	08/1953	12/2000	47	0.1786	0.2719	0.1919	0.40
30-4791	LITTLE FALLS CITY RSVR	NY	17	-74.8686	43.0603	900	01/1897	12/1998	102	0.1419	0.1469	0.1651	0.66
30-4796	LITTLE FALLS MILL ST	NY	17	-74.8667	43.0333	360	01/1921	09/1994	74	0.1434	0.1292	0.2064	0.99
30-4808	LITTLE VALLEY	NY	30	-78.8133	42.2464	1625	01/1942	12/2000	58	0.1794	0.1707	0.0502	1.66
30-4836	LOCKE 2 W	NY	16	-76.4667	42.6667	1200	01/1932	12/2000	69	0.1866	0.2274	0.1868	0.05
30-4844	LOCKPORT 2 NE	NY	30	-78.6814	43.1392	605	04/1891	09/1999	107	0.1776	0.2747	0.2397	0.31
30-4849	LOCKPORT 4 NE	NY	30	-78.6333	43.2000	440	06/1961	10/1994	34	0.1774	0.2832	0.1893	0.43
30-4952	MACEDON	NY	15	-77.3019	43.0733	466	01/1932	12/2000	60	0.1673	0.2457	0.1912	0.27
30-5032	MANORKILL	NY	18	-74.3167	42.3833	1620	05/1948	09/1995	48	0.1964	0.3813	0.2803	1.03
30-5171	MAYS POINT LOCK 25	NY	15	-76.7667	43.0000	400	01/1932	12/1995	64	0.1924	0.2423	0.2036	0.47
30-5276	MERRIMAN DAM	NY	18	-74.4331	41.8000	865	07/1961	12/2000	39	0.1543	0.1017	0.1117	1.37
30-5310	MIDDLETOWN	NY	6	-74.4489	41.4603	700	01/1893	12/2000	64	0.2051	0.3251	0.2843	0.71
30-5334	MILLBROOK	NY	84	-73.6167	41.8500	820	11/1941	12/2002	58	0.1909	0.2528	0.2266	0.09
30-5377	MINEOLA	NY	84	-73.6183	40.7328	96	01/1938	12/2002	65	0.1938	0.2175	0.1871	0.09

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
30-5426	MOHONK LAKE	NY	18	-74.1550	41.7681	1245	01/1896	12/2000	105	0.1727	0.1820	0.1174	0.41
30-5435	MONGAUP VALLEY 4 SSW	NY	18	-74.8167	41.6167	1200	07/1945	12/1997	50	0.1575	0.1773	0.0860	1.24
30-5512	MORRISVILLE 3 S	NY	17	-75.7333	42.8333	1300	08/1911	12/2000	82	0.1603	0.2808	0.1683	1.21
30-5597	MOUNT MORRIS 2 W	NY	15	-77.9053	42.7314	880	01/1948	12/2000	52	0.2063	0.2823	0.1425	1.62
30-5639	NARROWSBURG 4 SE	NY	18	-75.0167	41.5667	740	01/1957	12/1998	40	0.1558	0.1274	0.0803	1.09
30-5673	NEW ALBION	NY	30	-78.9000	42.3000	1860	01/1954	12/1986	30	0.2121	0.2259	0.0570	3.42
30-5679	NEWARK	NY	15	-77.0833	43.0500	430	01/1932	12/2000	69	0.1745	0.1632	0.1502	0.32
30-5687	NEW BERLIN	NY	17	-75.3333	42.6167	1080	01/1908	12/1995	66	0.1480	0.1115	0.1740	0.70
30-5743	NEW KINGSTON	NY	18	-74.7000	42.2333	1923	05/1948	09/1985	38	0.1680	0.2561	0.1580	0.96
30-5751	NEW LONDON LOCK 22	NY	17	-75.6500	43.2167	400	01/1932	12/2000	69	0.1747	0.0726	0.1405	1.53
30-5796	NEW YORK AVE V BROOKLYN	NY	84	-73.9808	40.5939	20	05/1948	12/2002	53	0.1892	0.2501	0.1537	0.25
30-5801	NY CITY CENTRAL PARK	NY	84	-73.9669	40.7889	130	01/1876	12/2002	126	0.1938	0.2264	0.1788	0.03
30-5803	NEW YORK JFK INTL AP	NY	84	-73.7622	40.6386	11	07/1948	12/2002	41	0.1752	0.1755	0.2077	0.81
30-5804	NEW YORK LAUREL HILL	NY	84	-73.9333	40.7333	10	10/1922	12/1983	33	0.2119	0.2597	0.1843	0.37
30-5811	NEW YORK LA GUARDIA AP	NY	84	-73.8800	40.7792	11	03/1947	12/2002	55	0.1728	0.1264	0.1934	1.62
30-5821	NY WESTERLEIGH STAT IS	NY	6	-74.1167	40.6333	80	05/1948	12/1991	44	0.2065	0.1750	0.1318	1.26
30-6062	NORTHVILLE	NY	17	-74.2042	43.1592	790	01/1905	11/2000	64	0.1278	0.0267	0.1034	2.00
30-6085	NORWICH	NY	16	-75.5194	42.5011	1020	08/1906	12/2000	95	0.1782	0.2727	0.2303	0.20
30-6119	OAKLAND VALLEY 1 S	NY	18	-74.6500	41.5000	920	05/1948	12/1996	44	0.1876	0.1739	0.1446	0.55
30-6196	OLEAN	NY	16	-78.4528	42.0733	1420	01/1910	12/2000	85	0.1700	0.2634	0.2582	0.56
30-6225	ONEONTA	NY	17	-75.0667	42.4500	1152	01/1895	09/1958	62	0.1966	0.2894	0.2137	0.67
30-6314	OSWEGO EAST	NY	15	-76.4928	43.4617	350	01/1926	12/2000	75	0.1723	0.1895	0.1623	0.12
30-6346	OVID 4 S	NY	16	-76.8167	42.6167	1122	01/1932	12/1971	39	0.2044	0.5674	0.4771	4.76
30-6441	PATCHOGUE 2 N	NY	84	-73.0014	40.7967	55	05/1937	10/1997	59	0.2117	0.3004	0.1116	1.94
30-6464	PAVILION	NY	15	-77.9833	42.8667	1040	01/1957	09/1992	35	0.1626	0.0565	0.0287	1.90
30-6510	PENN YAN 2 SW	NY	15	-77.0628	42.6711	830	08/1897	12/2000	76	0.2196	0.2551	0.1581	2.14
30-6567	PHOENICIA	NY	18	-74.3142	42.0864	870	05/1948	11/2000	51	0.1738	0.1493	0.1800	1.17
30-6623	PISECO	NY	17	-74.5231	43.4614	1730	05/1948	12/2000	53	0.1349	0.3173	0.2624	3.33
30-6674	PLEASANTVILLE	NY	84	-73.7758	41.1314	320	05/1944	06/1999	55	0.1742	0.2453	0.1580	0.55
30-6685	PLYMOUTH 2 SSE	NY	17	-75.6000	42.6167	1280	05/1948	12/1995	44	0.1666	0.1988	0.1404	0.16
30-6745	PORTAGEVILLE	NY	15	-78.0400	42.5697	1168	01/1898	12/2000	69	0.1729	0.1933	0.1567	0.06
30-6774	PORT JERVIS	NY	18	-74.6847	41.3800	470	01/1893	12/2000	107	0.2047	0.3021	0.2041	0.09

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30-6817	POUGHKEEPSIE	NY	84	-73.9333	41.6833	102	01/1893	03/1971	50	0.1993	0.2738	0.1918	0.10
30-6820	POUGHKEEPSIE	NY	84	-73.9167	41.6333	170	11/1948	12/2002	45	0.1704	0.2310	0.1127	1.12
30-6831	PRATTSBURG 2 NW	NY	15	-77.3000	42.5333	1942	01/1945	10/1986	42	0.1869	0.1495	0.1292	0.70
30-6839	PRATTSVILLE	NY	18	-74.4422	42.3281	1207	05/1948	12/2000	45	0.1824	0.4200	0.3762	2.97
30-7115	RIFTON 1 N	NY	84	-74.0500	41.8500	39	10/1921	11/1967	46	0.1903	0.2800	0.1630	0.48
30-7167	ROCHESTER WSO AP	NY	15	-77.6767	43.1167	533	01/1910	12/2000	91	0.1786	0.2215	0.1463	0.09
30-7195	ROCKDALE	NY	17	-75.4000	42.3833	1030	08/1943	12/2000	56	0.1645	0.2037	0.2036	0.15
30-7210	ROCK HILL 3 SW	NY	18	-74.6167	41.5833	1270	06/1963	12/2000	38	0.1579	0.1811	0.1320	0.82
30-7274	ROSENDALE 2 E	NY	18	-74.0500	41.8500	40	05/1948	12/2000	50	0.2032	0.2307	0.1721	0.31
30-7317	ROXBURY	NY	18	-74.5667	42.2833	1490	03/1915	09/1972	58	0.1915	0.3446	0.2490	0.66
30-7329	RUSHFORD	NY	30	-78.2667	42.4000	1540	02/1954	12/2000	46	0.1660	0.2970	0.2861	0.96
30-7398	SALAMANCA	NY	30	-78.7217	42.1581	1372	05/1948	10/1998	48	0.1637	0.1894	0.1999	0.30
30-7497	SCARSDALE	NY	84	-73.8000	40.9833	199	01/1904	09/1991	83	0.1932	0.2404	0.1182	0.60
30-7633	SETAUKET STRONG	NY	84	-73.1047	40.9586	40	08/1885	11/2002	114	0.1903	0.2421	0.1596	0.13
30-7659	SHARON SPRINGS 1N	NY	17	-74.6000	42.8000	820	01/1913	09/1953	41	0.2158	0.3429	0.2103	1.80
30-7705	SHERBURNE 1 S	NY	17	-75.4833	42.6500	1080	01/1908	12/2000	92	0.1648	0.0855	0.1245	0.76
30-7713	SHERMAN	NY	29	-79.5936	42.1572	1560	01/1952	12/2000	49	0.1653	0.2639	0.2094	1.43
30-7721	SHOKAN BROWN STN	NY	18	-74.2000	41.9500	510	05/1948	12/2000	53	0.2109	0.2327	0.1580	0.55
30-7772	SINCLAIRVILLE	NY	29	-79.2656	42.2786	1620	01/1960	12/2000	41	0.1997	0.3782	0.2260	1.57
30-7780	SKANEATELES	NY	16	-76.4333	42.9500	875	01/1895	12/1997	102	0.1989	0.2399	0.1803	0.18
30-7799	SLIDE MOUNTAIN	NY	18	-74.4167	42.0167	2650	05/1948	12/2000	53	0.2104	0.2497	0.1388	0.45
30-7830	SMITHVILLE FLATS	NY	17	-75.8167	42.3833	1080	05/1948	10/1998	45	0.1669	0.2493	0.1301	0.93
30-7842	SODUS CENTER	NY	15	-77.0125	43.2078	420	01/1923	12/2000	72	0.1486	0.2073	0.0866	2.79
30-8058	SOUTH WALES EMERY PARK	NY	30	-78.6000	42.7167	1089	01/1932	07/1982	49	0.1141	0.1136	0.1723	2.96
30-8080	SPECULATOR	NY	17	-74.3617	43.5000	1740	01/1949	11/2000	32	0.1349	0.1738	0.1632	1.22
30-8088	SPENCER 2 N	NY	17	-76.5000	42.2500	1050	08/1943	12/1993	49	0.1901	0.1864	0.1857	0.71
30-8152	STAFFORD	NY	15	-78.0833	42.9833	912	01/1932	09/1967	35	0.1558	0.1703	0.1307	0.59
30-8160	STAMFORD	NY	18	-74.6333	42.4000	1779	05/1948	12/2000	52	0.1653	0.1534	0.1570	0.78
30-8322	SUFFERN	NY	6	-74.1572	41.1128	270	05/1956	12/1998	37	0.2213	0.3005	0.2498	0.66
30-8383	SYRACUSE WSO AIRPORT	NY	16	-76.1033	43.1092	410	01/1922	12/2000	79	0.1805	0.1799	0.1657	0.28
30-8498	THURSTON	NY	16	-77.3333	42.2000	1620	05/1948	10/1998	49	0.1951	0.2118	0.1941	0.31
30-8578	TRENTON FALLS	NY	17	-75.1500	43.2667	800	08/1909	12/1997	81	0.1930	0.2091	0.1198	0.63

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
30-8586	TRIBES HILL	NY	17	-74.2886	42.9464	300	05/1904	12/2000	97	0.1588	0.2144	0.1996	0.22
30-8594	TROUPSBURG 3 NE	NY	16	-77.4833	42.0667	1710	01/1945	12/2000	56	0.1648	0.1929	0.1616	0.43
30-8627	TULLY HEIBERG FOREST	NY	16	-76.0833	42.7667	1899	01/1967	12/2000	33	0.1930	0.2016	0.1167	0.62
30-8665	UNADILLA	NY	17	-75.3167	42.3167	1020	07/1943	12/1977	30	0.1981	0.2628	0.0956	1.60
30-8733	UTICA HARBOR POINT	NY	17	-75.2333	43.1167	410	01/1893	11/1948	37	0.1624	0.2046	0.2268	0.40
30-8737	UTICA FAA AP	NY	17	-75.3839	43.1450	711	01/1951	12/2000	50	0.1753	0.2327	0.2416	0.53
30-8739	UTICA	NY	17	-75.2000	43.0833	580	08/1948	11/1991	40	0.1921	0.3631	0.3733	3.81
30-8902	WALDEN 2 NE	NY	6	-74.1667	41.5667	400	01/1926	12/1958	33	0.2361	0.3386	0.2412	1.16
30-8906	WALDEN 1 ESE	NY	84	-74.1628	41.5514	380	07/1972	12/2002	31	0.1704	0.2052	0.1166	0.74
30-8936	WALTON	NY	17	-75.1333	42.1667	1240	08/1956	12/1996	41	0.1375	0.0554	0.1290	1.32
30-8949	WAPPINGERS FALLS	NY	84	-73.8667	41.6500	114	03/1893	11/1950	58	0.1831	0.2445	0.1428	0.41
30-8962	WARSAW 6 SW	NY	30	-78.2167	42.6833	1820	01/1953	12/2000	45	0.1430	0.1742	0.1131	1.23
30-8967	WARWICK	NY	6	-74.3667	41.2667	541	03/1900	10/1974	75	0.2128	0.3253	0.2078	0.48
30-8987	WATERLOO	NY	15	-76.8667	42.9000	452	01/1932	12/2000	69	0.1957	0.2271	0.1813	0.51
30-9072	WELLSVILLE	NY	16	-77.9475	42.1172	1510	01/1956	12/2000	44	0.2174	0.3526	0.3064	0.62
30-9076	WELLSVILLE 4 NNW	NY	16	-77.9833	42.1667	1460	01/1939	12/1997	57	0.1672	0.2178	0.2208	0.47
30-9189	WESTFIELD	NY	29	-79.5856	42.2956	707	01/1896	12/2000	84	0.1963	0.2954	0.2513	0.53
30-9229	WEST JASPER	NY	16	-77.5667	42.1500	2169	05/1948	09/1997	46	0.2085	0.3006	0.2182	0.26
30-9292	WEST POINT	NY	84	-73.9608	41.3906	320	03/1890	12/2002	107	0.1782	0.1567	0.0901	0.65
30-9425	WHITESVILLE	NY	16	-77.7647	42.0397	1740	02/1954	12/2000	47	0.1515	0.1959	0.2471	1.60
30-9437	WHITNEY POINT LAKE	NY	17	-75.9667	42.3333	1040	04/1933	12/2000	59	0.1852	0.1670	0.1724	0.58
30-9442	WHITNEY POINT DAM	NY	17	-75.9667	42.3500	1040	05/1948	10/1998	51	0.1904	0.2323	0.1405	0.42
30-9507	WILSON 2 NE	NY	30	-78.8333	43.2500	350	01/1942	12/1996	53	0.1338	0.1401	0.1403	1.27
30-9516	WINDHAM 3 E	NY	18	-74.2011	42.3031	1680	01/1900	12/2000	58	0.2492	0.2990	0.1551	2.44
30-9533	WISCOY 1 E	NY	15	-78.0500	42.5167	1151	07/1940	12/1994	52	0.1897	0.1743	0.0989	0.66
30-9544	WOLCOTT 3 NW	NY	15	-76.8667	43.2500	400	07/1941	10/1996	56	0.1761	0.2763	0.1939	0.32
30-9670	YORKTOWN HEIGHTS 1 W	NY	84	-73.7975	41.2664	670	04/1965	12/2002	38	0.1972	0.4749	0.4279	3.82
31-0090	ALBEMARLE	NC	11	-80.1994	35.3992	610	06/1911	12/2000	90	0.1973	0.2841	0.1937	0.45
31-0160	ALTAPASS	NC	25	-82.0167	35.9000	2762	01/1911	12/1961	46	0.2665	0.4288	0.3920	4.01
31-0184	ANDREWS	NC	27	-83.8386	35.2014	1749	01/1910	12/2000	86	0.1747	0.2515	0.2098	0.22
31-0241	ARCOLA	NC	4	-77.9822	36.2911	330	01/1931	12/2000	62	0.2056	0.2797	0.2101	0.15
31-0286	ASHEBORO 2 W	NC	11	-79.8378	35.7044	870	02/1926	12/2000	75	0.2408	0.3159	0.2159	4.15

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
31-0300	ASHEVILLE WSO AP	NC	26	-82.5392	35.4358	2140	01/1951	12/2000	42	0.1675	0.1566	0.0674	0.81
31-0301	ASHEVILLE	NC	26	-82.5333	35.6000	2240	01/1903	12/2000	98	0.1735	0.2029	0.1525	0.01
31-0312	ASHFORD	NC	25	-81.9500	35.8833	1790	06/1948	12/1996	42	0.1829	0.1879	0.1393	0.26
31-0438	BADIN	NC	11	-80.1828	35.4592	600	05/1927	12/1997	68	0.1760	0.2267	0.1122	0.63
31-0506	BANNER ELK	NC	25	-81.8628	36.1531	3748	01/1908	12/2000	93	0.2257	0.3222	0.1829	1.05
31-0576	BAYBORO 3 E	NC	2	-76.7167	35.1500	10	01/1969	12/2000	29	0.2017	0.2884	0.2125	0.20
31-0650	BEETREE DAM	NC	24	-82.4000	35.6333	2543	01/1937	12/1997	54	0.2224	0.3127	0.2311	1.36
31-0674	BELHAVEN	NC	2	-76.6864	35.4992	8	01/1909	12/2000	87	0.2165	0.2512	0.2182	0.49
31-0724	BENT CREEK	NC	26	-82.5950	35.5053	2110	01/1949	12/2000	52	0.1505	0.0795	0.0812	0.76
31-0843	BLACK MOUNTAIN 2 W	NC	24	-82.3594	35.6072	2290	01/1950	12/2000	51	0.2131	0.2523	0.1253	0.75
31-0901	BLOWING ROCK 1 NW	NC	25	-81.7025	36.1472	3850	01/1943	12/1998	51	0.2060	0.2063	0.1003	0.62
31-0977	BOONE	NC	25	-81.6667	36.2167	3241	01/1929	11/1998	61	0.1919	0.3184	0.2289	0.77
31-1055	BREVARD	NC	26	-82.7053	35.2156	2212	01/1902	12/2000	91	0.1836	0.2216	0.1710	0.16
31-1081	BRIDGEWATER HYDRO	NC	24	-81.8372	35.7431	1150	01/1949	12/2000	52	0.1563	0.0867	0.1373	2.03
31-1159	BRYSON CITY	NC	26	-83.4500	35.4333	1762	01/1937	12/1997	58	0.1989	0.3094	0.2336	1.01
31-1174	BUCK FOREST	NC	26	-82.6167	35.1833	2515	01/1959	11/1991	33	0.1709	0.1607	0.1607	0.22
31-1239	BURLINGTON	NC	10	-79.4481	36.0603	660	01/1946	12/2000	54	0.1685	0.2119	0.2314	1.49
31-1241	BURLINGTON 3 NNE	NC	10	-79.4069	36.1278	640	07/1945	10/1998	51	0.1811	0.1383	0.1591	0.73
31-1285	BUTNER FILTER PLANT	NC	10	-78.7736	36.1414	355	02/1956	12/2000	45	0.1489	0.1728	0.1601	0.97
31-1441	CANTON 1 SW	NC	26	-82.8500	35.5167	2662	01/1931	12/1992	62	0.1803	0.3131	0.1853	0.69
31-1458	CAPE HATTERAS WSO	NC	2	-75.6225	35.2322	10	03/1957	12/2000	44	0.2092	0.1852	0.1625	0.85
31-1479	CAROLEEN	NC	11	-81.8000	35.2833	810	01/1900	12/1973	74	0.1747	0.1890	0.1217	0.13
31-1515	CARTHAGE 8 SE	NC	11	-79.4078	35.3314	440	05/1946	12/2000	54	0.2061	0.2118	0.0861	1.61
31-1538	CASAR	NC	11	-81.6019	35.4797	1120	03/1956	12/2000	45	0.1775	0.2464	0.1706	0.55
31-1564	CATALOOCHEE	NC	26	-83.1000	35.6167	2620	06/1945	12/2000	53	0.1399	0.1286	0.0724	1.32
31-1579	CATAWBA 3 NNW	NC	24	-81.0833	35.7500	900	01/1946	12/2000	54	0.2142	0.3292	0.2128	0.99
31-1606	CEDAR ISLAND	NC	2	-76.3000	34.9833	8	05/1950	12/2000	50	0.2173	0.3336	0.2507	0.23
31-1614	CEDAR MOUNTAIN	NC	26	-82.6333	35.1500	2753	01/1949	09/1980	32	0.1488	0.1471	0.1373	0.40
31-1624	CELO 2 S	NC	24	-82.1753	35.8292	2680	01/1943	12/2000	58	0.1859	0.1899	0.1684	0.19
31-1677	CHAPEL HILL 2 W	NC	11	-79.0794	35.9086	500	01/1891	12/2000	104	0.1924	0.3077	0.1701	1.01
31-1690	CHARLOTTE WSO ARPT	NC	11	-80.9542	35.2225	728	01/1948	12/2000	53	0.2002	0.2401	0.1500	0.32
31-1695	CHARLOTTE WB CITY	NC	11	-80.8500	35.2333	774	01/1893	12/1950	58	0.1915	0.1807	0.0959	0.56

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
31-1820	CLAYTON 3 W	NC	4	-78.4633	35.6408	300	01/1956	12/2000	43	0.2498	0.3869	0.2523	3.04
31-1877	CLINTON 2 SE	NC	3	-78.3167	34.9667	151	08/1936	11/1976	40	0.1807	0.1894	0.1239	0.93
31-1881	CLINTON 2 NE	NC	3	-78.2758	35.0247	158	01/1971	12/2000	30	0.2682	0.3851	0.2649	1.54
31-1975	CONCORD	NC	11	-80.6006	35.4167	690	01/1933	12/2000	68	0.1869	0.2193	0.1413	0.01
31-1990	CONOVER OXFORD SHOALS	NC	24	-81.1919	35.8214	883	01/1949	12/2000	52	0.1700	0.2303	0.2012	0.95
31-2102	COWEETA EXP STN	NC	26	-83.4333	35.0667	2249	01/1943	12/2000	57	0.1732	0.2135	0.1137	0.33
31-2200	CULLOWHEE	NC	26	-83.1911	35.3256	2192	01/1910	12/2000	91	0.1679	0.1701	0.0945	0.38
31-2230	DALTON	NC	9	-80.4000	36.3000	1010	06/1948	10/1998	48	0.1855	0.2351	0.1870	0.26
31-2238	DANBURY	NC	9	-80.1422	36.3950	760	01/1947	12/2000	54	0.1884	0.2721	0.1583	0.40
31-2388	DOBSON	NC	24	-80.7192	36.4119	1285	01/1943	10/1998	56	0.1764	0.1334	0.1525	0.93
31-2500	DUNN 4 NW	NC	4	-78.6881	35.3247	200	01/1963	12/2000	37	0.2083	0.2526	0.1702	0.04
31-2515	DURHAM	NC	10	-78.9625	36.0425	400	01/1909	12/2000	92	0.2020	0.2140	0.1211	0.60
31-2631	EDEN	NC	9	-79.7433	36.4742	678	01/1951	12/2000	50	0.1709	0.1614	0.1429	0.77
31-2635	EDENTON	NC	2	-76.6103	36.0622	20	01/1896	12/2000	104	0.1860	0.1594	0.0865	0.77
31-2719	ELIZABETH CITY	NC	2	-76.2050	36.3097	8	04/1911	12/2000	88	0.2126	0.2607	0.0782	2.57
31-2724	ELIZABETH CITY FAA AIR	NC	2	-76.1833	36.2667	10	01/1949	12/2000	37	0.1902	0.2665	0.1831	0.59
31-2732	ELIZABETHTOWN LOCK 2	NC	3	-78.5783	34.6267	60	01/1911	12/2000	90	0.2153	0.3470	0.2467	0.26
31-2740	ELKIN	NC	24	-80.8650	36.2544	870	01/1934	12/2000	66	0.1722	0.1265	0.1321	0.87
31-2827	ENFIELD	NC	3	-77.6750	36.1686	110	07/1910	12/2000	91	0.2236	0.3204	0.1826	0.35
31-2837	ENKA	NC	26	-82.6514	35.5389	2050	01/1931	12/2000	69	0.1609	0.2436	0.1212	0.91
31-3017	FAYETTEVILLE	NC	4	-78.8583	35.0583	96	01/1872	12/1999	106	0.1856	0.2519	0.1734	0.27
31-3101	FLETCHER 4 E	NC	26	-82.4833	35.4500	2190	01/1939	07/1995	54	0.1748	0.3316	0.2438	1.22
31-3106	FLETCHER 3 W	NC	26	-82.5572	35.4264	2070	01/1949	12/2000	52	0.1866	0.2239	0.0770	1.32
31-3168	FORT BRAGG WATER PLANT	NC	11	-79.0239	35.1778	160	08/1948	12/2000	52	0.1625	0.1867	0.1867	1.38
31-3228	FRANKLIN 2	NC	27	-83.4247	35.1750	2170	01/1939	12/2000	62	0.1902	0.2935	0.2335	0.13
31-3232	FRANKLINTON	NC	11	-78.4592	36.1050	375	06/1948	10/1998	51	0.1777	0.1282	0.0879	0.61
31-3238	GARNER	NC	11	-78.6608	35.6708	330	01/1946	12/1985	40	0.1820	0.1438	0.0435	1.29
31-3356	GASTONIA	NC	11	-81.1439	35.2656	700	01/1931	12/2000	68	0.1770	0.1773	0.0447	1.36
31-3455	GLENDALE SPRINGS	NC	25	-81.3833	36.3500	2910	01/1943	12/1992	49	0.2107	0.1936	0.0839	1.04
31-3510	GOLDSBORO 4 SE	NC	3	-77.9647	35.3444	109	01/1900	12/2000	98	0.2225	0.2674	0.1496	0.67
31-3555	GRAHAM 2 ENE	NC	10	-79.3728	36.0503	660	07/1902	12/2000	99	0.1841	0.2579	0.1671	0.44
31-3565	GRANDFATHER MOUNTAIN	NC	25	-81.8325	36.1083	5300	01/1956	12/2000	45	0.1684	0.1529	0.0799	0.55

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
31-3625	GREENSBORO PUMP STN	NC	10	-79.8000	36.0833	771	01/1949	12/1980	32	0.1796	0.1412	0.1684	0.77
31-3630	GREENSBORO WSO AIRPORT	NC	10	-79.9436	36.0975	897	01/1897	12/2000	104	0.1858	0.2038	0.1171	0.14
31-3638	GREENVILLE 2	NC	2	-77.4000	35.6333	32	03/1875	12/2000	96	0.2013	0.2902	0.2121	0.23
31-3784	HAMLET	NC	11	-79.6922	34.8872	350	01/1950	12/2000	51	0.1973	0.2995	0.1904	0.62
31-3897	HATTERAS	NC	2	-75.7167	35.2167	15	01/1893	12/2000	62	0.2005	0.2236	0.2527	1.57
31-3925	HAYWOOD GAP	NC	26	-82.9167	35.3000	5404	01/1949	09/1980	32	0.1896	0.2203	0.1014	0.82
31-3957	HELTON	NC	25	-81.5039	36.5631	2840	03/1940	10/1998	57	0.2282	0.2425	0.1815	0.74
31-3969	HENDERSON 2 NNW	NC	10	-78.4119	36.3481	480	06/1893	12/2000	107	0.1987	0.2719	0.1869	0.82
31-3976	HENDERSONVILLE	NC	26	-82.4500	35.3333	2160	06/1898	12/2000	102	0.2031	0.3224	0.2167	1.03
31-4015	HICKORY	NC	24	-81.3500	35.7500	1165	01/1913	12/1975	63	0.2093	0.3640	0.2708	2.24
31-4020	HICKORY FAA AIRPORT	NC	24	-81.3897	35.7411	1143	01/1949	12/2000	51	0.1641	0.1865	0.1049	2.09
31-4050	HIGHLANDS	NC	26	-83.2000	35.0500	3802	01/1941	12/1997	57	0.1744	0.2356	0.1350	0.24
31-4055	HIGHLANDS 2 S	NC	26	-83.1883	35.0531	3840	01/1879	12/2000	105	0.1918	0.2154	0.1572	0.45
31-4063	HIGH POINT	NC	10	-79.9722	35.9672	900	07/1921	12/2000	78	0.2019	0.2654	0.1965	1.00
31-4136	HOBUCKEN BRIDGE	NC	2	-76.6000	35.2333	8	06/1948	10/1998	34	0.2518	0.3862	0.1978	1.89
31-4260	HOT SPRINGS	NC	26	-82.8314	35.8953	1396	01/1937	12/2000	52	0.1625	0.2757	0.2174	0.83
31-4265	HOT SPRINGS 2	NC	26	-82.8333	35.9000	1480	01/1907	12/1983	72	0.1604	0.2713	0.2771	2.04
31-4385	IDLEWILD	NC	25	-81.4589	36.3119	2900	03/1940	12/1997	54	0.2348	0.3659	0.2522	0.89
31-4456	JACKSON	NC	3	-77.4239	36.3967	130	01/1949	12/2000	51	0.2236	0.3923	0.3483	1.76
31-4464	JACKSON SPRINGS 5 WNW	NC	11	-79.6772	35.1858	730	07/1952	12/2000	49	0.1947	0.2353	0.1306	0.23
31-4496	JEFFERSON 2 ESE	NC	25	-81.4286	36.4161	2770	02/1896	12/2000	94	0.2090	0.2818	0.1879	0.11
31-4649	KILL DEVIL HILLS N M	NC	2	-75.6667	36.0167	10	07/1943	04/1981	34	0.1849	0.1189	0.1528	1.68
31-4684	KINSTON 5 SE	NC	3	-77.5433	35.1967	24	01/1900	12/2000	95	0.1989	0.2874	0.2441	0.40
31-4689	KINSTON 7 NNE	NC	3	-77.5500	35.3667	60	03/1966	12/2000	34	0.2278	0.3178	0.2722	0.43
31-4764	LAKE LURE 2	NC	26	-82.1881	35.4206	1040	06/1948	12/2000	39	0.1716	-0.0215	0.1747	6.08
31-4772	LAKE MICHIE	NC	10	-78.8333	36.1500	331	01/1927	12/1971	44	0.1528	0.1569	0.0237	2.89
31-4780	LAKE RALEIGH	NC	11	-78.6833	35.7500	302	01/1927	12/1976	44	0.1895	0.1906	0.1235	0.19
31-4788	LAKE TOXAWAY	NC	26	-82.9608	35.1086	3080	01/1952	12/2000	46	0.1848	0.0817	0.1035	1.79
31-4860	LAURINBURG	NC	4	-79.4664	34.7508	210	05/1946	12/2000	55	0.1826	0.2071	0.1687	0.59
31-4938	LENOIR	NC	24	-81.5339	35.9117	1200	01/1872	12/2000	116	0.1763	0.1699	0.1561	0.37
31-4962	LEWISTON	NC	2	-77.1708	36.1325	50	03/1954	12/2000	46	0.1970	0.2575	0.1758	0.23
31-4970	LEXINGTON	NC	10	-80.2597	35.8458	760	01/1938	12/2000	63	0.1856	0.1957	0.1335	0.06

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
31-4996	LINCOLNTON 4 W	NC	11	-81.3333	35.4667	900	04/1952	12/2000	49	0.1459	0.0099	0.0081	3.02
31-5123	LOUISBURG	NC	11	-78.3039	36.1028	260	01/1893	12/2000	107	0.1887	0.2795	0.1951	0.58
31-5177	LUMBERTON 6 NW	NC	4	-79.0247	34.6272	112	05/1897	12/2000	101	0.2045	0.2788	0.1680	0.21
31-5283	MANGUMS STORE 4 WSW	NC	10	-78.9000	36.1667	381	01/1927	12/1970	44	0.1401	0.1068	0.1040	1.49
31-5303	MANTEO AIRPORT	NC	2	-75.7000	35.9167	13	01/1905	12/2000	89	0.1858	0.1502	0.1575	0.87
31-5340	MARION	NC	24	-82.0292	35.6631	1466	01/1893	12/2000	103	0.1997	0.2834	0.1628	0.66
31-5356	MARSHALL	NC	24	-82.6672	35.8022	2000	01/1899	12/2000	100	0.1755	0.1951	0.2109	0.95
31-5402	MAX PATCH MOUNTAIN	NC	26	-82.9500	35.8167	4022	01/1949	09/1980	32	0.1673	0.1146	0.1599	0.77
31-5743	MOCKSVILLE	NC	11	-80.4972	35.8439	802	02/1893	12/2000	77	0.1616	0.1560	0.1611	1.02
31-5763	MONCURE	NC	11	0.0000	0.0000	202	04/1894	12/1978	85	0.1795	0.1211	0.1277	1.01
31-5771	MONROE 4 SE	NC	11	-80.5233	34.9797	550	01/1896	12/2000	105	0.1969	0.2752	0.1654	0.33
31-5814	MOORESVILLE	NC	11	-80.8333	35.6000	870	03/1949	10/1998	49	0.1665	0.0922	0.1642	2.33
31-5830	MOREHEAD CITY 2 WNW	NC	2	-76.7333	34.7333	10	02/1896	12/2000	98	0.2136	0.2768	0.2324	0.21
31-5838	MORGANTON	NC	24	-81.6717	35.7306	1160	01/1893	12/2000	107	0.1950	0.2095	0.1060	0.69
31-5890	MOUNT AIRY	NC	9	-80.6508	36.4992	1041	01/1893	12/2000	106	0.1827	0.2189	0.1318	0.30
31-5913	MOUNT HOLLY 4 NE	NC	11	-80.9872	35.3328	610	01/1949	12/2000	52	0.1465	0.1354	0.0234	3.15
31-5921	MOUNT MITCHELL	NC	24	-82.2667	35.7667	6640	06/1925	12/1976	52	0.2211	0.1888	0.1812	2.89
31-5945	MOUNT PLEASANT	NC	11	-80.4308	35.4117	740	01/1948	10/1998	50	0.1951	0.2220	0.1645	0.24
31-6001	MURPHY 2 NE	NC	27	-84.0239	35.0961	1576	01/1872	12/2000	124	0.2076	0.3573	0.2112	1.71
31-6031	NANTAHALA	NC	27	-83.6833	35.2667	2011	02/1934	07/1976	43	0.1572	0.1209	0.1281	1.74
31-6044	NASHVILLE	NC	3	-77.9667	35.9667	210	05/1904	09/1987	84	0.1801	0.2546	0.1700	0.63
31-6091	NEUSE 2 NE	NC	11	-78.5667	35.9167	280	07/1911	09/1999	89	0.1866	0.2501	0.1701	0.20
31-6103	NEW BERN 3 NW	NC	2	-77.0833	35.1333	10	02/1872	12/1975	89	0.2209	0.2504	0.1806	0.31
31-6108	NEW BERN FAA AIRPORT	NC	2	-77.0500	35.0667	16	01/1949	12/2000	48	0.2231	0.2945	0.1957	0.16
31-6135	NEW HOLLAND	NC	2	-76.2108	35.4486	2	02/1914	12/2000	84	0.2317	0.3214	0.2383	0.34
31-6231	NORTH FORK	NC	24	-82.3333	35.7000	2772	01/1949	09/1980	32	0.2236	0.1999	0.1263	1.69
31-6236	NORTH FORK 2	NC	24	-82.3428	35.6614	2480	01/1917	12/2000	83	0.2071	0.2921	0.2174	0.58
31-6256	NORTH WILKESBORO	NC	24	-81.1494	36.1631	1120	01/1922	12/2000	77	0.2137	0.2316	0.1821	0.77
31-6261	N WILKESBORO 11 SE	NC	24	-80.9775	36.0731	1050	06/1948	10/1998	51	0.1921	0.2268	0.1038	1.16
31-6274	NORWOOD	NC	11	-80.1000	35.2333	290	01/1941	12/1989	46	0.1772	0.2011	0.0813	0.71
31-6341	OCONALUFTEE	NC	26	-83.3053	35.5156	2040	01/1949	12/2000	52	0.1511	0.1000	0.0980	0.54
31-6510	OXFORD AG	NC	10	-78.6092	36.3047	500	01/1939	12/2000	61	0.1902	0.1941	0.1532	0.24

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
31-6565	PARKER 1 E	NC	25	-81.6667	36.4500	3953	01/1918	12/1962	45	0.1779	0.2667	0.1671	0.69
31-6602	PATTERSON	NC	24	-81.5658	35.9997	1270	08/1898	12/2000	67	0.2091	0.2703	0.1725	0.26
31-6742	PINEHURST	NC	11	-79.4667	35.2000	551	01/1904	12/1977	74	0.2064	0.3182	0.1392	1.51
31-6805	PISGAH FOREST 1 N	NC	26	-82.7031	35.2678	2110	01/1940	12/2000	61	0.1921	0.3250	0.1572	1.11
31-6853	PLYMOUTH EXP STN	NC	2	-76.6500	35.8667	20	02/1945	12/2000	56	0.1688	0.0611	0.0487	1.72
31-6867	POLKTON 2 NE	NC	11	-80.1639	35.0203	305	06/1948	12/1992	45	0.1937	0.2656	0.1910	0.33
31-6891	POPE AFB	NC	11	-79.0089	35.1739	218	06/1948	12/2000	46	0.1568	0.1266	0.1117	0.88
31-7069	RALEIGH DURHAM WSFO AP	NC	10	-78.7864	35.8706	416	02/1945	12/2000	56	0.1610	0.0853	0.0984	1.07
31-7074	RALEIGH 4 SW	NC	11	-78.6844	35.7283	420	01/1892	12/2000	109	0.1815	0.1927	0.1566	0.13
31-7079	RALEIGH NC STATE UNIV	NC	11	-78.6989	35.7944	400	01/1921	12/2000	79	0.1827	0.2034	0.0981	0.32
31-7097	RANDLEMAN	NC	10	-79.7917	35.8222	810	02/1905	12/2000	96	0.1636	0.1688	0.1176	0.26
31-7165	RED SPRINGS 1 SE	NC	11	-79.1833	34.8000	180	01/1930	12/2000	68	0.1721	0.2234	0.1738	0.64
31-7202	REIDSVILLE 2 NW	NC	9	-79.6947	36.3825	890	01/1902	12/2000	87	0.1934	0.2467	0.1345	0.33
31-7229	RHODHISS HYDRO PLANT	NC	24	-81.4372	35.7739	976	01/1949	12/2000	52	0.1656	0.2498	0.2124	1.65
31-7324	ROARING GAP 1 NW	NC	24	-80.9964	36.4081	2820	09/1948	10/1998	50	0.2133	0.2044	0.1171	0.84
31-7363	ROCK HOUSE	NC	26	-83.1000	35.0000	3104	01/1900	12/1957	58	0.2194	0.3441	0.2230	2.03
31-7395	ROCKY MOUNT 6 SW	NC	3	-77.8892	35.9100	130	01/1905	12/2000	95	0.1969	0.3074	0.2077	0.34
31-7400	ROCKY MOUNT EXP FARM	NC	3	-77.6806	35.8936	110	05/1914	12/1999	84	0.2159	0.3680	0.2841	0.69
31-7486	ROSMAN	NC	26	-82.8175	35.1267	2200	01/1936	12/2000	65	0.1995	0.2362	0.1528	0.76
31-7499	ROUGEMONT	NC	10	-78.8569	36.2119	540	01/1914	12/2000	87	0.1707	0.2409	0.1380	0.60
31-7516	ROXBORO 7 ESE	NC	10	-78.8858	36.3469	710	01/1893	12/2000	88	0.1811	0.2853	0.1403	1.12
31-7615	SALISBURY	NC	11	-80.4811	35.6836	700	01/1893	12/2000	106	0.1785	0.2051	0.0893	0.56
31-7618	SALISBURY 9 WNW	NC	11	-80.6167	35.7000	825	04/1954	12/2000	47	0.1759	0.1532	0.0811	0.41
31-7630	SAMS GAP	NC	24	-82.5667	35.9500	3691	01/1949	12/1997	49	0.1789	0.1505	0.1591	0.66
31-7725	SCOTLAND NECK #2	NC	3	-77.4231	36.1369	100	07/1904	12/2000	97	0.2267	0.4133	0.2836	1.12
31-7789	SETTLE	NC	24	-80.7667	36.0167	702	08/1895	11/1957	61	0.1943	0.2641	0.1704	0.31
31-7845	SHELBY	NC	11	-81.5336	35.3144	920	01/1924	12/2000	74	0.1822	0.1301	0.0711	0.92
31-7924	SILER CITY 2 S	NC	11	-79.4622	35.7606	610	07/1916	12/2000	75	0.1850	0.2369	0.1482	0.11
31-7974	SLOAN 3 S	NC	3	-77.8167	34.7833	49	03/1893	12/1980	88	0.1766	0.2438	0.1069	1.40
31-7994	SMITHFIELD	NC	4	-78.3458	35.5164	150	01/1911	12/2000	90	0.2119	0.2552	0.1787	0.09
31-8037	SNEADS FERRY	NC	2	-77.4000	34.5500	10	06/1948	12/1986	37	0.1678	0.2323	0.2133	1.49
31-8089	SOUTHERN PINES 2 W	NC	11	-79.4333	35.1667	502	01/1893	12/1967	70	0.1990	0.2745	0.2126	0.64

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
31-8113	SOUTHPORT 5 N	NC	3	-78.0100	33.9922	20	01/1892	12/2000	107	0.2430	0.3444	0.2709	0.55
31-8158	SPARTA 3 SSW	NC	25	-81.0931	36.4819	3005	01/1942	12/2000	59	0.2066	0.2385	0.1690	0.07
31-8292	STATESVILLE 2 NNE	NC	24	-80.8808	35.8100	950	01/1902	12/2000	98	0.2207	0.3230	0.1972	0.98
31-8442	SWANNANOA 2 E	NC	24	-82.3667	35.6000	2241	03/1931	12/1986	56	0.1680	0.2392	0.2603	2.29
31-8492	TAPOCO	NC	36	-83.9397	35.4469	1110	01/1930	12/2000	71	0.1393	0.2206	0.1938	1.44
31-8500	TARBORO 1 S	NC	3	-77.5386	35.8847	35	01/1893	12/2000	108	0.1771	0.2703	0.1165	1.66
31-8694	TRANSOU	NC	25	-81.3039	36.3919	2875	03/1940	12/2000	61	0.2084	0.2735	0.1312	1.11
31-8706	TRENTON	NC	2	-77.3500	35.0667	30	01/1956	12/2000	45	0.2258	0.3250	0.2023	0.36
31-8744	TRYON	NC	26	-82.2517	35.2058	1200	01/1917	12/2000	84	0.1877	0.1247	0.1216	1.19
31-8754	TUCKASEGEE 2 S	NC	26	-83.1333	35.2333	2313	01/1946	12/1977	32	0.1696	0.1948	0.2136	0.66
31-8778	TURNERSBURG	NC	24	-80.8139	35.9067	825	01/1956	12/2000	45	0.1888	0.2628	0.1335	1.36
31-8964	WADESBORO	NC	11	-80.0772	34.9603	480	06/1938	12/2000	63	0.1660	0.2074	0.0859	1.38
31-9100	WASHINGTON MAIN STREET	NC	2	-77.0167	35.5333	14	01/1946	12/2000	54	0.2259	0.2224	0.0589	2.47
31-9123	WATERVILLE 2	NC	26	-83.0981	35.7742	1440	01/1931	12/2000	70	0.1531	0.1891	0.2045	0.78
31-9147	WAYNESVILLE EXP STN	NC	26	-82.9681	35.4811	2658	05/1894	12/2000	102	0.1625	0.1578	0.0978	0.32
31-9191	WELDON 2	NC	3	-77.6000	36.4333	79	03/1872	12/1971	85	0.2041	0.2467	0.0866	1.58
31-9352	WHITEVILLE	NC	3	-78.7167	34.3167	59	07/1903	12/1975	35	0.1682	0.2099	0.2260	1.89
31-9357	WHITEVILLE 7 NW	NC	3	-78.7914	34.4094	90	05/1954	12/2000	47	0.2276	0.2819	0.2254	0.38
31-9382	WILBAR 4 NW	NC	25	-81.3333	36.2833	2323	01/1943	12/1975	32	0.1740	0.2081	0.1454	0.29
31-9406	WILKESBORO	NC	24	-81.1833	36.1500	1178	01/1943	12/1994	50	0.2017	0.2555	0.2009	0.27
31-9423	WILLARD 4 SW	NC	3	-78.0492	34.6528	55	01/1908	12/2000	93	0.1980	0.2209	0.2023	0.65
31-9427	WILLIAM O HUSKE L&D	NC	4	-78.8253	34.8347	30	02/1956	09/2000	45	0.2039	0.3344	0.2481	0.84
31-9440	WILLIAMSTON 1 E	NC	2	-77.0333	35.8500	20	07/1930	12/2000	68	0.2081	0.3858	0.3050	1.36
31-9457	WILMINGTON WSO AIRPORT	NC	3	-77.9061	34.2683	30	01/1933	12/2000	67	0.2148	0.2867	0.2045	0.03
31-9467	WILMINGTON 7 N	NC	3	-77.9167	34.3167	40	07/1949	12/2000	49	0.2368	0.4323	0.3458	1.74
31-9476	WILSON 3 SW	NC	3	-77.9456	35.6939	110	01/1937	12/2000	64	0.2030	0.2450	0.2648	1.32
31-9539	WINSTON SALEM REYNOL	NC	10	-80.2333	36.1333	994	01/1904	12/1964	61	0.1926	0.2214	0.1935	0.67
31-9555	W KERR SCOTT RESERVOIR	NC	24	-81.2275	36.1308	1070	01/1966	12/2000	35	0.1985	0.1876	0.1627	0.47
31-9667	YADKIN COLLEGE	NC	10	-80.3608	35.8558	810	01/1956	12/2000	45	0.1895	0.0888	0.0897	2.05
31-9675	YADKINVILLE 6 E	NC	24	-80.5481	36.1306	875	02/1940	12/2000	55	0.2033	0.2724	0.1854	0.21
31-9700	YANCEYVILLE	NC	10	-79.3333	36.4333	620	03/1949	12/1979	31	0.2190	0.2875	0.0783	2.61
33-0058	AKRON CANTON WSO AP	OH	40	-81.4333	40.9167	1208	01/1883	12/2000	118	0.1807	0.2049	0.0738	1.24

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
33-0063	AKRON WB AIRPORT	OH	40	-81.4500	41.0333	1070	05/1896	11/1952	55	0.2353	0.3263	0.2172	1.69
33-0083	ALEXANDRIA 4 W	OH	40	-82.6833	40.0833	1220	01/1893	11/1998	91	0.1982	0.2999	0.2939	0.78
33-0107	ALLIANCE 3 NNW	OH	39	-81.1169	40.9550	1055	01/1927	10/1998	60	0.2125	0.2292	0.1820	2.16
33-0141	AMESVILLE	OH	39	-81.9667	39.4000	660	04/1904	09/1988	63	0.1721	0.2015	0.1486	0.02
33-0251	ASHLAND	OH	40	-82.3000	40.8667	1050	01/1913	12/1967	55	0.1858	0.2282	0.1907	0.23
33-0256	ASHLAND 2 SW	OH	40	-82.3500	40.8333	1265	01/1889	12/2000	97	0.1998	0.3396	0.2577	0.21
33-0264	ASHTABULA	OH	41	-80.8000	41.8500	690	06/1951	12/1997	47	0.2056	0.1850	0.1041	0.91
33-0274	ATHENS 5 NW	OH	39	-82.1833	39.3833	689	06/1893	11/1980	59	0.1787	0.2655	0.1659	0.36
33-0279	ATHENS 1 E	OH	39	-82.0964	39.3428	800	01/1939	12/2000	60	0.1749	0.2271	0.1357	0.28
33-0298	ATWOOD DAM	OH	40	-81.2833	40.5167	950	01/1950	12/1986	37	0.1887	0.1417	0.1318	1.55
33-0430	BARNESVILLE	OH	39	-81.1500	39.9833	1240	01/1940	12/2000	59	0.1517	0.2166	0.1993	0.86
33-0460	BATAVIA 4 N	OH	45	-84.1667	39.1167	850	04/1915	12/1950	36	0.1437	0.2068	0.1866	1.25
33-0493	BEACH CITY LAKE	OH	40	-81.5667	40.6333	985	01/1950	09/1998	49	0.1778	0.3338	0.3723	2.54
33-0563	BELLEFONTAINE	OH	43	-83.7747	40.3533	1185	01/1894	12/2000	104	0.1740	0.1971	0.1818	0.28
33-0573	BELLEVILLE LOCK & DAM	OH	31	-81.7439	39.1161	560	06/1917	12/2000	83	0.1697	0.1723	0.1778	0.52
33-0581	BELMONT 4 SE	OH	39	-80.9833	39.9833	1332	01/1896	12/1948	52	0.1886	0.3177	0.2116	0.70
33-0639	BERLIN LAKE	OH	39	-81.0167	41.0333	1040	11/1948	10/1998	47	0.1614	0.2341	0.1534	0.70
33-0676	BEVERLY LOCK 4	OH	39	-81.6286	39.5469	640	01/1914	12/2000	42	0.1532	0.2304	0.2630	1.75
33-0823	BOLIVAR DAM	OH	40	-81.4333	40.6500	981	01/1950	12/1986	37	0.1813	0.2974	0.3137	1.26
33-0854	BOURNEVILLE____________	OH	39	-83.1667	39.2667	705	06/1949	12/1985	37	0.2001	0.2745	0.1335	1.04
33-0862	BOWLING GREEN WWTP	OH	52	-83.6111	41.3831	675	06/1893	12/2000	108	0.1835	0.2489	0.1866	0.15
33-1057	BUCKEYE LAKE 2 WNW	OH	40	-82.4817	39.9519	887	02/1956	12/2000	44	0.1972	0.2632	0.1702	0.29
33-1072	BUCYRUS SEWAGE PLANT	OH	42	-82.9694	40.8128	955	05/1893	12/2000	107	0.1902	0.3045	0.2619	0.44
33-1113	BURTON	OH	81	-81.1667	41.4667	1160	07/1950	12/1989	40	0.1973	0.1810	0.0966	0.78
33-1152	CADIZ	OH	39	-80.9981	40.2686	1260	06/1893	12/2000	97	0.1550	0.1788	0.1620	0.43
33-1178	CALDWELL 6 NW	OH	39	-81.6000	39.8167	980	01/1936	09/1990	48	0.1676	0.1997	0.1698	0.08
33-1182	CALDWELL HIWAY DEPT	OH	39	-81.5333	39.7500	740	01/1949	09/1981	30	0.1857	0.1985	0.0839	0.83
33-1197	CAMBRIDGE	OH	40	-81.5833	40.0167	800	01/1949	12/2000	40	0.2054	0.3445	0.2853	0.37
33-1202	CAMBRIDGE STATE HOSPIT	OH	40	-81.5833	40.0833	850	01/1893	12/1963	71	0.2365	0.3911	0.3063	1.51
33-1245	CANFIELD 1 S	OH	39	-80.7667	41.0167	1140	02/1896	12/1997	84	0.1769	0.2211	0.1823	0.07
33-1259	CANTON HIWAY DEPT	OH	40	-81.3833	40.7667	1020	01/1949	08/1984	32	0.2500	0.3042	0.2037	3.13
33-1288	CARPENTER 4 NW	OH	39	-82.2194	39.1469	822	01/1964	12/2000	36	0.1861	0.1672	0.1110	0.43

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
33-1315	CARROLLTON 3 NNE	OH	39	-81.0667	40.6167	1190	01/1940	10/1987	47	0.1423	0.0353	0.1011	1.87
33-1353	CATAWBA ISLAND 1 SW	OH	41	-82.8500	41.5500	600	05/1916	12/1958	43	0.1894	0.1165	0.0987	1.22
33-1390	CELINA 3 NE	OH	43	-84.5364	40.5694	860	01/1957	12/2000	44	0.1825	0.3544	0.2272	1.07
33-1399	CENTERBURG	OH	81	-82.7000	40.3000	1201	01/1946	11/1998	46	0.1858	0.1784	0.2186	1.05
33-1404	CENTERBURG 2 SE	OH	81	-82.6500	40.3000	1205	01/1953	12/2000	46	0.1718	0.1247	0.2069	0.80
33-1458	CHARDON	OH	81	-81.1833	41.5833	1130	06/1945	12/2000	56	0.1673	0.2245	0.0986	1.80
33-1466	CHARLES MILL LAKE	OH	40	-82.3569	40.7400	1025	01/1939	12/2000	62	0.1978	0.2854	0.2310	0.14
33-1515	CHEVIOT	OH	45	-84.6233	39.1547	960	04/1965	12/2000	36	0.1477	0.1951	0.1752	0.81
33-1528	CHILLICOTHE MOUND CITY	OH	39	-83.0036	39.3744	650	01/1911	12/2000	90	0.1774	0.2907	0.1797	0.67
33-1536	CHILO MELDAHL L&D	OH	46	-84.1731	38.7983	500	01/1920	12/2000	80	0.2071	0.2402	0.1508	0.80
33-1541	CHIPPEWA LAKE	OH	81	-81.9361	41.0517	1180	01/1895	12/2000	106	0.1607	0.1867	0.1993	0.13
33-1550	FERNBANK	OH	45	-84.6961	39.1169	500	01/1915	12/2000	86	0.1643	0.1989	0.1631	0.14
33-1561	CINCINNATI ABBE WSO CI	OH	45	-84.5167	39.1500	760	05/1896	12/1982	87	0.1830	0.2487	0.2023	0.54
33-1571	CINCINNATI SUS BRIDGE	OH	45	-84.5000	39.1000	-999	01/1905	12/1947	43	0.1993	0.2342	0.1531	0.84
33-1576	CINCINNATI LUNKEN FAA	OH	45	-84.4189	39.1033	490	01/1949	12/2000	47	0.1639	0.1628	0.1954	0.52
33-1581	CINCINNATI WB CITY	OH	45	-84.5167	39.1000	636	01/1922	12/1970	49	0.2070	0.2043	0.1176	1.49
33-1592	CIRCLEVILLE	OH	46	-82.9547	39.6106	673	01/1895	12/2000	104	0.1826	0.2974	0.1814	0.42
33-1600	CLARINGTON LOCK 14	OH	30	-80.8333	39.8000	640	07/1901	08/1974	62	0.1708	0.2700	0.1753	0.49
33-1642	CLENDENING DAM	OH	39	-81.2833	40.2667	924	01/1943	12/1986	41	0.1452	0.0241	0.0335	2.08
33-1657	CLEVELAND WSFO AP	OH	41	-81.8528	41.4050	770	05/1896	12/2000	105	0.1859	0.2054	0.1845	0.18
33-1770	COLUMBIANA 2 SE	OH	39	-80.6833	40.8833	1112	06/1900	12/1974	37	0.1867	0.2142	0.1771	0.30
33-1781	COLUMBUS SULLIVANT AVE	OH	43	-83.1167	39.9500	879	01/1953	12/1982	30	0.1587	0.3669	0.2612	2.63
33-1782	COLUMBUS UNIV FARM	OH	43	-83.0500	40.0000	801	01/1883	12/1969	87	0.1911	0.1844	0.1349	0.91
33-1783	COLUMBUS VLY CROSSING	OH	43	-82.9250	39.9036	735	01/1916	12/2000	85	0.1766	0.2506	0.1757	0.05
33-1786	COLUMBUS WSO AIRPORT	OH	43	-82.8808	39.9914	810	01/1948	12/2000	53	0.1631	0.2449	0.2590	1.23
33-1788	COLUMBUS WSO CITY	OH	43	-83.0000	39.9667	725	05/1896	12/1972	77	0.1768	0.1903	0.1630	0.24
33-1818	CONNEAUT	OH	41	-80.5667	41.9833	640	01/1949	10/1998	48	0.2043	0.2771	0.1640	0.44
33-1858	COOPERDALE	OH	40	-82.0667	40.2211	780	01/1949	12/2000	52	0.1675	0.2812	0.1267	1.43
33-1890	COSHOCTON WPC PLANT	OH	40	-81.8711	40.2403	760	01/1909	12/2000	91	0.1773	0.2396	0.2198	0.31
33-1905	COSHOCTON AGR RES STN	OH	40	-81.8000	40.3667	1140	04/1956	12/2000	45	0.1780	0.3375	0.1672	1.66
33-2044	DANVILLE 2 W	OH	40	-82.3039	40.4397	970	06/1963	12/2000	38	0.1939	0.2648	0.2288	0.23
33-2067	DAYTON MCD	OH	45	-84.1911	39.7633	745	06/1893	12/2000	108	0.1508	0.1106	0.1144	0.60

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
33-2075	VANDALIA WB AIRPORT	OH	45	-84.2186	39.9061	1000	01/1911	12/2000	78	0.1722	0.0879	0.0954	0.99
33-2090	DEER CREEK DAM	OH	46	-83.2128	39.6253	860	01/1971	12/2000	30	0.1700	0.2706	0.2231	0.43
33-2098	DEFIANCE	OH	52	-84.3833	41.2833	700	01/1894	12/2000	95	0.1762	0.2812	0.1646	1.11
33-2119	DELAWARE	OH	43	-83.0739	40.3175	920	01/1897	12/2000	104	0.1731	0.2694	0.1679	0.32
33-2124	DELAWARE LAKE	OH	43	-83.0667	40.3667	930	01/1950	12/1997	46	0.1484	0.2168	0.1233	1.42
33-2160	DENNISON WATER WORKS	OH	40	-81.3433	40.3886	860	01/1910	11/2000	71	0.1565	0.1848	0.1156	0.64
33-2251	DORSET 2 E	OH	39	-80.6667	41.6833	980	01/1957	12/2000	44	0.1907	0.2739	0.2217	0.59
33-2272	DOVER DAM	OH	40	-81.4167	40.5667	930	01/1950	12/2000	50	0.1786	0.2101	0.1774	0.29
33-2485	EATON	OH	45	-84.6336	39.7347	1002	01/1915	12/2000	86	0.1363	0.0651	0.1212	1.57
33-2580	ELLSWORTH	OH	39	-80.8500	41.0167	1040	01/1927	12/1958	32	0.1418	0.0981	0.2521	4.58
33-2599	ELYRIA 3 E	OH	41	-82.0500	41.3833	730	01/1949	12/2000	52	0.2011	0.2660	0.1516	0.43
33-2626	ENTERPRISE	OH	39	-82.4842	39.5586	820	01/1947	12/2000	54	0.1867	0.2608	0.1396	0.55
33-2651	FAIRFIELD	OH	45	-84.5833	39.3500	575	01/1912	12/2000	87	0.1879	0.1531	0.0922	0.81
33-2786	FINDLAY FAA AIRPORT	OH	43	-83.6686	41.0136	800	01/1942	12/2000	58	0.1837	0.3527	0.1807	1.81
33-2791	FINDLAY WPCC	OH	43	-83.6622	41.0461	768	01/1890	12/2000	110	0.1726	0.3478	0.2506	1.16
33-2928	FRANKLIN 2 W	OH	45	-84.3144	39.5528	670	07/1923	12/2000	78	0.1685	0.0835	0.1150	1.00
33-2956	FREDERICKTOWN 4 S	OH	81	-82.5333	40.4167	1050	01/1940	12/2000	59	0.1483	0.2414	0.2799	1.50
33-2974	FREMONT WATER WORKS	OH	42	-83.1167	41.3333	600	07/1901	12/2000	93	0.2079	0.3239	0.2392	0.58
33-3021	GALION WATER WORKS	OH	81	-82.8000	40.7167	1170	01/1949	12/2000	50	0.1901	0.1941	0.1367	0.28
33-3029	GALLIPOLIS	OH	31	-82.1822	38.8203	569	02/1912	12/2000	89	0.1509	0.2191	0.1838	0.21
33-3095	GENEVA 3 S	OH	41	-80.9500	41.7500	751	01/1944	12/1982	34	0.1620	0.1524	0.1548	0.76
33-3120	GERMANTOWN DAM	OH	45	-84.4003	39.6358	740	04/1914	10/1998	82	0.1918	0.2285	0.1810	0.56
33-3356	GREENFIELD SEWAGE PLAN	OH	46	-83.4056	39.3542	970	01/1949	11/1998	49	0.1923	0.2346	0.0977	1.26
33-3362	GREEN_HILL	OH	39	-81.0100	40.4400	1135	01/1893	12/1924	32	0.1840	0.2415	0.0972	1.18
33-3375	GREENVILLE SEWAGE PLAN	OH	45	-84.6500	40.1000	1024	06/1893	12/2000	107	0.1876	0.2268	0.1362	0.50
33-3393	GREER	OH	40	-82.2000	40.5167	900	03/1946	12/2000	53	0.1522	0.3847	0.3001	2.74
33-3421	GROVER HILL	OH	43	-84.4725	41.0183	730	05/1955	12/2000	46	0.1501	0.0862	0.0667	1.15
33-3482	HAMILTON 2	OH	45	-84.5667	39.4000	590	06/1924	12/1987	59	0.1439	0.0944	0.1517	1.03
33-3500	HANNIBAL LOCK & DAM	OH	31	-80.8667	39.6667	620	01/1949	12/2000	49	0.1980	0.2521	0.1457	1.21
33-3730	HIGGINSPORT	OH	46	-83.9667	38.7833	502	01/1946	12/1981	35	0.1880	0.2285	0.1395	0.33
33-3758	HILLSBORO	OH	46	-83.6167	39.2000	1100	01/1893	12/2000	108	0.1870	0.3119	0.2194	0.39
33-3780	HIRAM	OH	40	-81.1500	41.3000	1230	01/1885	12/2000	115	0.1843	0.2932	0.2209	0.03

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
33-3874	HOYTVILLE 2 NE	OH	52	-83.7667	41.2167	700	06/1952	12/2000	49	0.1981	0.2287	0.1496	0.23
33-3915	HUNTSVILLE 3 N	OH	43	-83.8131	40.4803	1030	01/1949	12/2000	52	0.1941	0.4206	0.3418	2.53
33-3971	IRONTON	OH	31	-82.6833	38.5333	541	01/1900	12/1981	81	0.1577	0.1480	0.1208	0.29
33-3987	IRWIN	OH	43	-83.4833	40.1167	1010	04/1941	11/1997	57	0.1795	0.3052	0.2240	0.37
33-4004	JACKSON	OH	31	-82.7053	39.0775	800	03/1914	12/2000	81	0.1578	0.2240	0.1943	0.11
33-4189	KENTON	OH	43	-83.6061	40.6489	995	01/1890	12/2000	111	0.1548	0.1434	0.0979	0.57
33-4238	KINGS MILLS	OH	45	-84.2606	39.3531	750	07/1912	12/2000	88	0.1597	0.2031	0.1709	0.30
33-4363	LAKEVIEW 3 NE	OH	43	-83.8833	40.5167	1020	01/1915	12/1982	68	0.1720	0.3209	0.2634	0.89
33-4383	LANCASTER 2 NW	OH	39	-82.6333	39.7333	860	05/1896	12/1996	99	0.1734	0.1925	0.1797	0.18
33-4409	LA RUE	OH	43	-83.3833	40.5833	930	01/1918	12/1990	67	0.1698	0.1641	0.1565	0.38
33-4434	LAURELVILLE	OH	39	-82.7333	39.4667	760	01/1952	12/2000	49	0.1731	0.2871	0.2154	0.55
33-4473	LEESVILLE DAM	OH	40	-81.2000	40.4667	980	01/1950	12/2000	48	0.1901	0.2644	0.2039	0.05
33-4551	LIMA WWTP	OH	43	-84.1294	40.7247	850	04/1901	12/2000	100	0.1770	0.2280	0.1296	0.29
33-4616	LITHOPOLIS 1 NE	OH	39	-82.8167	39.7833	990	01/1953	11/1998	45	0.1706	0.0842	0.0791	0.92
33-4681	LONDON	OH	45	-83.4500	39.8833	1020	04/1918	12/2000	83	0.1764	0.1256	0.1278	0.50
33-4728	LOUISVILLE	OH	39	-81.2500	40.8333	1170	03/1946	12/2000	55	0.1489	0.2037	0.1323	1.41
33-4865	MANSFIELD WSO AP	OH	81	-82.5178	40.8203	1295	01/1949	12/2000	48	0.1571	0.1236	0.1268	0.83
33-4874	MANSFIELD 6 W	OH	81	-82.6167	40.7667	1350	03/1899	12/2000	89	0.1702	0.1599	0.1025	0.78
33-4924	MARIETTA LOCK 1	OH	31	-81.4536	39.4108	610	01/1917	12/2000	84	0.1715	0.2319	0.1912	0.09
33-4927	MARIETTA WWTP	OH	31	-81.4331	39.4089	580	01/1963	12/2000	38	0.1684	0.2178	0.2287	0.65
33-4929	MARIETTA WATER WORKS	OH	31	-81.4667	39.4333	830	06/1893	12/1962	68	0.1491	0.1440	0.1595	0.50
33-4937	MARION	OH	43	-83.1333	40.5833	981	06/1893	11/1949	57	0.1903	0.2128	0.1867	0.82
33-4942	MARION 2 N	OH	43	-83.1333	40.6167	965	02/1891	12/2000	109	0.1861	0.2386	0.1868	0.27
33-4967	MARSHALLVILLE	OH	40	-81.7333	40.8833	1120	03/1946	12/2000	55	0.2156	0.3437	0.2494	0.54
33-4979	MARYSVILLE	OH	43	-83.3669	40.2411	1000	01/1917	12/2000	84	0.1677	0.1814	0.1722	0.29
33-5021	McARTHUR	OH	39	-82.2900	39.1500	740	05/1893	10/1944	35	0.1920	0.1025	0.0722	1.74
33-5029	MC ARTHUR 2 N	OH	39	-82.4822	39.2503	785	08/1948	12/2000	49	0.1796	0.2986	0.2058	0.54
33-5041	MC CONNELSVILLE LOCK 7	OH	40	-81.8569	39.6539	760	06/1893	12/2000	108	0.1811	0.2339	0.1802	0.10
33-5185	MIAMISBURG	OH	45	-84.2833	39.6167	697	07/1923	12/1984	62	0.1512	0.1734	0.1869	0.54
33-5199	MIDDLEBOURNE	OH	39	-81.3333	40.0500	880	05/1948	10/1987	40	0.1648	0.2119	0.2343	0.92
33-5220	MIDDLETOWN	OH	45	-84.4167	39.5167	635	07/1923	12/2000	77	0.1609	0.1483	0.1350	0.13
33-5268	MILFORD 2	OH	45	-84.2867	39.1814	520	04/1951	12/2000	50	0.1617	0.1626	0.1815	0.29

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
33-5297	MILLERSBURG	OH	40	-81.9167	40.5500	819	01/1917	12/2000	74	0.1867	0.4183	0.3149	1.38
33-5315	MILLPORT 2 NW	OH	39	-80.9000	40.7167	1150	02/1893	12/2000	108	0.1590	0.1873	0.1528	0.29
33-5356	MINERAL RIDGE WTR WKS	OH	39	-80.7833	41.1500	890	06/1929	12/1999	71	0.1644	0.1646	0.1179	0.23
33-5398	MOHAWK DAM	OH	40	-82.0908	40.3486	865	01/1950	12/2000	49	0.1486	0.3290	0.2548	1.86
33-5406	MOHICANVILLE DAM	OH	40	-82.1500	40.7333	971	01/1950	12/1986	37	0.2341	0.4824	0.3827	2.26
33-5438	MONTPELIER	OH	52	-84.6078	41.5803	860	03/1891	12/2000	106	0.1469	0.1506	0.1769	2.15
33-5505	MOSQUITO CREEK DAM	OH	39	-80.7667	41.3000	910	01/1945	12/2000	56	0.1762	0.2918	0.2082	0.52
33-5535	MOUNT GILEAD	OH	81	-82.8167	40.5500	1090	05/1949	12/1995	46	0.1961	0.2697	0.1660	0.41
33-5543	MOUNT HEALTHY EXP FARM	OH	45	-84.5667	39.2833	850	03/1914	11/1955	42	0.1457	0.1048	0.1540	0.86
33-5573	MOUNT STERLING GAS PUM	OH	46	-83.2833	39.7333	922	01/1949	12/1997	40	0.2053	0.1638	0.1354	1.95
33-5585	MOUNT_VERNON	OH	81	-82.4667	40.3833	980	05/1896	10/1998	77	0.1723	0.2411	0.1774	0.35
33-5669	NAPOLEON	OH	52	-84.1144	41.3939	682	01/1886	12/2000	108	0.1855	0.1850	0.1611	0.15
33-5718	NELSONVILLE 1 WNW	OH	39	-82.2439	39.5014	700	01/1952	12/2000	49	0.1836	0.1407	0.1447	0.89
33-5747	NEWARK WATER WORKS	OH	40	-82.4131	40.0875	835	01/1935	12/2000	66	0.1473	0.1408	0.0682	1.29
33-5767	NEW_BREMEN	OH	43	-84.2300	40.2600	1038	01/1897	12/1933	31	0.1572	0.1774	0.0737	1.20
33-5786	NEW CARLISLE	OH	45	-84.0333	39.9322	880	01/1914	12/2000	82	0.1594	0.1859	0.1419	0.30
33-5794	NEWCOMERSTOWN	OH	40	-81.6000	40.2667	801	06/1893	12/1991	53	0.2133	0.3322	0.3151	1.06
33-5857	NEW LEXINGTON 2 NW	OH	40	-82.2156	39.7331	890	01/1942	12/2000	59	0.1617	0.2235	0.0990	1.04
33-5894	NEW PHILADELPHIA	OH	40	-81.4317	40.4878	925	01/1943	12/1998	45	0.1469	0.2257	0.2067	1.09
33-5904	NEW PHILADELPHIA 1 A	OH	40	-81.4500	40.5000	920	01/1950	12/1989	38	0.1665	0.2991	0.2511	0.54
33-5947	NEW STRAITSVILLE	OH	39	-82.2500	39.5833	780	01/1952	09/1990	39	0.1773	0.1104	0.0952	0.73
33-6118	NORWALK WWTP	OH	42	-82.6167	41.2667	670	03/1894	12/2000	107	0.2163	0.3487	0.2901	0.31
33-6123	NORWALK 5 SE	OH	42	-82.5667	41.1833	925	01/1964	10/1998	31	0.2385	0.2853	0.1938	1.78
33-6136	NORWICH	OH	40	-81.7833	39.9833	980	05/1948	12/1985	37	0.1831	0.2666	0.2101	0.02
33-6196	OBERLIN	OH	81	-82.2167	41.2667	816	01/1883	12/2000	118	0.1811	0.1800	0.0767	0.98
33-6342	OTTAWA WATER WORKS	OH	43	-84.0528	41.0317	730	05/1896	12/2000	89	0.1784	0.2513	0.1903	0.06
33-6375	OXFORD WATER WORKS	OH	45	-84.7333	39.5167	860	01/1917	10/1998	61	0.1769	0.2872	0.2444	1.42
33-6389	PAINESVILLE 2 N	OH	41	-81.3000	41.7500	600	01/1950	12/2000	51	0.1482	0.2123	0.2118	1.80
33-6405	PANDORA	OH	43	-83.9617	40.9542	770	01/1950	12/2000	51	0.1628	0.1928	0.1525	0.12
33-6465	PAULDING 1 S	OH	52	-84.5922	41.1244	725	01/1915	12/2000	86	0.2045	0.2719	0.1735	0.50
33-6493	PEEBLES 1 S	OH	39	-83.4167	38.9500	810	01/1940	12/1984	33	0.1701	0.2331	0.1790	0.13
33-6498	PEEBLES 1 S	OH	39	-83.4167	38.9333	830	01/1911	12/1961	51	0.1516	0.1581	0.0986	1.06

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
33-6590	PHILO	OH	40	-81.9000	39.8667	751	01/1902	09/1965	63	0.2046	0.2526	0.1754	0.50
33-6600	PHILO 3 SW	OH	40	-81.9167	39.8386	1020	06/1895	12/2000	106	0.1886	0.2212	0.1371	0.39
33-6616	PIEDMONT LAKE	OH	39	-81.2167	40.1833	940	03/1949	10/1998	49	0.1527	0.0213	0.0249	2.03
33-6630	PIKETON	OH	39	-83.0197	39.0706	570	07/1942	12/2000	59	0.1875	0.2451	0.1515	0.25
33-6645	PIQUA	OH	44	-84.2372	40.1525	950	01/1915	12/2000	81	0.1912	0.2602	0.2132	1.13
33-6650	PIQUA WWTP	OH	44	-84.2333	40.1333	800	01/1939	10/1998	53	0.2003	0.2196	0.1970	1.33
33-6697	PLEASANT HILL 1 NW	OH	44	-84.3458	40.0494	920	03/1922	12/2000	79	0.1573	0.2761	0.1804	1.16
33-6702	PLEASANT HILL DAM	OH	40	-82.3333	40.6167	1125	01/1950	10/1998	46	0.1505	0.2061	0.2006	1.02
33-6729	PLYMOUTH 2 WSW	OH	42	-82.7000	40.9833	961	01/1933	09/1982	50	0.1862	0.1552	0.1785	1.96
33-6781	PORTSMOUTH SCIOTOVILLE	OH	31	-82.8872	38.7569	540	02/1893	12/2000	108	0.1651	0.1962	0.2153	0.65
33-6786	PORTSMOUTH US GRANT BR	OH	31	-82.9969	38.7314	570	01/1914	12/1996	81	0.1826	0.1663	0.1722	1.17
33-6861	PROSPECT	OH	43	-83.2000	40.4833	915	05/1910	12/2000	89	0.1541	0.2535	0.2119	0.87
33-6882	PUT-IN-BAY	OH	41	-82.8000	41.6500	580	04/1916	08/1997	76	0.1875	0.2997	0.2437	0.62
33-6949	RAVENNA 2 S	OH	40	-81.2833	41.1333	1107	01/1950	12/2000	49	0.1849	0.2590	0.2016	0.03
33-7120	RIPLEY EXP FARM	OH	46	-83.7972	38.7872	880	01/1959	12/2000	42	0.1922	0.2519	0.1852	0.08
33-7255	ROSEVILLE	OH	40	-82.0722	39.8164	740	01/1962	12/2000	39	0.1526	0.2041	0.0613	1.90
33-7375	ST MARTIN URSULINE SCH	OH	46	-83.8833	39.2167	985	01/1949	12/1983	35	0.1965	0.2243	0.0862	1.63
33-7383	ST MARYS 2 W	OH	43	-84.4375	40.5447	875	01/1938	12/2000	63	0.1973	0.3309	0.2372	0.84
33-7447	SANDUSKY	OH	41	-82.7167	41.4500	584	05/1896	12/2000	103	0.2053	0.2588	0.2016	0.40
33-7476	SAYRE 1 NE	OH	40	-82.0500	39.6833	890	01/1952	11/1989	38	0.1876	0.2027	0.1881	0.65
33-7538	SEDALIA	OH	45	-83.4775	39.7339	1070	01/1941	12/2000	60	0.1720	0.1678	0.0877	0.70
33-7559	SENECAVILLE DAM	OH	39	-81.4347	39.9222	875	05/1939	10/1998	60	0.2111	0.3339	0.2823	2.69
33-7693	SIDNEY	OH	43	-84.1506	40.2706	940	01/1898	12/2000	102	0.1673	0.1507	0.0844	0.53
33-7698	SIDNEY HIGHWAY DEPT	OH	43	-84.1633	40.2983	1030	01/1949	09/1998	50	0.1864	0.2273	0.1297	0.46
33-7700	SIDNEY 2 N	OH	43	-84.1667	40.3167	1040	01/1893	11/1977	80	0.1568	0.1819	0.0832	1.06
33-7927	SPRINGFIELD ELMWOOD AV	OH	45	-83.7833	39.9167	1020	01/1901	12/1949	49	0.1491	0.1161	0.1549	0.64
33-7932	SPRINGFIELD WASTEWATER	OH	45	-83.8500	39.9167	902	05/1914	12/1987	61	0.1947	0.2445	0.2378	1.72
33-7935	SPRINGFIELD NEW WTR WK	OH	45	-83.8167	39.9667	930	01/1939	12/2000	61	0.2039	0.2367	0.1735	1.18
33-8025	STEUBENVILLE	OH	39	-80.6281	40.3761	992	04/1941	12/2000	60	0.1985	0.3399	0.3148	2.75
33-8110	STRYKER	OH	52	-84.4333	41.5000	700	01/1962	12/2000	38	0.2071	0.2578	0.2721	2.11
33-8148	SUMMERFIELD 3 NE	OH	39	-81.3000	39.8167	980	02/1906	11/1998	79	0.1816	0.2863	0.1729	0.55
33-8240	TAPPAN DAM	OH	40	-81.2281	40.3561	950	01/1950	11/1997	48	0.1773	0.2045	0.1995	0.60

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
33-8313	TIFFIN	OH	42	-83.1667	41.1167	740	01/1890	12/2000	109	0.1677	0.2312	0.2062	0.73
33-8332	TIPP CITY	OH	45	-84.1689	39.9528	900	01/1924	12/2000	76	0.1719	0.2065	0.2071	0.44
33-8356	TOLEDO WB AIRPORT	OH	41	-83.4667	41.5667	636	05/1896	12/1954	59	0.1919	0.2899	0.2312	0.40
33-8357	TOLEDO EXPRESS WSO AP	OH	52	-83.8014	41.5886	669	01/1955	12/2000	46	0.1901	0.1981	0.0744	1.20
33-8366	TOLEDO WB CITY	OH	41	-83.5333	41.6500	600	05/1948	08/1999	48	0.2037	0.2919	0.1803	0.46
33-8378	TOM JENKINS DAM-BURR O	OH	40	-82.0589	39.5444	760	01/1951	10/1998	47	0.2154	0.3098	0.2032	0.70
33-8534	UPPER SANDUSKY	OH	43	-83.2833	40.8333	854	01/1883	12/2000	116	0.1621	0.2563	0.2101	0.43
33-8539	UPPER SANDUSKY WATER W	OH	43	-83.2833	40.8167	820	01/1949	12/1997	48	0.1625	0.1757	0.1573	0.22
33-8552	URBANA WWTP	OH	43	-83.7833	40.1000	1000	01/1896	12/2000	105	0.1580	0.1518	0.0994	0.47
33-8560	UTICA	OH	40	-82.4333	40.2167	1005	01/1945	12/1993	47	0.1897	0.3800	0.2460	0.95
33-8609	VAN WERT	OH	43	-84.5808	40.8494	790	01/1925	12/2000	76	0.1797	0.2077	0.1474	0.14
33-8642	VERSAILLES	OH	44	-84.4822	40.2197	975	01/1914	12/2000	87	0.1790	0.2700	0.2278	0.13
33-8656	VICKERY 2 NW	OH	42	-82.9667	41.3667	591	04/1893	12/1952	59	0.1625	0.1580	0.1266	0.91
33-8769	WARREN 3 S	OH	39	-80.8167	41.2000	900	01/1893	12/2000	107	0.1645	0.1659	0.1459	0.13
33-8794	WASHINGTON COURT HOUSE	OH	46	-83.4281	39.5269	960	01/1916	12/1999	78	0.1856	0.2135	0.1525	0.22
33-8810	WATERLOO	OH	31	-82.4736	38.7003	625	06/1956	12/2000	33	0.1812	0.1129	0.0436	2.09
33-8822	WAUSEON WATER PLANT	OH	52	-84.1450	41.5189	750	01/1883	12/2000	118	0.1626	0.1236	0.1454	1.06
33-8830	WAVERLY	OH	39	-82.9797	39.1114	560	06/1893	12/2000	107	0.1412	0.1859	0.1795	1.39
33-8951	WESTERVILLE	OH	43	-82.9433	40.1264	810	01/1952	12/2000	48	0.2214	0.2878	0.1400	3.21
33-8960	WEST FORK MILL CREEK D	OH	45	-84.5000	39.2667	732	04/1965	12/2000	31	0.2047	0.2549	0.1303	1.46
33-8990	WEST MANCHESTER 3 SW	OH	45	-84.6428	39.8644	1100	01/1917	12/2000	80	0.1474	0.0495	0.1181	1.58
33-9190	WILLOUGHBY 3 NW	OH	41	-81.4333	41.6667	640	07/1894	11/1976	72	0.1926	0.2156	0.1080	0.60
33-9211	WILLS CREEK DAM	OH	40	-81.8500	40.1500	780	01/1950	12/2000	50	0.1838	0.1298	0.0378	1.94
33-9219	WILMINGTON 3 N	OH	45	-83.8167	39.4833	1030	02/1915	12/2000	85	0.1776	0.1993	0.1756	0.13
33-9224	WILMINGTON	OH	45	-83.8500	39.4333	975	01/1949	10/1998	50	0.1720	0.1756	0.1368	0.03
33-9298	WOODSFIELD	OH	39	-81.1000	39.7833	1220	01/1949	12/1992	41	0.1913	0.2568	0.1759	0.30
33-9312	WOOSTER EXP STN	OH	40	-81.9167	40.7833	1020	03/1887	12/2000	113	0.2073	0.3328	0.2984	0.61
33-9322	WOOSTER 2 SE	OH	40	-81.9333	40.7833	1102	03/1914	12/1958	44	0.2043	0.2080	0.1531	0.99
33-9361	XENIA 6 SSE	OH	45	-83.9000	39.6167	968	01/1917	12/2000	82	0.1763	0.1904	0.1440	0.05
33-9406	YOUNGSTOWN WSO AP	OH	39	-80.6739	41.2544	1180	01/1909	12/2000	91	0.2001	0.2457	0.1197	0.96
33-9417	ZANESVILLE FAA AIRPORT	OH	40	-81.8922	39.9444	880	01/1946	12/2000	54	0.1586	0.1465	0.1682	1.41
33-9422	ZANESVILLE WWTP	OH	40	-82.0000	39.9167	700	01/1889	12/1996	98	0.2042	0.2834	0.1682	0.57

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
36-0022	ACMETONIA LOCK 3	PA	30	-79.8153	40.5361	748	03/1905	12/2000	96	0.1730	0.3367	0.2685	1.16
36-0106	ALLENTOWN BETHLEHEM EA	PA	7	-75.4492	40.6508	390	02/1944	12/2000	57	0.1817	0.2627	0.2074	0.16
36-0111	ALLENTOWN GAS COMPANY	PA	7	-75.4667	40.6000	249	01/1912	09/1965	54	0.1661	0.1100	0.1317	1.17
36-0130	ALTOONA FAA AIRPORT	PA	19	-78.3169	40.3000	1476	05/1948	12/2000	53	0.1788	0.2707	0.2808	1.24
36-0134	ALTOONA HORSESHOE CURV	PA	19	-78.4833	40.5000	1503	02/1888	09/1967	80	0.1875	0.2025	0.1026	0.28
36-0140	ALTOONA 3 W	PA	19	-78.4667	40.4950	1320	01/1968	10/2000	33	0.1647	0.2249	0.1478	0.31
36-0313	AUSTINBURG 2 W	PA	16	-77.5333	42.0000	1591	01/1943	09/1981	37	0.1913	0.2031	0.1238	0.50
36-0355	BAKERSTOWN 4 WNW	PA	30	-79.9833	40.6500	1230	06/1948	12/1989	41	0.1610	0.2146	0.3182	2.94
36-0409	BARNES	PA	30	-79.0186	41.6678	1360	01/1941	08/1991	50	0.1748	0.1612	0.1728	0.81
36-0457	BEAR GAP	PA	18	-76.4983	40.8236	900	07/1944	12/2000	56	0.1975	0.1880	0.1100	0.60
36-0475	BEAVER FALLS	PA	30	-80.3133	40.7628	760	01/1909	12/2000	92	0.1666	0.2558	0.1989	0.18
36-0482	BEAVERTOWN	PA	18	-77.1500	40.7667	540	02/1946	12/2000	55	0.1679	0.1713	0.1348	0.48
36-0488	BECHTELSVILLE 1 ENE	PA	7	-75.6150	40.3783	460	03/1958	12/2000	42	0.1849	0.4160	0.2330	2.35
36-0530	BELLEFONTE 4 S	PA	19	-77.7833	40.8500	1112	01/1901	12/1972	50	0.1586	0.2531	0.1638	0.70
36-0611	BERWICK	PA	18	-76.2500	41.0667	571	01/1946	12/1976	31	0.2221	0.2134	0.2008	2.18
36-0629	BETHLEHEM	PA	7	-75.3833	40.6167	240	07/1940	12/1980	40	0.1551	0.2283	0.1545	1.57
36-0634	BETHLEHEM LEHIGH UNIV	PA	7	-75.3667	40.6000	361	09/1894	12/1977	75	0.1582	0.1544	0.1392	1.04
36-0656	BIGLERVILLE	PA	18	-77.2578	39.9356	720	01/1939	12/2000	62	0.2083	0.3297	0.1952	0.40
36-0725	BLAIN 5 SW	PA	18	-77.5892	40.3025	820	05/1948	10/1998	49	0.1896	0.3098	0.3096	0.87
36-0738	BLAIRSVILLE 5 E	PA	30	-79.1500	40.4333	2020	01/1939	12/1985	43	0.1773	0.1240	0.0757	1.38
36-0743	BLAKESLEE CORNERS	PA	18	-75.6000	41.1000	1650	05/1948	12/1982	35	0.2196	0.4433	0.3742	1.67
36-0763	BLOSERVILLE 1 N	PA	18	-77.3639	40.2636	700	01/1913	12/2000	88	0.2134	0.3364	0.2524	0.25
36-0861	BRADDOCK LOCK 2	PA	30	-79.8594	40.3917	730	06/1943	12/2000	58	0.1716	0.3567	0.2788	1.68
36-0865	BRADFORD FAA AIRPORT	PA	30	-78.6403	41.8031	2117	05/1948	12/2000	47	0.1632	0.1931	0.1905	0.16
36-0867	BRADFORD CITY HALL	PA	30	-78.6500	41.9500	1500	01/1910	11/2000	71	0.1767	0.2484	0.2015	0.07
36-0868	BRADFORD 5 SW RES 5	PA	30	-78.7144	41.8975	1660	01/1910	12/2000	82	0.1910	0.2276	0.1461	0.61
36-1002	BROOKVILLE FAA AIRPORT	PA	30	-79.1000	41.1500	1401	01/1899	12/1961	56	0.1262	-0.0250	0.1176	5.60
36-1004	BROOKVILLE SEWAGE PLT	PA	30	-79.0833	41.1500	1210	01/1964	12/1995	32	0.1677	0.1967	0.1255	0.29
36-1033	BRUCETON 1 S	PA	30	-79.9833	40.3000	1040	07/1935	12/1992	58	0.1695	0.1153	0.0848	1.16
36-1087	BUFFALO MILLS	PA	19	-78.6458	39.9461	1310	08/1924	12/2000	77	0.2125	0.3140	0.1751	0.74
36-1105	BURGETTSTOWN 2 W	PA	30	-80.4333	40.3833	981	06/1948	12/1988	41	0.1467	0.2836	0.1842	2.28
36-1115	BURNT CABINS 2 NE	PA	19	-77.8667	40.0833	991	01/1942	12/1977	35	0.1490	0.4404	0.3767	4.95

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
36-1130	BUTLER	PA	30	-79.9000	40.8667	1102	03/1927	12/1964	38	0.1736	0.2746	0.1419	1.15
36-1139	BUTLER 2 SW	PA	30	-79.9167	40.8500	1000	05/1948	12/2000	53	0.1673	0.2080	0.1776	0.02
36-1212	CANTON	PA	17	-76.8611	41.6175	1160	05/1948	12/2000	48	0.1964	0.2825	0.2451	0.98
36-1215	CANTON 1 NW	PA	17	-76.8667	41.6667	1522	01/1941	09/1975	35	0.2068	0.2601	0.1630	1.03
36-1234	CARLISLE	PA	18	-77.2167	40.2000	469	01/1894	12/1979	71	0.2013	0.1833	0.0804	0.95
36-1255	CARROLLTOWN 1 NNE	PA	30	-78.7000	40.5833	2080	01/1944	12/1990	47	0.1647	0.1920	0.1144	0.46
36-1262	CARTER CAMP 2 W	PA	16	-77.7500	41.6167	2031	01/1939	10/1972	34	0.2141	0.3989	0.2413	1.52
36-1301	CEDAR RUN	PA	17	-77.4478	41.5217	780	01/1941	08/1986	46	0.1610	0.1760	0.1505	0.11
36-1342	CHADDS FORD	PA	7	-75.5825	39.8692	229	08/1945	12/2000	53	0.1871	0.2934	0.1765	0.34
36-1354	CHAMBERSBURG	PA	19	-77.6394	39.9353	640	01/1894	12/2000	90	0.1806	0.2354	0.1498	0.04
36-1372	CHARLEROI	PA	30	-79.9167	40.1333	1040	05/1948	09/1998	44	0.1672	0.1945	0.1583	0.06
36-1377	CHARLEROI LOCK 4	PA	30	-79.9000	40.1500	749	01/1931	12/2000	70	0.1439	0.3111	0.2191	2.95
36-1480	CLARENCE 1 E	PA	19	-77.9453	41.0456	1390	08/1950	12/2000	51	0.1625	0.2356	0.1835	0.32
36-1485	CLARION 3 SW	PA	30	-79.4356	41.1922	1040	01/1885	12/2000	98	0.1801	0.2230	0.1908	0.20
36-1505	CLAUSSVILLE	PA	7	-75.6500	40.6167	670	08/1945	12/2000	56	0.1832	0.2539	0.1914	0.05
36-1512	CLAYSVILLE 3 W	PA	30	-80.4667	40.1167	1001	04/1904	12/1970	66	0.1434	0.2672	0.2922	1.88
36-1519	CLEARFIELD	PA	30	-78.4500	41.0167	1140	01/1908	12/2000	85	0.1490	0.2298	0.1774	0.75
36-1534	CLERMONT 8 SW	PA	30	-78.5333	41.7333	1620	01/1952	06/1999	42	0.1576	0.2358	0.2123	0.27
36-1589	COATESVILLE 1 SW	PA	7	-75.8333	39.9667	341	01/1894	12/1982	89	0.1793	0.2146	0.1166	0.71
36-1705	CONFLUENCE 1 SW DAM	PA	31	-79.3669	39.7994	1490	07/1946	12/2000	55	0.1789	0.2815	0.2119	0.38
36-1710	CONFLUENCE 1 NW	PA	31	-79.3667	39.8333	1331	04/1892	12/1980	89	0.1676	0.2143	0.1817	0.05
36-1723	CONNELLSVILLE	PA	30	-79.6000	40.0167	870	01/1929	12/1975	46	0.1940	0.3263	0.2557	0.98
36-1726	CONNELLSVILLE 2	PA	30	-79.5964	39.9969	900	05/1948	12/2000	50	0.2042	0.3411	0.2386	1.45
36-1737	CONSHOHOCKEN	PA	7	-75.3178	40.0744	70	08/1923	12/2000	78	0.2152	0.3225	0.2603	1.54
36-1749	COOKSBURG	PA	30	-79.2092	41.3306	1180	04/1955	09/1991	35	0.1913	0.3687	0.3005	1.70
36-1790	CORRY	PA	30	-79.6333	41.9167	1440	01/1921	09/1997	76	0.1663	0.1737	0.1752	0.31
36-1806	COUDERSPORT 3 NW	PA	16	-78.0667	41.8333	2301	01/1939	12/1986	41	0.1819	0.3767	0.4242	2.92
36-1833	COVINGTON 2 WSW	PA	16	-77.1167	41.7333	1745	01/1939	12/2000	61	0.1738	0.1945	0.1986	0.33
36-1881	CREEKSIDE	PA	30	-79.2000	40.6833	1050	04/1920	12/1991	69	0.1786	0.1909	0.1820	0.48
36-1896	CRESSON 1 SE	PA	19	-78.5667	40.4500	2231	02/1920	12/1982	56	0.2034	0.2438	0.1283	0.40
36-2013	DANVILLE	PA	18	-76.6175	40.9592	475	01/1941	12/2000	59	0.1756	0.3303	0.2904	1.27
36-2108	DERRY 3 SW	PA	30	-79.3333	40.3000	1060	01/1897	12/2000	93	0.1804	0.2932	0.2343	0.38

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
36-2116	DEVAULT 1 W	PA	7	-75.5500	40.0833	360	06/1951	12/1987	37	0.2463	0.2691	0.1531	4.16
36-2183	DONEGAL	PA	30	-79.4000	40.1333	1800	01/1944	12/2000	55	0.1906	0.3055	0.2347	0.64
36-2190	DONORA	PA	30	-79.8694	40.1636	762	01/1927	12/2000	73	0.1707	0.1788	0.0927	0.69
36-2221	DOYLESTOWN	PA	7	-75.1333	40.3000	361	01/1902	12/1987	82	0.1921	0.2155	0.1106	0.71
36-2236	PHILADELPHIA DREXEL UN	PA	7	-75.1833	39.9500	30	01/1894	09/1985	56	0.1957	0.2218	0.1472	0.22
36-2245	DRIFTWOOD	PA	17	-78.1403	41.3419	820	07/1895	10/1998	63	0.1735	0.1928	0.1242	0.23
36-2260	DUBOIS FAA AP	PA	30	-78.8989	41.1783	1814	05/1948	12/1996	49	0.1666	0.2108	0.2462	0.80
36-2265	DU BOIS 7 E	PA	30	-78.6333	41.1000	1670	02/1937	12/1974	38	0.1861	0.2825	0.1498	0.96
36-2325	DUSHORE 2 SSW	PA	17	-76.4181	41.4775	1890	05/1948	12/1997	46	0.1683	0.1265	0.2104	1.23
36-2343	EAGLES MERE	PA	17	-76.5833	41.4000	1991	04/1941	12/1986	37	0.1503	0.2150	0.1761	0.59
36-2466	EBENSBURG	PA	30	-78.7167	40.4833	2090	08/1917	12/1963	45	0.1642	0.2530	0.1591	0.62
36-2470	EBENSBURG SEWAGE PLANT	PA	30	-78.7289	40.4681	1940	02/1964	12/2000	37	0.1869	0.3344	0.1960	1.40
36-2537	EISENHOWER NATL HIST S	PA	18	-77.2292	39.8050	540	05/1948	12/2000	48	0.2402	0.4357	0.2773	1.51
36-2574	EMSWORTH L/D OHIO RIV	PA	30	-80.0833	40.5000	717	02/1939	12/2000	57	0.1653	0.2754	0.2403	0.41
36-2629	EMPORIUM	PA	16	-78.2275	41.5067	1040	05/1948	12/2000	53	0.1878	0.3087	0.1769	1.08
36-2633	EMPORIUM 1 E	PA	16	-78.2167	41.5167	1161	01/1889	12/1955	67	0.1838	0.3981	0.4026	2.22
36-2644	ENGLISH CENTER	PA	17	-77.2833	41.4333	879	05/1948	11/1984	37	0.1657	0.2427	0.1793	0.25
36-2662	EPHRATA	PA	7	-76.1667	40.1667	510	01/1900	10/1984	84	0.1827	0.1597	0.1089	0.57
36-2671	EQUINUNK 2 WNW	PA	18	-75.2667	41.8667	890	05/1948	12/2000	53	0.2087	0.3287	0.2061	0.29
36-2682	ERIE WSO ARPT	PA	41	-80.1825	42.0800	730	01/1926	12/2000	75	0.2255	0.3843	0.3129	3.07
36-2721	EVERETT	PA	19	-78.3653	40.0136	1000	05/1897	12/2000	79	0.1864	0.2713	0.2351	0.42
36-2814	FARRELL SHARON	PA	30	-80.5167	41.2167	850	01/1912	12/1980	68	0.1923	0.2686	0.1584	0.71
36-2942	FORD CITY 4 S DAM	PA	30	-79.5000	40.7167	930	07/1943	12/2000	58	0.1635	0.2290	0.2394	0.41
36-3018	BEAR CREEK DAM	PA	18	-75.7333	41.1167	1509	07/1958	12/2000	43	0.2245	0.3132	0.1964	0.55
36-3028	FRANKLIN	PA	30	-79.8306	41.4003	1015	01/1897	12/2000	104	0.1793	0.2873	0.1988	0.40
36-3056	FREELAND	PA	18	-75.9000	41.0167	1903	07/1914	08/1989	75	0.2152	0.2797	0.1629	0.40
36-3130	GALETON	PA	16	-77.6519	41.7356	1345	02/1931	12/2000	70	0.1753	0.2827	0.2087	0.51
36-3189	GEIGERTOWN	PA	7	-75.8333	40.2000	400	08/1945	12/1975	31	0.2080	0.3605	0.2693	1.08
36-3200	GEORGE SCHOOL	PA	7	-74.9333	40.2167	141	01/1907	12/1977	71	0.1922	0.3319	0.2116	0.39
36-3218	GETTYSBURG	PA	18	-77.2333	39.8333	541	01/1893	12/1981	82	0.1849	0.1938	0.1286	0.26
36-3295	GLENCOE 1 E	PA	20	-78.8333	39.8167	1890	05/1948	11/2000	51	0.1841	0.3630	0.2114	1.27
36-3311	GLEN HAZEL 2 NE DAM	PA	30	-78.6014	41.5631	1720	01/1943	12/2000	55	0.1598	0.2290	0.1725	0.24

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36-3321	LYNDELL 2 NW	PA	7	-75.7506	40.0997	500	04/1959	12/2000	42	0.1892	0.2247	0.1710	0.06
36-3343	GLENWILLARD DASH DAM	PA	30	-80.2167	40.5500	710	01/1945	12/2000	56	0.1636	0.2638	0.1900	0.45
36-3379	GORDON	PA	18	-76.3333	40.7500	902	07/1903	11/1955	53	0.1877	0.1665	0.0981	0.60
36-3394	GOULDSBORO	PA	18	-75.4500	41.2500	1890	07/1914	10/1987	74	0.2231	0.3133	0.2344	0.52
36-3435	GRATERFORD	PA	7	-75.4500	40.2333	151	02/1920	12/1971	51	0.2071	0.2468	0.1489	0.57
36-3437	GRATERFORD 1 E	PA	7	-75.4353	40.2306	240	08/1960	12/2000	40	0.1734	0.2958	0.2579	1.07
36-3451	GRAYS LANDING	PA	31	-79.9167	39.7833	800	01/1939	12/2000	62	0.1479	0.2418	0.2052	0.49
36-3510	GREENSBURG 2 S	PA	30	-79.5500	40.2667	981	04/1908	12/1951	44	0.1791	0.1789	0.1557	0.50
36-3515	GREENSBURG 2 E	PA	30	-79.5167	40.3000	1230	05/1948	12/1995	42	0.1547	0.1860	0.2479	1.21
36-3516	GREENSBURG 3 SE UNITY	PA	30	-79.5000	40.2833	1240	01/1910	12/1958	47	0.1654	0.1833	0.1828	0.22
36-3526	GREENVILLE 2 NE	PA	30	-80.3667	41.4167	1130	01/1894	12/1996	96	0.1807	0.2654	0.2427	0.42
36-3632	HAMBURG	PA	7	-75.9953	40.5517	350	01/1894	12/2000	98	0.1741	0.2085	0.1424	0.36
36-3662	HANOVER	PA	8	-76.9833	39.8000	600	04/1904	12/1991	88	0.1838	0.2223	0.2014	1.23
36-3699	HARRISBURG CAPITAL CIT	PA	8	-76.8500	40.2167	340	01/1926	09/1991	66	0.1990	0.3615	0.2780	0.59
36-3704	HARRISBURG NORTH	PA	18	-76.9000	40.3000	322	01/1923	12/1962	38	0.1452	0.1950	0.1226	1.89
36-3758	HAWLEY 1 E	PA	18	-75.1667	41.4833	890	01/1921	12/2000	80	0.1787	0.2367	0.1940	0.17
36-4001	HOLLIDAYSBURG	PA	19	-78.4169	40.4383	990	05/1948	10/1998	49	0.1962	0.2491	0.1912	0.25
36-4008	HOLLISTERVILLE	PA	18	-75.4333	41.3833	1370	01/1928	12/2000	73	0.2427	0.3229	0.1479	1.89
36-4019	HOLTWOOD	PA	8	-76.3333	39.8333	190	07/1914	03/1999	84	0.1864	0.1816	0.1070	0.79
36-4027	HOME	PA	30	-79.1000	40.7500	1220	05/1948	09/1992	44	0.1578	0.1382	0.1017	0.64
36-4043	HONESDALE 4 NW	PA	18	-75.3167	41.6167	1410	01/1944	12/1996	52	0.2120	0.3557	0.2328	0.43
36-4047	HONEY BROOK 1 S	PA	7	-75.8975	40.0789	665	08/1957	12/2000	44	0.1843	0.2353	0.1379	0.36
36-4159	HUNTINGDON 1 WNW	PA	19	-78.0008	40.5144	670	01/1888	12/1969	82	0.1509	0.2416	0.1872	0.84
36-4166	HUNTSDALE	PA	18	-77.3000	40.1000	620	01/1939	12/1985	47	0.1896	0.3119	0.1151	2.11
36-4190	HYNDMAN	PA	19	-78.7333	39.8167	960	01/1906	12/1993	82	0.1729	0.1736	0.1909	0.74
36-4214	INDIANA 3 SE	PA	30	-79.1167	40.6000	1102	01/1947	12/2000	54	0.1719	0.2801	0.2578	0.47
36-4219	INDIANA	PA	30	-79.1667	40.6167	1302	06/1896	12/1952	37	0.1768	0.3153	0.2673	0.75
36-4276	IRWIN	PA	30	-79.7000	40.3333	1102	01/1897	12/1957	61	0.1487	0.1901	0.1893	0.43
36-4304	JACKSON SUMMIT	PA	16	-77.0167	41.9500	1690	05/1948	12/1983	35	0.2110	0.2584	0.2045	0.45
36-4325	JAMESTOWN 2 NW	PA	30	-80.4667	41.5000	1040	01/1932	12/2000	68	0.1957	0.2541	0.1852	0.69
36-4370	JIM THORPE	PA	18	-75.7500	40.8667	830	01/1894	06/1959	63	0.1915	0.2228	0.1427	0.14
36-4385	JOHNSTOWN	PA	20	-78.9167	40.3333	1214	04/1888	12/1992	104	0.1747	0.3179	0.3313	1.03

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36-4390	JOHNSTOWN 2	PA	20	-78.9167	40.3167	1280	05/1948	12/1994	47	0.1823	0.2874	0.2665	0.21
36-4432	KANE 1 NNE	PA	30	-78.8036	41.6767	1750	01/1939	12/2000	62	0.1609	0.2296	0.0941	1.81
36-4450	KARTHAUS	PA	17	-78.1092	41.1175	950	01/1941	12/1971	31	0.1424	0.1820	0.1672	0.77
36-4481	KEGG	PA	20	-78.7167	39.9833	1280	03/1951	12/1991	36	0.1996	0.2048	0.1572	1.35
36-4611	KITTANNING LOCK 7	PA	30	-79.5333	40.8167	790	06/1951	12/2000	50	0.1695	0.2524	0.2098	0.09
36-4672	KRESGEVILLE 2 W	PA	18	-75.5333	40.9000	830	04/1943	12/1989	47	0.1835	0.2324	0.1714	0.08
36-4727	LAKE MINISINK	PA	18	-75.0500	41.2167	1362	05/1948	12/1986	39	0.1918	0.3730	0.3444	1.39
36-4733	LAKEVILLE 1 N	PA	18	-75.2667	41.4500	1440	01/1928	12/1971	44	0.2630	0.3989	0.2742	2.66
36-4763	LANCASTER 2 NE FILT PL	PA	8	-76.2742	40.0500	270	01/1926	12/2000	71	0.2104	0.2349	0.1883	0.93
36-4804	LANSFORD	PA	18	-75.8833	40.8333	1142	08/1915	12/1953	39	0.2123	0.2168	0.1435	0.83
36-4853	LAURELTON ST VILLAGE	PA	18	-77.2139	40.9017	800	05/1948	12/2000	41	0.1649	0.1713	0.0842	0.87
36-4873	LAWRENCEVILLE 1 S	PA	16	-77.1333	41.9667	922	01/1897	12/1973	77	0.1897	0.3105	0.1855	0.88
36-4893	LEBANON 4 WNW	PA	8	-76.4833	40.3500	591	02/1891	09/1965	74	0.1813	0.2916	0.1921	0.76
36-4896	LEBANON 4 WNW	PA	8	-76.4667	40.3333	450	05/1948	12/2000	38	0.2244	0.3823	0.2896	0.45
36-4934	LEHIGHTON	PA	18	-75.6961	40.8222	580	01/1935	12/2000	66	0.1785	0.2064	0.0800	0.86
36-4972	LE ROY	PA	17	-76.7167	41.6833	1040	01/1893	12/1995	75	0.1625	0.2743	0.2452	0.69
36-4984	LEWIS RUN 3 SE	PA	30	-78.6433	41.8417	1740	05/1948	12/1996	41	0.1586	0.2366	0.2127	0.24
36-4992	LEWISTOWN	PA	19	-77.5697	40.5869	460	08/1938	12/2000	63	0.1641	0.0951	0.0237	1.51
36-5050	LINESVILLE 1 S	PA	30	-80.4333	41.6500	1030	02/1920	12/2000	57	0.1870	0.2987	0.1999	0.57
36-5104	LOCK HAVEN	PA	17	-77.4167	41.1333	551	03/1888	10/1977	85	0.1717	0.2819	0.2248	0.44
36-5109	LOCK HAVEN 2	PA	17	-77.4500	41.1167	566	05/1948	12/2000	33	0.1985	0.2773	0.1192	1.30
36-5160	LONG POND 2 W	PA	18	-75.5481	41.1192	1800	01/1947	09/2000	53	0.1749	0.2064	0.1669	0.25
36-5259	LYCIPPUS 1 E	PA	30	-79.4000	40.2333	1421	01/1893	12/1948	56	0.1467	0.2175	0.1343	1.35
36-5336	MADERA 2 SE	PA	30	-78.4000	40.8000	1600	06/1949	12/1992	42	0.1985	0.3397	0.2414	1.21
36-5381	MAPLETON DEPOT	PA	19	-77.9333	40.4000	580	01/1939	12/1996	58	0.1820	0.3316	0.2598	0.70
36-5390	MARCUS HOOK	PA	1	-75.4283	39.8253	10	07/1919	12/2000	73	0.2650	0.4196	0.2817	1.64
36-5400	MARIENVILLE	PA	30	-79.1000	41.4833	1779	05/1948	12/1996	44	0.1597	0.1480	0.1624	0.52
36-5408	MARION CENTER 2 SE	PA	20	-79.0333	40.7500	1611	01/1941	12/1993	53	0.1598	0.3365	0.3587	2.17
36-5470	MATAMORAS	PA	18	-74.7000	41.3667	420	01/1905	12/2000	92	0.1885	0.2972	0.1846	0.42
36-5573	MCKEESPORT	PA	30	-79.8667	40.3333	740	01/1929	12/2000	64	0.1464	0.1651	0.1932	0.68
36-5601	MEADOW RUN PONDS	PA	18	-75.6333	41.2167	1910	07/1948	10/1998	47	0.2236	0.3894	0.3692	1.61
36-5606	MEADVILLE 1 S	PA	30	-80.1667	41.6333	1065	01/1929	07/1999	70	0.1877	0.2123	0.1302	0.61

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36-5651	MERCER	PA	30	-80.2347	41.2244	1220	01/1940	12/2000	57	0.1571	0.2020	0.0842	1.60
36-5662	MERCERSBURG 1 E	PA	19	-77.9000	39.8333	541	08/1928	12/1989	61	0.1850	0.2620	0.1655	0.07
36-5676	MERWINSBURG	PA	18	-75.4667	40.9667	985	07/1925	12/1995	63	0.1843	0.2281	0.1728	0.08
36-5686	MEYERSDALE 2 SSW	PA	20	-79.0406	39.7808	2000	05/1948	12/2000	52	0.2133	0.3301	0.2903	0.37
36-5731	MILAN	PA	17	-76.5472	41.9281	850	05/1948	09/1998	41	0.1999	0.2440	0.1831	0.71
36-5738	MILANVILLE	PA	18	-75.0642	41.6731	760	08/1945	09/1975	31	0.2045	0.3279	0.2180	0.23
36-5790	MILLHEIM	PA	18	-77.4744	40.8839	1120	06/1949	12/2000	51	0.2052	0.2617	0.1786	0.12
36-5817	MILLVILLE 2 SW	PA	18	-76.5667	41.1000	860	01/1939	08/1992	51	0.1961	0.2816	0.2010	0.02
36-5825	MILROY	PA	19	-77.6333	40.7333	1030	01/1946	10/1998	40	0.1526	0.2404	0.1790	0.77
36-5902	MONTGOMERY DAM	PA	30	-80.3833	40.6500	690	01/1962	12/2000	39	0.1617	0.1169	0.0655	1.18
36-5915	MONTROSE 1 E	PA	17	-75.8500	41.8667	1420	01/1904	12/2000	96	0.1563	0.1820	0.1438	0.29
36-5956	MORGANTOWN	PA	7	-75.9000	40.1500	591	06/1951	12/1984	34	0.1913	0.2654	0.1674	0.11
36-6055	MT POCONO 2 N	PA	18	-75.3667	41.1500	1915	01/1902	08/1960	57	0.1720	0.1927	0.1699	0.37
36-6111	MURRYSVILLE 2 SW	PA	30	-79.7333	40.4167	860	05/1948	12/1997	49	0.1624	0.1895	0.1624	0.09
36-6126	MYERSTOWN	PA	7	-76.3064	40.3675	480	08/1938	12/2000	61	0.2075	0.2639	0.1069	1.67
36-6151	NATRONA LOCK 4	PA	30	-79.7167	40.6167	760	01/1928	12/2000	73	0.1760	0.2914	0.2407	0.39
36-6194	NESHAMINY FALLS	PA	7	-74.9550	40.1358	60	01/1915	12/2000	86	0.1872	0.1720	0.1659	0.58
36-6233	NEW CASTLE 1 N	PA	30	-80.3619	41.0172	825	01/1904	12/2000	96	0.1586	0.1219	0.1144	0.74
36-6246	NEWELL	PA	30	-79.9000	40.0833	810	01/1902	12/1980	72	0.1622	0.2684	0.1865	0.63
36-6289	NEW PARK	PA	8	-76.5061	39.7350	800	08/1924	12/2000	77	0.2172	0.3276	0.2383	0.12
36-6297	NEWPORT	PA	18	-77.1294	40.4783	380	01/1927	12/1991	65	0.2185	0.3769	0.2373	0.68
36-6310	NEW STANTON	PA	30	-79.6333	40.2000	950	03/1952	12/2000	40	0.1540	0.2660	0.2872	1.24
36-6326	NEW TRIPOLI 4 E	PA	18	-75.6833	40.6833	689	01/1939	12/1981	43	0.1931	0.2537	0.0775	1.37
36-6370	NORRISTOWN	PA	7	-75.3583	40.1197	70	05/1948	12/2000	40	0.2021	0.2309	0.1408	0.45
36-6622	ORWELL 2 NW	PA	17	-76.3000	41.9167	1600	05/1948	12/1993	46	0.1492	0.1961	0.2456	0.95
36-6681	PALM	PA	7	-75.5022	40.3856	300	01/1942	12/2000	59	0.1865	0.2437	0.0881	2.05
36-6689	PALMERTON	PA	18	-75.6167	40.8000	410	04/1917	12/1997	81	0.1886	0.2061	0.1333	0.21
36-6719	PARKERS LANDING	PA	30	-79.6833	41.1000	879	05/1892	12/1950	59	0.1597	0.2182	0.1478	0.38
36-6721	PARKER	PA	30	-79.6833	41.0833	1060	01/1952	10/1987	36	0.2026	0.1760	0.0962	2.21
36-6724	PARKER 1 E	PA	30	-79.6719	41.0964	1100	05/1948	09/1998	48	0.1793	0.1408	0.1289	1.12
36-6762	PAUPACK 2 WNW	PA	18	-75.2333	41.4000	1360	04/1926	05/2000	74	0.2005	0.3683	0.3187	0.82
36-6840	PERKASIE	PA	7	-75.3000	40.3667	400	01/1939	11/1978	39	0.1918	0.1369	0.1185	0.93

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36-6889	PHILADELPHIA WSO AP	PA	7	-75.2311	39.8683	10	01/1900	12/2000	101	0.1774	0.1754	0.1356	0.32
36-6899	PHILADELPHIA POINT BRE	PA	7	-75.2000	39.9167	30	01/1925	12/1962	38	0.1680	0.0485	0.1381	2.98
36-6904	PHILADELPHIA SHAWMONT	PA	7	-75.2500	40.0333	69	03/1896	12/1956	61	0.1702	0.3017	0.1727	1.40
36-6916	PHILIPSBURG 8 E	PA	19	-78.0667	40.9167	1945	05/1948	10/1998	51	0.1805	0.3052	0.2777	0.90
36-6927	PHOENIXVILLE 1 E	PA	7	-75.5011	40.1200	105	01/1915	12/2000	85	0.1967	0.2182	0.1633	0.23
36-6954	PINE GROVE 1 NE	PA	18	-76.3667	40.5667	541	09/1924	10/1961	38	0.1968	0.1930	0.0563	1.10
36-6993	PITTSBURGH WSCOM 2 AP	PA	30	-80.2311	40.5014	1150	01/1900	12/2000	96	0.1578	0.2035	0.1135	0.83
36-6997	PITTSBURGH WB CITY	PA	30	-80.0000	40.4500	1017	01/1897	09/1979	82	0.1551	0.2365	0.1578	0.76
36-7029	PLEASANT MOUNT 1 W	PA	18	-75.4500	41.7333	1799	01/1925	12/2000	76	0.2099	0.3485	0.2711	0.32
36-7103	PORT ALLEGANY	PA	30	-78.2872	41.8158	1475	01/1969	12/2000	32	0.1805	0.2272	0.2395	0.82
36-7116	PORT CLINTON 1 S	PA	18	-76.0333	40.5833	449	01/1939	12/1978	40	0.1742	0.1433	0.0921	0.69
36-7149	POTTSTOWN	PA	7	-75.6500	40.2500	120	01/1894	09/1956	47	0.1823	0.2160	0.1496	0.13
36-7156	POTTSVILLE	PA	18	-76.2000	40.6833	820	01/1903	12/1948	46	0.1843	0.3079	0.2629	0.49
36-7217	PUNXSUTAWNEY 1	PA	30	-79.0000	40.9500	1300	01/1930	12/1992	60	0.1392	0.1538	0.1698	0.90
36-7229	PUTNEYVILLE 2 SE DAM	PA	30	-79.2825	40.9250	1280	02/1942	12/2000	59	0.1682	0.2622	0.1495	0.85
36-7310	RAYMOND	PA	16	-77.8667	41.8500	2300	01/1939	11/1992	52	0.1775	0.2172	0.1943	0.12
36-7312	RAYSTOWN LAKE 2	PA	19	-78.0753	40.3814	1000	01/1970	12/2000	31	0.1886	0.2494	0.1533	0.06
36-7318	READING WB CITY	PA	7	-75.9667	40.3333	289	01/1894	12/1972	71	0.1989	0.2900	0.1680	0.35
36-7409	RENOVO	PA	17	-77.7381	41.3297	660	07/1895	12/2000	96	0.1706	0.3290	0.2215	1.17
36-7410	RENOVO 5 S	PA	19	-77.7667	41.2333	2039	05/1948	09/1997	44	0.2045	0.2250	0.2185	1.35
36-7477	RIDGWAY	PA	30	-78.7497	41.4200	1360	01/1913	12/2000	87	0.1597	0.1746	0.1620	0.18
36-7497	RINGTOWN	PA	18	-76.2333	40.8667	1089	01/1895	08/1951	53	0.1843	0.1698	0.1985	1.20
36-7540	ROCHESTER 1 N	PA	30	-80.3000	40.7167	900	05/1948	12/1990	43	0.1669	0.1916	0.1188	0.36
36-7727	RUSHVILLE	PA	17	-76.1167	41.7833	870	02/1949	12/2000	52	0.1746	0.2832	0.1582	0.81
36-7730	SABINSVILLE 3 SE	PA	16	-77.4747	41.8422	1999	01/1970	12/2000	31	0.1842	0.1727	0.1816	0.53
36-7735	SAGAMORE	PA	30	-79.2375	40.7819	1160	04/1965	12/2000	35	0.1648	0.2475	0.1928	0.16
36-7739	SAGAMORE 1 S	PA	30	-79.2333	40.7667	1320	01/1941	11/1974	33	0.1432	0.2922	0.2024	2.60
36-7782	SALINA 3 W	PA	30	-79.5458	40.5100	1109	01/1953	12/2000	48	0.1180	0.2372	0.2925	4.03
36-7796	SALTSBURG	PA	30	-79.4833	40.4500	850	01/1893	08/1952	53	0.1533	0.2647	0.2290	0.76
36-7846	SAXTON	PA	19	-78.2500	40.2000	780	01/1941	12/2000	60	0.2133	0.3413	0.2174	0.89
36-7855	SCANDIA 2 E	PA	30	-79.0333	41.9167	2120	05/1948	11/1997	49	0.1700	0.2338	0.1457	0.33
36-7863	SCHENLEY LOCK 5	PA	30	-79.6667	40.6833	783	07/1891	12/2000	109	0.1624	0.1618	0.1872	0.58

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36-7902	SCRANTON	PA	18	-75.6667	41.4167	804	01/1926	12/1974	49	0.1734	0.1202	0.0620	1.03
36-7931	SELINSGROVE 2 S	PA	18	-76.8611	40.7831	420	01/1889	12/2000	93	0.1680	0.1852	0.1272	0.47
36-7965	SHADE GAP 2 NE	PA	19	0.0000	0.0000	-999	05/1948	10/1980	33	0.2091	0.2559	0.2496	1.75
36-7978	SHAMOKIN	PA	18	-76.5500	40.8000	770	07/1944	12/1994	51	0.1987	0.3831	0.2975	0.95
36-8026	SHEFFIELD 6 W	PA	30	-79.1464	41.7089	1920	05/1948	10/1998	49	0.1723	0.1360	0.0881	0.93
36-8057	SHICKSHINNY 3 N	PA	18	-76.1500	41.2000	780	06/1971	12/2000	30	0.1801	0.3353	0.2641	1.02
36-8073	SHIPPENSBURG	PA	18	-77.5167	40.0500	680	01/1933	12/2000	68	0.2017	0.2797	0.1270	0.66
36-8145	SINNEMAHONING	PA	17	-78.0958	41.3203	820	01/1951	12/2000	49	0.1889	0.2976	0.2341	0.62
36-8184	SLIPPERY ROCK	PA	30	-80.0667	41.0500	1250	05/1949	12/2000	52	0.1612	0.1580	0.1484	0.31
36-8190	SMETHPORT HIWAY SHED	PA	30	-78.4333	41.8167	1469	01/1931	12/1990	52	0.2165	0.3119	0.1790	2.20
36-8275	SOUTH CANAAN 1 NE	PA	18	-75.4000	41.5167	1400	07/1948	12/1990	43	0.1939	0.3093	0.3710	2.35
36-8308	SOUTH MOUNTAIN	PA	18	-77.5000	39.8500	1519	05/1940	12/2000	61	0.1923	0.2482	0.1675	0.04
36-8379	SPRING GROVE	PA	8	-76.8667	39.8667	450	01/1932	12/2000	69	0.1702	0.2856	0.2034	1.33
36-8395	SPRINGS 1 SW	PA	20	-79.1667	39.7333	2503	02/1917	11/1958	38	0.1830	0.2355	0.2922	1.67
36-8449	STATE COLLEGE	PA	19	-77.8672	40.7933	1170	01/1888	12/2000	113	0.1568	0.2442	0.2134	0.64
36-8469	STEVENSON DAM	PA	17	-78.0167	41.4000	932	07/1969	12/2000	32	0.1847	0.2102	0.0783	1.17
36-8560	STOYSTOWN	PA	20	-78.9500	40.1000	1801	04/1961	12/1991	31	0.1511	0.1311	0.0438	2.27
36-8570	STRAUSSTOWN	PA	7	-76.1833	40.4833	600	08/1945	12/2000	56	0.1728	0.1487	0.0810	1.22
36-8596	STROUDSBURG 2 E	PA	18	-75.1906	41.0125	460	01/1911	12/2000	83	0.2081	0.2988	0.1669	0.33
36-8668	SUNBURY	PA	18	-76.7925	40.8544	439	01/1927	12/2000	51	0.2169	0.3258	0.1936	0.41
36-8692	SUSQUEHANNA	PA	17	-75.6050	41.9483	910	02/1935	12/2000	64	0.1748	0.2377	0.1109	0.89
36-8758	TAMAQUA	PA	18	-75.9753	40.7947	925	01/1941	12/2000	60	0.2059	0.2911	0.1376	0.63
36-8763	TAMAQUA 4 N DAM	PA	18	-75.9833	40.8500	1110	01/1932	03/2000	68	0.2089	0.2097	0.1091	0.82
36-8873	TIONESTA 2 SE LAKE	PA	30	-79.4333	41.4833	1200	01/1941	12/2000	56	0.1719	0.2463	0.1744	0.13
36-8888	TITUSVILLE WATER WORKS	PA	30	-79.7000	41.6333	1220	01/1939	12/2000	62	0.1572	0.1784	0.1381	0.27
36-8893	TOBYHANNA	PA	18	-75.2225	41.1386	1916	05/1948	12/2000	50	0.2077	0.3574	0.2729	0.39
36-8905	TOWANDA 1 ESE	PA	17	-76.4428	41.7506	760	01/1895	12/2000	106	0.1620	0.2048	0.2408	0.62
36-8959	TROY 1 NE	PA	17	-76.7833	41.7833	1110	02/1949	12/2000	51	0.1606	0.2048	0.2881	1.74
36-9022	TYRONE	PA	19	-78.2192	40.6644	890	05/1948	12/2000	48	0.1965	0.2831	0.1539	0.32
36-9024	TYRONE 4 NE BALD EAGLE	PA	19	-78.2000	40.7167	1020	01/1939	10/1972	34	0.1952	0.3662	0.2122	1.04
36-9042	UNION CITY	PA	30	-79.8167	41.9000	1400	05/1948	12/2000	53	0.1800	0.1857	0.1508	0.42
36-9050	UNIONTOWN	PA	30	-79.7192	39.9150	956	01/1888	12/2000	111	0.1558	0.2256	0.2050	0.26

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36-9128	VANDERGRIFT	PA	30	-79.5500	40.6000	800	04/1914	12/1987	72	0.1895	0.2369	0.1588	0.46
36-9298	WARREN 1 SSW	PA	30	-79.1500	41.8500	1210	01/1893	12/2000	108	0.1698	0.2276	0.1271	0.56
36-9318	WASHINGTON 3 NE	PA	30	-80.1889	40.1789	1300	05/1948	12/2000	44	0.2002	0.3189	0.2628	1.30
36-9367	WAYNESBURG 1 E	PA	30	-80.1667	39.9000	940	03/1921	12/2000	75	0.1783	0.1900	0.1319	0.35
36-9408	WELLSBORO 3 S	PA	16	-77.3894	41.7003	1818	01/1889	12/2000	102	0.2012	0.3369	0.3189	0.53
36-9464	WEST CHESTER 1 W	PA	7	-75.6350	39.9708	375	01/1888	12/2000	104	0.1977	0.2010	0.1448	0.39
36-9490	WESTFIELD 5 N	PA	16	-77.5667	41.9833	1880	05/1948	12/1987	37	0.2069	0.3421	0.1436	2.66
36-9503	WEST GROVE 1 E	PA	7	-75.8000	39.8000	449	01/1928	08/1976	49	0.1997	0.2869	0.1524	0.60
36-9507	WEST HICKORY	PA	30	-79.4000	41.5833	1180	03/1952	12/1991	39	0.2083	0.3346	0.2457	1.65
36-9555	WEST NEWTON	PA	30	-79.7667	40.2167	771	01/1893	12/1947	55	0.1666	0.2534	0.2079	0.14
36-9655	WHITESBURG	PA	30	-79.4167	40.7667	1350	01/1941	12/1992	51	0.1698	0.2065	0.1632	0.03
36-9702	WILKES BARRE	PA	18	-75.8833	41.2333	660	01/1890	04/2000	109	0.2058	0.3080	0.1967	0.16
36-9705	WILKES BARRE WB-SCRANT	PA	18	-75.7267	41.3389	930	01/1939	12/2000	62	0.2296	0.3306	0.2380	0.71
36-9714	WILLIAMSBURG	PA	19	-78.2000	40.4667	840	01/1945	12/2000	45	0.2226	0.2911	0.2136	1.39
36-9728	WILLIAMSPORT WSO AP	PA	18	-76.9217	41.2433	520	01/1944	12/2000	57	0.2124	0.3690	0.3154	0.69
36-9733	WILLIAMSPORT	PA	18	-77.0000	41.2333	495	02/1895	10/1949	53	0.1765	0.1570	0.1214	0.53
36-9823	WOLFSBURG	PA	19	-78.5278	40.0417	1185	07/1950	12/2000	50	0.2111	0.2703	0.1306	0.71
36-9933	YORK 3 SSW PUMP STN	PA	8	-76.7500	39.9167	390	01/1894	12/2000	96	0.1921	0.3090	0.1931	0.49
36-9938	YORK 2 S FILTER PLANT	PA	8	-76.7253	39.9400	640	05/1948	09/1998	50	0.2131	0.3506	0.1904	0.78
36-9950	YORK HAVEN	PA	8	-76.7167	40.1167	310	03/1921	12/2000	80	0.2056	0.3538	0.3008	0.87
36-9966	YOUNGSVILLE	PA	30	-79.3167	41.8500	1217	05/1948	12/1982	33	0.1797	0.2355	0.1832	0.10
36-9995	ZIONSVILLE 3 SE	PA	7	-75.4500	40.4667	585	01/1939	12/1996	58	0.2010	0.3267	0.1582	1.18
38-0074	AIKEN 4 NE	SC	13	-81.6958	33.4925	492	01/1902	12/2000	97	0.1939	0.2723	0.2107	0.28
38-0165	ANDERSON	SC	12	-82.6667	34.5333	800	01/1892	12/2000	108	0.1962	0.2717	0.1650	0.34
38-0170	ANDERSON FAA AIRPORT	SC	12	-82.7092	34.4950	760	01/1943	12/2000	58	0.1701	0.3410	0.2318	1.94
38-0184	ANDREWS	SC	4	-79.5736	33.4322	35	01/1963	12/2000	32	0.1810	0.2675	0.1568	0.85
38-0204	ANTREVILLE	SC	12	-82.5656	34.2558	675	01/1952	12/2000	49	0.2268	0.4587	0.4067	2.18
38-0448	BAMBERG	SC	5	-81.0306	33.3000	165	08/1951	12/2000	49	0.1998	0.3883	0.2482	1.60
38-0506	BATESBURG	SC	13	-81.5389	33.9000	660	01/1947	12/2000	54	0.1724	0.1839	0.1919	0.91
38-0559	BEAUFORT 7 SW	SC	4	-80.6958	32.3950	25	01/1893	12/1999	103	0.2071	0.2717	0.1937	0.05
38-0736	BISHOPVILLE 3 W	SC	5	-80.2392	34.2169	224	04/1933	12/2000	66	0.1973	0.2555	0.2330	1.49
38-0764	BLACKVILLE 3 W	SC	13	-81.3292	33.3631	324	01/1896	11/2000	105	0.1715	0.1754	0.1703	0.76

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38-0772	BLAIR	SC	13	-81.4000	34.4167	251	08/1905	12/1981	77	0.1893	0.2093	0.1277	0.33
38-0972	BRANCHVILLE 6 S	SC	5	-80.8097	33.1831	95	01/1947	12/1999	52	0.2132	0.3073	0.2188	0.17
38-1093	BROOKGREEN GARDENS	SC	4	-79.0919	33.5178	20	01/1958	12/2000	43	0.2426	0.2662	0.2456	3.03
38-1256	CAESARS HEAD	SC	26	-82.6208	35.0878	3200	01/1939	12/2000	62	0.1839	0.3838	0.2650	1.92
38-1277	CALHOUN FALLS	SC	12	-82.5858	34.0906	530	03/1899	12/2000	102	0.2037	0.3076	0.1953	0.35
38-1310	CAMDEN 2 WSW	SC	13	-80.6564	34.2428	140	01/1893	12/2000	108	0.2100	0.2649	0.1346	1.23
38-1462	CATAWBA	SC	11	-80.9167	34.8500	560	07/1906	12/2000	95	0.1811	0.3008	0.2128	1.61
38-1530	CHAPPELLS	SC	13	-81.8850	34.2142	475	07/1905	12/2000	95	0.1718	0.2125	0.1385	0.31
38-1544	CHARLESTON WSO AP	SC	4	-80.0403	32.8986	40	01/1930	12/2000	71	0.2224	0.2489	0.2235	1.36
38-1549	CHARLESTON WSO CITY	SC	4	-79.9333	32.7833	10	01/1897	12/2000	55	0.2258	0.2091	0.1452	1.04
38-1588	CHERAW	SC	5	-79.8833	34.7000	140	01/1896	12/2000	105	0.1739	0.3049	0.2386	0.70
38-1625	CHESNEE 7 WSW	SC	11	-81.9683	35.1317	748	07/1948	12/2000	53	0.1895	0.2509	0.1169	0.55
38-1633	CHESTER 1 NW	SC	11	-81.2242	34.7197	520	01/1923	12/2000	70	0.1925	0.2863	0.2080	0.66
38-1726	CLARK HILL 1 W	SC	12	-82.1897	33.6631	380	01/1952	12/2000	49	0.1923	0.4614	0.3605	1.77
38-1770	CLEMSON COLLEGE	SC	12	-82.8236	34.6603	824	01/1930	12/2000	71	0.1661	0.2315	0.2412	1.26
38-1804	CLEVELAND 4 S	SC	26	-82.4842	35.0261	1070	06/1943	12/2000	58	0.1802	0.1759	0.1420	0.22
38-1939	COLUMBIA WSFO AP	SC	13	-81.1219	33.9456	213	01/1941	12/2000	60	0.1685	0.2487	0.1023	1.68
38-1944	COLUMBIA UNIV OF SC	SC	13	-81.0167	33.9833	242	01/1930	12/2000	69	0.1719	0.2084	0.1792	0.34
38-1997	CONWAY	SC	4	-79.0558	33.8306	20	04/1893	12/2000	107	0.2076	0.2653	0.1830	0.03
38-2260	DARLINGTON	SC	5	-79.8767	34.3036	150	01/1896	12/2000	102	0.2185	0.3255	0.2205	0.28
38-2386	DILLON	SC	4	-79.3803	34.4236	115	02/1904	12/2000	76	0.1968	0.2932	0.2157	0.28
38-2712	EDGEFIELD 3 NNE	SC	13	-81.9142	33.8275	550	07/1912	12/2000	89	0.1687	0.2204	0.1967	0.45
38-2730	EDISTO ISLAND 3 SW	SC	4	-80.3347	32.4697	8	01/1957	12/2000	36	0.2480	0.2536	0.0919	3.13
38-2757	EFFINGHAM	SC	5	-79.7558	34.0633	106	01/1893	12/2000	108	0.2039	0.3778	0.2514	0.88
38-2917	EUTAWVILLE	SC	4	-80.3500	33.4000	121	01/1893	10/1957	65	0.1918	0.3081	0.1915	0.75
38-3106	FLORENCE FAA AP	SC	5	-79.7289	34.1936	146	01/1941	12/2000	60	0.1893	0.1630	0.0349	4.63
38-3111	FLORENCE 8 NE	SC	5	-79.7403	34.2931	120	02/1915	12/2000	86	0.2121	0.2829	0.2259	0.75
38-3216	FORT MILL 4 NW	SC	11	-81.0078	35.0217	569	02/1928	12/2000	73	0.1868	0.2295	0.2098	0.72
38-3356	GAFFNEY 6 E	SC	11	-81.5758	35.0922	650	01/1945	12/2000	56	0.2332	0.3312	0.1930	2.76
38-3433	GASTON SHOALS	SC	11	-81.6108	35.1406	600	01/1913	12/2000	87	0.2155	0.2153	0.1061	2.31
38-3468	GEORGETOWN 2 E	SC	4	-79.2239	33.3619	10	06/1893	12/2000	99	0.2131	0.3137	0.2357	0.54
38-3525	GIVHANS FERRY 2 ESE	SC	4	-80.3500	33.0167	55	01/1947	12/2000	52	0.1916	0.2453	0.1147	1.02

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38-3700	GREAT FALLS	SC	13	-80.8833	34.5500	356	01/1941	12/2000	60	0.1824	0.2513	0.1803	0.00
38-3732	GREENVILLE	SC	12	-82.3833	34.8667	991	01/1930	12/1977	48	0.2357	0.2343	0.0776	3.99
38-3747	GRNVL SPART WSO AP	SC	12	-82.2239	34.8847	943	01/1963	12/2000	38	0.1775	0.2536	0.2172	0.32
38-3754	GREENWOOD 3 SW	SC	12	-82.1711	34.1997	615	01/1896	12/2000	104	0.1965	0.3161	0.2503	0.02
38-3906	HAMPTON	SC	4	-81.1167	32.8667	95	06/1951	12/2000	50	0.1697	0.2784	0.1876	1.31
38-4063	HEATH SPRINGS	SC	13	-80.6667	34.6000	689	01/1902	12/1955	50	0.2096	0.2288	0.0747	2.00
38-4169	HILTON HEAD	SC	4	-80.7500	32.2167	15	06/1953	12/1997	45	0.2235	0.2679	0.1464	0.63
38-4197	HOLLY HILL	SC	4	-80.4211	33.3258	100	01/1958	12/1999	34	0.1765	0.0844	-0.0050	4.87
38-4607	JOHNSTON 4 SW	SC	13	-81.8467	33.7775	620	01/1899	12/2000	100	0.1631	0.2498	0.1896	0.70
38-4690	KERSHAW	SC	5	-80.5922	34.5233	500	04/1916	12/2000	81	0.2082	0.3219	0.2298	0.06
38-4753	KINGSTREE	SC	5	-79.8153	33.6500	60	01/1894	12/2000	107	0.2106	0.3090	0.2173	0.09
38-4886	LAKE CITY 1 SE	SC	5	-79.7300	33.8475	75	01/1938	12/2000	59	0.2050	0.2799	0.1993	0.13
38-4918	LANCASTER 2 SE	SC	11	-80.7533	34.7003	535	06/1948	10/1998	46	0.1845	0.2156	0.2184	1.10
38-4936	LANDRUM	SC	26	-82.1833	35.1833	1001	01/1915	10/1974	56	0.1720	0.2133	0.1568	0.01
38-5017	LAURENS	SC	12	-82.0219	34.4989	589	01/1918	12/2000	82	0.2078	0.3140	0.1813	0.72
38-5200	LITTLE MOUNTAIN	SC	13	-81.4147	34.1994	711	01/1894	12/2000	107	0.2008	0.2959	0.1482	0.81
38-5232	LOCKHART	SC	11	-81.4547	34.7811	400	06/1948	12/2000	49	0.1999	0.1832	0.0789	1.41
38-5278	LONGCREEK	SC	26	-83.2494	34.8158	1710	01/1939	11/2000	58	0.1715	0.2516	0.1087	0.94
38-5306	LORIS	SC	3	-78.8825	34.0347	90	01/1946	12/2000	51	0.2377	0.3378	0.2021	0.52
38-5493	MANNING	SC	5	-80.2364	33.6950	100	01/1949	12/2000	31	0.1603	0.3206	0.2875	1.93
38-5509	MARION 2 W	SC	4	-79.4000	34.1667	55	01/1928	12/1993	60	0.2030	0.3427	0.2532	1.02
38-5628	MCCLELLANVILLE	SC	4	-79.4667	33.0667	12	01/1958	12/1999	39	0.2083	0.3053	0.2421	0.57
38-5633	MCCOLL 3 NNW	SC	4	-79.5683	34.7050	190	01/1936	12/2000	63	0.1912	0.2573	0.1989	0.20
38-5658	MC CORMICK 9 E	SC	12	-82.1439	33.9236	495	01/1943	12/1995	53	0.1951	0.2999	0.2374	0.01
38-6209	NEWBERRY	SC	13	-81.6269	34.2825	476	01/1893	12/2000	108	0.1949	0.2746	0.2546	1.01
38-6293	NINETY NINE ISLANDS	SC	11	-81.5053	35.0647	500	01/1941	12/2000	60	0.1968	0.2519	0.1773	0.23
38-6423	OAKWAY	SC	26	-83.0333	34.6000	990	01/1952	12/1989	38	0.1780	0.2878	0.1785	0.42
38-6522	ORANGEBURG 2 SE	SC	5	-80.8333	33.4667	259	01/1917	12/1952	36	0.1879	0.3556	0.2508	0.78
38-6527	ORANGEBURG 2	SC	5	-80.8733	33.4886	180	01/1939	12/2000	62	0.2264	0.2736	0.1800	0.96
38-6616	PAGELAND 2 WSW	SC	5	-80.4014	34.7614	620	04/1968	12/2000	33	0.2428	0.3520	0.2299	1.58
38-6688	PARR	SC	13	-81.3181	34.2931	258	03/1946	12/2000	55	0.1820	0.3514	0.2532	0.91
38-6749	PEE DEE	SC	4	-79.5333	34.2000	60	01/1924	10/1992	68	0.2017	0.3061	0.2079	0.33

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
38-6775	PELION 4 NW	SC	13	-81.2742	33.7175	450	01/1947	12/2000	54	0.1960	0.2409	0.1679	0.34
38-6831	PICKENS 5 SE	SC	26	-82.7189	34.8819	1162	01/1942	12/2000	57	0.1678	0.1347	0.1134	0.25
38-6893	PINOPOLIS DAM	SC	4	-79.9833	33.2500	50	01/1899	05/1994	82	0.2290	0.2774	0.1326	1.25
38-7281	RIDGELAND 5 NE	SC	4	-80.9000	32.5333	20	01/1942	12/1998	56	0.1973	0.1815	0.1211	0.67
38-7313	RIMINI	SC	5	-80.5314	33.6489	80	02/1914	12/2000	87	0.1699	0.2354	0.2075	1.31
38-7390	ROCK HILL 5 NE	SC	11	-80.9667	34.9833	600	03/1949	12/1978	30	0.1747	0.1752	0.1302	0.12
38-7542	ST GEORGE	SC	4	-80.5833	33.1833	103	01/1899	12/1997	71	0.1883	0.2405	0.1707	0.18
38-7560	ST MATTHEWS	SC	5	-80.7806	33.6525	280	01/1899	10/1998	73	0.1854	0.3237	0.2753	0.63
38-7589	SALEM 1 SW	SC	26	-82.9475	34.9469	1082	01/1952	12/2000	49	0.1440	0.2218	0.1643	1.14
38-7631	SALUDA	SC	13	-81.7747	33.9978	480	04/1902	12/2000	97	0.1758	0.2943	0.2083	0.37
38-7712	SANTEE COOPER SPILLWAY	SC	4	-80.1500	33.4500	75	06/1948	10/1998	50	0.1729	0.2409	0.1958	0.86
38-7722	SANTUCK 4 SE	SC	12	-81.5167	34.6333	520	08/1893	12/2000	107	0.2035	0.3344	0.2138	0.44
38-8114	SOCIETY HILL 6 S	SC	5	-79.8500	34.4167	141	01/1893	12/1958	66	0.2047	0.2761	0.2045	0.22
38-8186	SPARTANBURG	SC	11	-81.8833	34.9833	840	06/1948	12/1982	30	0.1527	0.1090	0.0474	1.53
38-8219	SPRINGFIELD	SC	13	-81.2797	33.4931	300	01/1947	12/2000	54	0.1949	0.1954	0.1840	1.35
38-8405	SULLIVANS ISLAND	SC	4	-79.8500	32.7667	3	07/1951	12/2000	45	0.2331	0.2743	0.1597	0.90
38-8426	SUMMERVILLE	SC	4	-80.2322	32.0414	65	07/1898	10/2000	100	0.2151	0.2391	0.1750	0.29
38-8440	SUMTER	SC	5	-80.3500	33.9333	177	01/1930	12/2000	71	0.2310	0.3605	0.2203	1.11
38-8621	TILGHMAN FOREST NURSER	SC	5	-80.5000	33.9000	210	06/1952	09/1986	35	0.1803	0.2016	0.1224	1.60
38-8786	UNION 8 SW	SC	12	-81.7500	34.6500	560	07/1949	12/2000	51	0.1968	0.2722	0.1619	0.40
38-8879	WAGENER 1 SW	SC	13	-81.3833	33.6333	430	06/1948	12/1997	49	0.1996	0.3673	0.3108	1.62
38-8887	WALHALLA	SC	26	-83.0842	34.7483	980	07/1896	12/2000	97	0.1983	0.2498	0.1488	0.69
38-8922	WALTERBORO	SC	4	-80.6761	32.8847	56	05/1903	12/2000	73	0.2073	0.2341	0.1320	0.31
38-8947	WARE SHOALS	SC	12	-82.2500	34.4000	642	01/1938	12/1989	52	0.1679	0.1962	0.1365	0.89
38-8951	WARE SHOALS 2	SC	12	-82.2297	34.3981	464	01/1971	12/2000	29	0.1794	0.2701	0.2267	0.23
38-8979	WATEREE DAM	SC	13	-80.7031	34.3347	230	01/1893	12/2000	78	0.1843	0.1647	0.0869	0.81
38-9039	WEDGEFIELD	SC	5	-80.5189	33.8933	250	01/1923	12/2000	40	0.1965	0.3951	0.2769	1.22
38-9122	WEST PELZER	SC	12	-82.4872	34.6531	862	01/1939	12/2000	62	0.2059	0.3464	0.2765	0.21
38-9218	WHITMIRE 4 NE	SC	12	-81.5500	34.5333	400	01/1941	12/1990	48	0.1740	0.4034	0.3313	1.84
38-9327	WINNSBORO	SC	13	-81.0928	34.3739	560	03/1896	12/2000	100	0.1815	0.2610	0.1571	0.17
38-9350	WINTHROP COLLEGE	SC	11	-81.0314	34.9403	690	01/1900	12/2000	100	0.1748	0.2304	0.1218	0.64
38-9412	WOODRUFF 5 NW	SC	12	-82.1106	34.7764	740	01/1939	12/2000	59	0.1976	0.2481	0.1547	0.34

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38-9469	YEMASSEE	SC	4	-80.8500	32.6833	25	01/1899	12/2000	100	0.1960	0.2654	0.1764	0.09
40-0081	ALLARDT	TN	36	-84.8744	36.3806	1645	01/1928	12/2000	73	0.1728	0.1499	0.0934	0.43
40-0254	ARTHUR	TN	33	-83.6333	36.5500	1070	01/1937	12/1997	60	0.1673	0.1664	0.1288	0.98
40-0271	ASHWOOD	TN	36	-87.1333	35.5833	732	01/1893	12/1976	84	0.1799	0.1975	0.1489	0.18
40-0284	ATHENS	TN	36	-84.5833	35.4322	940	01/1939	12/2000	62	0.1676	0.1681	0.1255	0.07
40-0669	BETHPAGE 1 S	TN	47	-86.3278	36.4642	560	01/1954	12/2000	47	0.1554	0.1338	0.1640	0.77
40-0847	BLUFF CITY	TN	34	-82.2667	36.4667	1480	01/1897	10/1974	70	0.1115	0.0016	0.1565	1.96
40-0876	BOLIVAR 2	TN	76	-88.9892	35.2622	455	01/1895	12/2000	101	0.1623	0.1644	0.1794	0.32
40-0884	BOLTON	TN	75	-89.7500	35.3167	300	01/1903	10/1989	64	0.1935	0.2712	0.2397	0.56
40-1094	TRI-CITIES AP	TN	34	-82.4044	36.4731	1500	01/1948	12/2000	53	0.1406	0.0913	0.1437	0.38
40-1145	BROWNSVILLE	TN	75	-89.2586	35.5894	330	01/1903	12/2000	98	0.1742	0.2415	0.1673	0.16
40-1150	BROWNSVILLE SEWAGE PLA	TN	75	-89.2692	35.5847	355	01/1949	12/1997	48	0.1936	0.2387	0.1675	0.23
40-1236	BULLS GAP	TN	34	-83.0833	36.2500	1060	01/1937	12/1980	44	0.1403	-0.0031	0.0148	2.68
40-1295	BUTLER	TN	34	-82.0167	36.3500	1991	01/1949	09/1980	32	0.1425	0.1615	0.1953	0.43
40-1312	BYRDSTOWN 1 W	TN	47	-85.1500	36.5667	1030	01/1893	10/1951	42	0.1736	0.2459	0.2229	0.48
40-1323	CAGLE	TN	36	-85.4500	35.4667	2060	01/1949	09/1980	32	0.1735	0.2016	0.1026	0.46
40-1480	CARTHAGE	TN	47	-85.9444	36.2456	515	01/1893	12/2000	100	0.1640	0.1905	0.1624	0.05
40-1561	CELINA	TN	47	-85.4589	36.5400	540	01/1904	12/2000	67	0.1665	0.1997	0.1175	0.28
40-1587	CENTERVILLE WATER PL	TN	47	-87.4261	35.7553	660	01/1949	12/2000	52	0.1717	0.1360	0.1079	0.68
40-1636	CHARLESTON	TN	36	-84.7500	35.2833	722	01/1886	12/1997	99	0.1678	0.2116	0.1920	0.30
40-1656	LOVELL FIELD	TN	36	-85.2014	35.0311	671	01/1928	12/2000	73	0.1630	0.2258	0.1963	0.39
40-1663	NEPTUNE 3 S	TN	47	-87.2244	36.3244	392	01/1936	12/2000	64	0.1689	0.2022	0.0989	0.59
40-1716	CHICKAMAUGA DAM	TN	36	-85.2333	35.1000	702	01/1937	12/1997	61	0.1720	0.2427	0.2540	1.63
40-1790	CLARKSVILLE SEWAGE PLT	TN	47	-87.3564	36.5467	382	01/1893	12/2000	108	0.1765	0.2812	0.1478	0.82
40-1808	CLEVELAND FILTER PLANT	TN	36	-84.7981	35.2203	800	01/1956	12/2000	45	0.2139	0.2863	0.1504	2.81
40-1835	CLINTON	TN	35	-84.1000	36.1000	850	01/1889	12/1975	83	0.1876	0.2800	0.2016	0.24
40-1916	COLDWATER 1 E	TN	36	-86.7333	35.0833	630	01/1898	12/1975	77	0.1831	0.2201	0.1765	0.39
40-1957	COLUMBIA 3 WNW	TN	36	-87.0872	35.6386	650	06/1942	12/2000	55	0.1654	0.1861	0.1247	0.08
40-1978	CONASAUGA 4 N	TN	36	-84.7347	35.0328	854	01/1946	10/1998	44	0.1383	0.1097	0.1263	1.32
40-2009	COOKEVILLE	TN	36	-85.5033	36.1075	1090	01/1915	12/2000	81	0.1451	0.2628	0.2283	1.88
40-2024	COPPERHILL	TN	26	-84.3758	34.9939	1450	04/1914	12/2000	85	0.1613	0.1403	0.1287	0.17
40-2074	COSBY	TN	26	-83.2167	35.7833	1722	01/1937	12/1997	36	0.1869	0.2129	0.2055	0.70

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
40-2108	COVINGTON	TN	75	-89.7000	35.5497	385	01/1893	12/2000	101	0.1910	0.2270	0.1196	0.65
40-2197	CROSSVILLE FAA AIRPORT	TN	36	-85.0825	35.9542	1867	01/1949	12/2000	52	0.1594	0.1457	0.1065	0.31
40-2202	CROSSVILLE EXP STN	TN	36	-85.1311	36.0147	1810	01/1913	12/2000	88	0.1818	0.1368	0.1247	0.80
40-2316	DANDRIDGE	TN	35	-83.4167	36.0167	1040	01/1905	12/1997	74	0.1687	0.4085	0.3574	1.78
40-2360	DAYTON	TN	36	-84.9947	35.4717	865	01/1957	12/2000	42	0.1749	0.1834	0.1938	0.68
40-2385	BREEDENTON 2 NW	TN	36	-84.7833	35.5333	879	01/1896	08/1956	57	0.1690	0.1891	0.1615	0.06
40-2489	DICKSON	TN	47	-87.3936	36.0747	780	01/1901	12/2000	99	0.1695	0.2207	0.1706	0.02
40-2589	DOVER 1 NW	TN	47	-87.8625	36.4817	475	01/1898	12/2000	101	0.1805	0.2480	0.1688	0.28
40-2600	DRESDEN	TN	75	-88.7000	36.2833	450	05/1924	12/2000	76	0.1711	0.1978	0.1932	0.31
40-2657	DUNLAP	TN	36	-85.3833	35.3667	722	03/1935	12/1997	63	0.1853	0.2249	0.1952	0.69
40-2680	DYERSBURG	TN	74	-89.3697	36.0456	350	01/1903	10/1998	69	0.1781	0.1205	0.0752	0.43
40-2685	DYERSBURG FAA AIRPORT	TN	74	-89.4100	36.0003	300	01/1949	12/2000	52	0.1903	0.2486	0.1667	1.08
40-2806	ELIZABETHTON	TN	34	-82.2325	36.3644	1755	04/1895	12/2000	84	0.1576	0.1822	0.1208	0.19
40-2875	EMBREEVILLE	TN	34	-82.4667	36.1833	1591	05/1926	12/1961	36	0.1390	0.3170	0.2447	2.50
40-2929	ERWIN	TN	34	-82.4167	36.1667	1752	01/1927	12/1961	30	0.1942	0.3386	0.1880	2.56
40-3044	FALLS CREEK PARK	TN	36	-85.3167	35.6833	1503	01/1940	12/1970	31	0.1670	0.1725	0.0414	1.81
40-3069	FAYETTEVILLE	TN	36	-86.5667	35.1500	702	01/1937	12/1997	53	0.1817	0.1042	0.1071	1.42
40-3074	FAYETTEVILLE 1 NE	TN	36	-86.5411	35.1500	725	01/1935	12/2000	64	0.1777	0.1880	0.0747	0.96
40-3280	FRANKLIN SEWAGE PLANT	TN	47	-86.8697	35.9478	655	01/1893	12/2000	107	0.1884	0.2908	0.1724	0.90
40-3366	GAINESBORO	TN	47	-85.6333	36.3667	581	04/1940	11/1975	36	0.1675	0.0149	0.0710	3.78
40-3420	GATLINBURG 2 SW	TN	26	-83.5369	35.6878	1454	01/1922	12/2000	75	0.1525	0.2477	0.2066	1.00
40-3679	GREENEVILLE EXP STN	TN	26	-82.8436	36.1056	1320	01/1893	12/2000	81	0.1753	0.2463	0.1970	0.20
40-3697	GREENFIELD 1 E	TN	75	-88.7978	36.1681	400	01/1949	12/1997	44	0.2087	0.2368	0.2273	1.62
40-4223	HOHENWALD	TN	36	-87.5414	35.5567	980	01/1893	12/1961	63	0.1782	0.2107	0.1316	0.21
40-4392	HUMBOLDT	TN	75	-88.9333	35.8167	331	01/1949	12/1988	39	0.1972	0.3286	0.1749	1.37
40-4417	HUNTINGDON SEWAGE PLAN	TN	75	-88.4253	36.0028	440	01/1939	12/2000	62	0.1800	0.1547	0.1488	0.79
40-4556	JACKSON FCWOS AP	TN	76	-88.9167	35.5931	433	01/1949	12/2000	50	0.1538	0.0376	0.1199	2.12
40-4561	JACKSON EXP STN	TN	76	-88.8333	35.6167	400	01/1893	12/2000	106	0.1713	0.2649	0.1975	0.90
40-4590	JAMESTOWN	TN	36	-84.9414	36.4256	1690	01/1950	12/2000	51	0.1413	0.2249	0.1381	1.55
40-4609	JEFFERSON CITY EVAP	TN	35	-83.5000	36.1167	1201	04/1910	08/1981	52	0.1439	0.2286	0.2394	0.73
40-4663	JOHNSON CITY VET HOSPI	TN	34	-82.3833	36.3167	1732	01/1940	12/1970	31	0.1469	0.2155	0.0773	1.52
40-4673	JOHNSONVILLE	TN	75	-88.0333	36.0000	420	01/1886	12/1997	79	0.1877	0.1533	0.1434	1.12

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40-4678	JOHNSONVILLE STEAM PLA	TN	75	-87.9833	36.0333	410	01/1950	09/1980	30	0.2005	0.1943	0.1845	1.24
40-4771	KENTON	TN	74	-88.9986	36.2014	325	03/1902	11/1963	48	0.1870	0.1620	0.1201	0.30
40-4858	KINGSPORT	TN	34	-82.5275	36.5194	1284	01/1917	12/2000	79	0.1444	0.1582	0.0966	0.39
40-4871	KINGSTON	TN	36	-84.5275	35.8581	730	01/1889	12/2000	109	0.1623	0.1381	0.1099	0.31
40-4876	KINGSTON SPRINGS	TN	47	-87.1147	36.1036	517	02/1941	12/2000	59	0.1662	0.1502	0.2068	1.43
40-4946	KNOXVILLE EXP STN	TN	36	-83.9572	35.8819	830	01/1949	12/2000	47	0.1577	0.1062	0.1060	0.74
40-4950	MCGHEE TYSON AP	TN	36	-83.9858	35.8181	962	01/1891	12/2000	110	0.1591	0.2022	0.1912	0.39
40-4955	KNOXVILLE UNIV OF TENN	TN	36	-83.9167	35.9500	895	04/1943	08/1982	40	0.1695	0.2370	0.1802	0.25
40-4987	LAFAYETTE	TN	47	-86.0306	36.5194	975	01/1956	12/2000	45	0.1561	0.1841	0.1740	0.23
40-5089	LAWRENCEBURG FILTER PL	TN	36	-87.3514	35.2639	870	01/1955	12/2000	46	0.1986	0.2661	0.2198	1.77
40-5108	LEBANON 3 W	TN	47	-86.3178	36.2289	525	01/1903	12/2000	74	0.1692	0.1858	0.1104	0.31
40-5118	LEBANON 7 N	TN	47	-86.2631	36.2981	510	01/1935	12/2000	63	0.1560	0.1426	0.1363	0.43
40-5158	LENOIR CITY	TN	36	-84.2622	35.7875	785	09/1948	12/2000	51	0.1494	0.2114	0.0606	2.74
40-5187	LEWISBURG EXP STN	TN	36	-86.8083	35.4142	787	01/1899	12/2000	102	0.1795	0.2177	0.1870	0.39
40-5210	LEXINGTON	TN	75	-88.3975	35.6467	540	01/1963	12/2000	33	0.1800	0.3220	0.1270	2.76
40-5278	LINDEN 2	TN	36	-87.8261	35.6333	498	01/1963	12/2000	36	0.1983	0.3104	0.2463	2.46
40-5311	LITTLE WAR GAP	TN	34	-83.0167	36.5000	1982	01/1937	10/1978	42	0.1349	0.2412	0.1275	1.52
40-5327	LIVINGSTON 5 NE	TN	47	-85.2833	36.4333	960	01/1949	12/1988	40	0.1469	0.2936	0.1791	2.07
40-5332	LIVINGSTON RADIO WLIV	TN	47	-85.3394	36.3772	975	01/1949	11/2000	52	0.1694	0.2776	0.1652	0.58
40-5442	LORETTO	TN	36	-87.4333	35.0833	840	01/1896	12/1961	54	0.1643	0.1696	0.1242	0.08
40-5451	LOUDON	TN	36	-84.3333	35.7333	801	01/1886	12/1961	67	0.1473	0.2479	0.1248	1.93
40-5535	LYNNVILLE 4 SSW	TN	36	-87.0500	35.3333	732	01/1893	12/1971	79	0.1501	0.2013	0.2333	1.54
40-5592	MANCHESTER	TN	36	-86.0833	35.4833	1040	01/1950	12/1997	40	0.1848	0.1613	0.1003	0.68
40-5681	MARTIN UNIV OF TENN BR	TN	75	-88.8636	36.3444	340	01/1937	12/2000	64	0.1814	0.3079	0.2322	0.74
40-5720	MASON	TN	75	-89.5314	35.4156	319	01/1949	10/1998	49	0.1749	0.1769	0.1736	0.41
40-5841	MC GHEE	TN	36	-84.2167	35.6167	810	01/1905	12/1961	46	0.1402	0.2605	0.2272	2.21
40-5862	MC KENZIE	TN	75	-88.5167	36.1500	522	01/1896	12/1964	38	0.1608	0.1370	0.0649	1.85
40-5882	MC MINNVILLE	TN	36	-85.7814	35.6719	940	01/1895	12/2000	105	0.1850	0.2740	0.1972	0.86
40-5954	MEMPHIS WSCMO AP	TN	76	-89.9864	35.0564	254	01/1940	12/2000	61	0.1402	0.0940	0.1322	0.59
40-5964	MEMPHIS WB CITY	TN	75	-90.0500	35.1500	384	01/1928	08/1965	38	0.1528	0.1644	0.2387	2.26
40-6012	MILAN 1 N	TN	75	-88.7389	35.9158	426	01/1899	12/2000	99	0.1632	0.1608	0.1478	0.63
40-6104	MINT	TN	36	-84.0167	35.6333	961	01/1937	09/1976	40	0.1622	0.2391	0.1778	0.38

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
40-6162	MONTEAGLE	TN	36	-85.8417	35.2244	1850	01/1939	12/2000	62	0.1952	0.2075	0.1091	1.09
40-6170	MONTEREY 1 E	TN	36	-85.2639	36.1542	1860	01/1932	12/2000	66	0.1437	0.1998	0.1033	1.49
40-6272	MORRISTOWN WFO	TN	34	-83.4011	36.1678	1338	01/1949	12/2000	52	0.1627	0.1316	0.1397	0.68
40-6274	MOSCOW	TN	76	-89.4117	35.0711	335	05/1920	12/2000	80	0.1514	0.1252	0.2048	1.37
40-6292	MOUNTAIN CITY 2	TN	25	-81.7917	36.4758	2510	01/1939	12/2000	53	0.1639	0.2309	0.1629	0.81
40-6340	MOUNT PLEASANT 2 SW	TN	36	-87.2019	35.5572	778	02/1953	12/2000	43	0.1938	0.2934	0.1795	1.42
40-6371	MURFREESBORO 5 N	TN	36	-86.3786	35.9211	550	01/1893	12/2000	108	0.1691	0.2546	0.1821	0.45
40-6402	NASHVILLE WSO AIRPORT	TN	47	-86.6764	36.1253	600	01/1891	12/2000	110	0.1596	0.1441	0.1394	0.39
40-6435	NEAPOLIS EXP STN	TN	36	-86.9819	35.7197	700	01/1952	12/2000	45	0.1710	0.1933	0.2025	0.65
40-6471	NEWBERN	TN	74	-89.2667	36.1167	371	04/1924	09/1993	69	0.1595	0.1906	0.0843	1.54
40-6493	NEWCOMB	TN	36	-84.1722	36.5522	985	01/1952	12/2000	48	0.1070	0.2213	0.1685	5.43
40-6534	NEWPORT 1 NW	TN	26	-83.2008	35.9833	1036	01/1893	12/2000	107	0.1428	0.1729	0.1755	0.89
40-6547	NEW RIVER	TN	36	-84.5667	36.3833	1171	02/1908	12/1951	43	0.1394	0.2032	0.2062	1.48
40-6619	NORRIS	TN	35	-84.0603	36.2131	1110	02/1935	12/2000	60	0.2053	0.3222	0.1294	1.02
40-6624	NORRIS DAM	TN	35	-84.0833	36.2167	879	01/1939	12/1970	31	0.2007	0.2647	0.2145	1.72
40-6666	NORTH SPRINGS	TN	47	-85.7181	36.4664	570	01/1958	12/2000	39	0.1864	0.2013	0.1431	0.63
40-6709	OAK GROVE	TN	75	-88.3500	35.6667	531	02/1941	12/1980	40	0.1703	0.1884	0.1638	0.24
40-6750	OAK RIDGE ATDL	TN	36	-84.2486	36.0028	905	01/1949	12/2000	52	0.1737	0.2464	0.2355	1.10
40-6803	OLD HICKORY DAM	TN	47	-86.6569	36.2953	460	01/1949	12/2000	51	0.1725	0.2325	0.1780	0.07
40-6829	ONEIDA 2 W	TN	36	-84.5308	36.5028	1440	03/1952	12/2000	46	0.1464	0.1429	0.1078	0.71
40-6861	ORLINDA	TN	47	-86.7000	36.6000	700	01/1951	12/1997	46	0.1509	0.2164	0.1267	0.87
40-6950	PALMETTO	TN	36	-86.5833	35.4833	771	03/1893	12/1976	84	0.1932	0.2923	0.1459	1.71
40-6977	PARIS 2 NW	TN	75	-88.2958	36.2872	443	01/1939	12/2000	61	0.1710	0.2791	0.1921	0.65
40-7007	PARKSVILLE	TN	36	-84.6500	35.1000	751	01/1893	12/1961	57	0.1570	0.2473	0.1713	0.68
40-7099	PERRYVILLE	TN	75	-88.0333	35.6333	371	01/1896	11/1981	86	0.1972	0.2747	0.1611	0.55
40-7115	PETROS	TN	36	-84.4333	36.1000	1401	01/1937	12/1997	54	0.1877	0.2320	0.2243	1.36
40-7184	PIKEVILLE	TN	36	-85.1936	35.5981	864	01/1961	12/2000	40	0.1766	0.2145	0.1379	0.16
40-7201	PINEWOOD	TN	47	-87.4667	35.9000	522	01/1907	12/1997	73	0.1898	0.2694	0.1367	1.06
40-7359	PORTLAND 2	TN	47	-86.5258	36.5875	794	01/1949	12/2000	52	0.1649	0.2347	0.2566	1.17
40-7459	PULASKI WATER PLANT	TN	36	-87.0422	35.1839	634	06/1957	12/2000	43	0.1697	0.2720	0.1753	0.75
40-7573	REAGAN	TN	75	-88.3333	35.5000	571	01/1937	12/1980	44	0.1964	0.2626	0.2055	0.32
40-7710	RIPLEY	TN	74	-89.5289	35.7456	335	06/1962	12/2000	39	0.1457	0.0948	0.2048	3.36

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
40-7811	ROCK ISLAND 2 NW	TN	36	-85.6347	35.8058	870	01/1905	10/1998	94	0.1912	0.2069	0.1323	0.66
40-7834	ROCKWOOD 2	TN	36	-84.7050	35.8528	860	01/1941	12/2000	60	0.1546	0.1639	0.1168	0.31
40-7850	RODDY	TN	36	-84.7772	35.7656	810	01/1938	10/1998	60	0.1499	0.2546	0.2124	1.28
40-7884	ROGERSVILLE 1 NE	TN	34	-82.9839	36.4161	1355	01/1889	12/2000	111	0.1397	0.1910	0.1633	0.18
40-7979	RUGBY	TN	36	-84.7000	36.3667	1430	01/1893	12/1947	55	0.1777	0.2152	0.1676	0.17
40-8065	SAMBURG WILDLIFE REF	TN	74	-89.3028	36.4528	310	05/1924	12/2000	77	0.1790	0.1986	0.1205	0.36
40-8108	SAVANNAH 6 SW	TN	76	-88.3167	35.1500	420	01/1893	12/2000	108	0.1810	0.2461	0.1478	0.59
40-8113	SAVANNAH TVA	TN	76	-88.2167	35.2333	430	01/1949	09/1980	32	0.1850	0.0608	0.0345	3.60
40-8160	SELMER	TN	76	-88.5994	35.1647	470	01/1924	12/2000	77	0.1586	0.1258	0.1136	0.13
40-8176	SEVIERVILLE	TN	35	-83.5833	35.8833	902	01/1906	12/1997	78	0.1536	0.0975	0.1510	1.97
40-8179	SEVIERVILLE 1 SE	TN	35	-83.5475	35.8594	930	01/1956	12/2000	45	0.1497	0.3601	0.3027	1.09
40-8184	SEWANEE	TN	36	-85.9172	35.2025	1900	01/1896	12/1961	60	0.1528	0.1314	0.1513	0.65
40-8203	SHADY GROVE	TN	47	-87.2833	35.7500	551	01/1949	09/1980	32	0.1907	0.1188	0.0568	2.48
40-8246	SHELBYVILLE 3	TN	36	-86.4775	35.4922	760	06/1951	12/2000	49	0.1719	0.2607	0.1493	0.70
40-8405	SMITHVILLE	TN	36	-85.7925	35.9661	890	03/1971	12/2000	30	0.1536	0.2269	0.1634	0.55
40-8491	SOUTH HOLSTON DAM	TN	34	-82.0833	36.5167	1522	01/1948	12/1997	49	0.1645	0.2157	0.2090	0.98
40-8522	SPARTA	TN	36	-85.4814	35.9567	1020	01/1940	12/2000	60	0.1689	0.1429	0.1019	0.34
40-8527	SPARTA TVA	TN	36	-85.4833	35.9000	961	01/1906	12/1961	36	0.1647	0.2137	0.0819	1.27
40-8562	SPRINGFIELD EXP STN	TN	47	-86.8472	36.4739	745	02/1942	12/2000	59	0.1689	0.2013	0.1369	0.08
40-8570	SPRINGVILLE	TN	75	-88.1500	36.2833	400	01/1903	12/1961	43	0.1894	0.2821	0.2612	0.82
40-8609	STATESVILLE	TN	36	-86.1253	36.0314	723	01/1952	12/2000	49	0.1768	0.2993	0.1558	1.56
40-8677	STRAWBERRY PLAINS	TN	35	-83.6833	36.0667	869	01/1939	12/1980	42	0.1614	0.3045	0.1960	0.88
40-8758	SUMMITVILLE	TN	36	-85.9833	35.5500	1122	01/1949	09/1980	32	0.1710	0.1700	0.1526	0.15
40-8766	SUNBRIGHT 2 SW	TN	36	-84.6969	36.2492	1495	01/1949	10/1998	50	0.1550	0.2454	0.2485	1.63
40-8868	TAZEWELL	TN	33	-83.5603	36.4650	1365	01/1939	12/2000	58	0.1827	0.2937	0.1813	1.02
40-8886	TELLICO PLAINS	TN	36	-84.2997	35.3675	910	04/1896	12/1961	47	0.1361	0.1400	0.0759	1.87
40-9124	TROUSDALE	TN	36	-85.9333	35.6667	981	01/1940	12/1980	41	0.1523	0.0884	0.0757	1.22
40-9155	TULLAHOMA	TN	36	-86.2089	35.3453	1022	03/1893	12/2000	107	0.1845	0.1726	0.1681	0.78
40-9219	UNION CITY	TN	74	-89.0317	36.3925	350	01/1896	12/2000	104	0.1674	0.1474	0.0755	0.56
40-9339	VICTORY	TN	36	-87.8167	35.0833	971	01/1937	12/1980	44	0.1883	0.2297	0.0938	1.29
40-9367	WALKERS FORD	TN	35	-83.7000	36.3333	1280	05/1941	09/1976	36	0.1796	0.2736	0.1684	0.16
40-9455	WATAUGA DAM	TN	34	-82.1167	36.3333	1713	01/1949	12/1981	33	0.1188	0.1385	0.1904	0.93

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40-9484	WATTS BAR DAM	TN	36	-84.7833	35.6167	830	01/1939	12/1997	59	0.1573	0.1211	0.1613	0.96
40-9492	WAVERLY 4 W	TN	47	-87.8347	36.0825	540	06/1962	12/1999	38	0.1762	0.2663	0.2167	0.44
40-9502	WAYNESBORO	TN	36	-87.7592	35.3042	750	01/1893	12/2000	107	0.1787	0.2651	0.1822	0.58
40-9752	WILDERSVILLE	TN	75	-88.3667	35.7833	479	01/1898	12/1980	65	0.1736	0.1980	0.1657	0.14
40-9866	WOODBURY 1 WNW	TN	36	-86.0875	35.8428	750	01/1955	12/2000	46	0.1566	0.1499	0.1491	0.32
44-0013	ABINGDON 7 WSW	VA	34	-82.1000	36.6667	2001	01/1949	09/1980	32	0.1724	0.2029	0.0920	0.98
44-0021	ABINGDON 3 S	VA	34	-81.9653	36.6672	1920	01/1970	12/2000	31	0.1355	0.2105	0.1510	0.58
44-0135	ALLISONIA 2 SSE	VA	21	-80.7283	36.9247	1820	01/1952	12/2000	49	0.1681	0.1616	0.1896	1.16
44-0166	ALTAVISTA	VA	9	-79.1650	37.0633	515	05/1945	09/1998	54	0.1922	0.2970	0.2014	0.33
44-0187	AMELIA 4 SW	VA	9	-78.0669	37.3167	360	01/1970	12/2000	30	0.2611	0.4672	0.3343	2.14
44-0193	AMISSVILLE	VA	8	-78.0167	38.6833	551	07/1943	10/1982	40	0.1858	0.3111	0.2279	0.61
44-0243	APPOMATTOX	VA	9	-78.8314	37.3558	910	01/1938	12/2000	61	0.2224	0.3124	0.1980	0.20
44-0327	ASHLAND 1 SW	VA	8	-77.4833	37.7500	220	01/1893	12/2000	83	0.1792	0.2910	0.1737	1.13
44-0385	BACK BAY WILDLIFE REFU	VA	2	-75.9122	36.6631	10	01/1954	12/2000	47	0.2373	0.3612	0.2965	0.87
44-0551	BEDFORD	VA	9	-79.5233	37.3475	975	01/1931	12/2000	69	0.2099	0.2358	0.1250	0.57
44-0670	BERRYVILLE	VA	19	-77.9833	39.1500	600	06/1931	11/1987	54	0.1936	0.0589	0.0068	2.45
44-0720	BIG MEADOWS 2	VA	21	-78.4356	38.5217	3540	01/1935	12/2000	66	0.2857	0.3431	0.1883	3.88
44-0733	BIG STONE GAP	VA	33	-82.7667	36.8667	1490	01/1956	12/1997	42	0.1705	0.2722	0.2631	0.17
44-0765	BLACKSBURG	VA	21	-80.4167	37.2500	2172	01/1893	10/1952	60	0.1630	0.1578	0.1371	0.68
44-0766	BLACKSBURG 3 SE	VA	21	-80.4133	37.2017	2100	01/1953	12/2000	48	0.1621	0.0651	0.0815	2.11
44-0792	BLAND	VA	23	-81.1161	37.0997	2000	01/1952	12/2000	49	0.1681	0.2139	0.2829	2.45
44-0993	BREMO BLUFF PWR	VA	9	-78.2886	37.7092	225	01/1915	12/2000	86	0.2189	0.2688	0.1757	0.23
44-1082	BROOKNEAL	VA	9	-78.9517	37.0675	428	01/1951	12/2000	40	0.1900	0.3412	0.1704	1.87
44-1121	BUCHANAN	VA	21	-79.6775	37.5278	880	01/1893	12/2000	96	0.2018	0.2191	0.1398	0.13
44-1136	BUCKINGHAM 1 E	VA	9	-78.5111	37.5442	552	05/1894	12/2000	64	0.2043	0.2811	0.2362	0.41
44-1159	BUENA VISTA	VA	21	-79.3628	37.7269	830	06/1937	12/2000	61	0.1853	0.2493	0.1759	0.13
44-1209	BURKES GARDEN	VA	23	-81.3358	37.0925	3300	03/1896	12/2000	105	0.1563	0.1099	0.1598	1.32
44-1259	BYLLESBY 3 W	VA	24	-80.9350	36.7836	2555	05/1967	12/2000	34	0.1721	0.1552	0.1333	0.57
44-1322	CAMP PICKETT	VA	9	-77.9486	37.0372	330	08/1948	12/2000	52	0.1904	0.1925	0.1539	0.39
44-1471	CATAWBA SANATORIUM	VA	21	-80.0833	37.3833	1880	01/1911	12/1977	66	0.1936	0.2478	0.1681	0.04
44-1585	CHARLOTTE COURT HSE 3W	VA	9	-78.3819	37.0322	590	06/1946	12/2000	54	0.2249	0.2984	0.1398	1.09
44-1593	CHARLOTTESVILLE 2 W	VA	9	-78.5231	38.0325	870	01/1895	12/2000	103	0.2205	0.2437	0.1564	0.55

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44-1606	CHASE CITY	VA	9	-78.4628	36.8006	510	04/1947	12/2000	49	0.1698	0.1120	0.0593	1.42
44-1614	CHATHAM	VA	9	-79.4106	36.8225	640	07/1922	12/2000	79	0.2192	0.3234	0.2413	0.24
44-1729	CLARENDON LYON PARK	VA	8	-77.0833	38.9000	220	04/1925	11/1962	38	0.1956	0.2896	0.2123	0.19
44-1746	CLARKSVILLE	VA	9	-78.5703	36.6197	310	03/1891	12/2000	109	0.1817	0.2001	0.2230	1.66
44-1801	CLIFTON FORGE 2 NW	VA	21	-79.8333	37.8500	1400	08/1896	10/1983	58	0.2120	0.2161	0.2516	2.43
44-1913	COLONIAL BEACH	VA	1	-76.9628	38.2506	10	01/1964	12/2000	35	0.1674	0.5387	0.3838	7.99
44-1929	COLUMBIA 2SSE	VA	9	-78.1500	37.7333	290	05/1893	12/1985	89	0.2119	0.3278	0.2458	0.31
44-1955	CONCORD 4 SSW	VA	9	-78.9586	37.2828	640	01/1951	12/2000	50	0.1963	0.2781	0.2674	1.32
44-1999	COPPER HILL	VA	21	-80.1422	37.0864	2690	04/1940	12/2000	61	0.2226	0.2411	0.1812	0.62
44-2009	CORBIN	VA	8	-77.3747	38.2022	220	01/1959	12/2000	42	0.1995	0.3057	0.1978	0.15
44-2041	COVINGTON	VA	21	-80.0053	37.7886	1207	01/1940	12/1998	58	0.2047	0.3141	0.2336	0.26
44-2044	COVINGTON FILTER PLANT	VA	21	-79.9883	37.8106	1230	01/1961	12/2000	40	0.2166	0.3263	0.2589	0.49
44-2064	CRAIGSVILLE 2 S	VA	21	-79.3997	38.0611	1780	01/1964	12/2000	37	0.2168	0.2538	0.1643	0.24
44-2142	CROZIER	VA	9	-77.8769	37.6664	350	01/1940	12/2000	60	0.2371	0.3423	0.2142	0.55
44-2155	CULPEPER	VA	8	-77.9833	38.4833	475	07/1907	12/1989	80	0.1863	0.1559	0.0942	1.14
44-2195	DAHLGREN PROVING GROUN	VA	1	-77.0333	38.3333	20	05/1920	12/1960	41	0.2654	0.3961	0.2691	1.53
44-2208	DALE ENTERPRISE	VA	21	-78.9353	38.4553	1400	01/1893	12/2000	108	0.1884	0.2906	0.2147	0.28
44-2216	DAMASCUS	VA	34	-81.8000	36.6333	1952	01/1927	07/1974	46	0.1254	0.1263	0.1406	0.40
44-2237	DANTE	VA	33	-82.2833	36.9833	1841	01/1918	12/1958	40	0.1752	0.3387	0.3116	0.80
44-2245	DANVILLE	VA	9	-79.3886	36.5869	410	03/1891	12/2000	109	0.1715	0.1621	0.1147	0.62
44-2269	DAVENPORT 2 NE	VA	33	-82.1000	37.1167	1601	03/1940	11/1998	55	0.1798	0.3251	0.3081	0.68
44-2315	DEERFIELD 1 S	VA	21	-79.3667	38.1667	1722	01/1928	12/1980	49	0.2036	0.3233	0.2437	0.35
44-2504	DRIVER 4 NE	VA	2	-76.4833	36.8833	20	01/1941	09/1986	46	0.1461	0.2349	0.1686	4.47
44-2729	ELKWOOD 7 SE	VA	8	-77.7667	38.4500	328	05/1940	11/1983	44	0.2035	0.2937	0.1997	0.03
44-2790	EMPORIA 1 WNW	VA	4	-77.5597	36.6983	100	01/1931	12/2000	69	0.1751	0.2126	0.1741	0.80
44-2941	FARMVILLE 2 N	VA	9	-78.3864	37.3264	450	02/1897	12/2000	80	0.1600	0.1667	0.1671	1.31
44-3071	FLOYD	VA	21	-80.2908	36.9278	2625	02/1933	12/2000	68	0.2230	0.2483	0.2250	1.18
44-3204	FREDERICKSBURG SEWAGE	VA	8	-77.4511	38.2872	15	04/1893	12/2000	107	0.2082	0.2235	0.1203	0.51
44-3213	FREE UNION	VA	9	-78.5872	38.0953	570	07/1955	12/2000	45	0.1949	0.2301	0.1614	0.08
44-3267	GALAX RADIO WBOB	VA	24	-80.9139	36.6633	2385	01/1949	12/2000	48	0.1935	0.3255	0.2431	1.51
44-3375	GLASGOW 1 SE	VA	21	-79.4369	37.6200	740	01/1939	12/2000	62	0.2266	0.2586	0.1183	0.84
44-3397	GLEN LYN	VA	23	-80.8597	37.3733	1520	03/1914	12/2000	85	0.1503	0.2078	0.2119	0.28

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
44-3466	GORDONSVILLE 3 S	VA	9	-78.1825	38.0861	460	02/1946	12/2000	55	0.2511	0.3647	0.2754	1.15
44-3470	GOSHEN	VA	21	-79.5008	37.9839	1350	01/1940	12/2000	61	0.2014	0.2856	0.1793	0.24
44-3623	GROSECLOSE	VA	34	-81.3500	36.8667	2552	01/1942	12/1997	53	0.1555	0.1893	0.2008	0.62
44-3640	GRUNDY	VA	33	-82.0894	37.2822	1170	01/1949	12/2000	43	0.1742	0.2002	0.1761	0.35
44-3690	HALIFAX 1 N	VA	9	-78.9167	36.7833	361	01/1931	12/1965	35	0.1915	0.3342	0.2060	0.98
44-3991	HILLSVILLE	VA	24	-80.7753	36.8017	2585	03/1940	12/2000	60	0.1809	0.1487	0.0551	2.08
44-4044	HOLLAND 1 E	VA	2	-76.7683	36.6831	80	03/1933	12/2000	68	0.2181	0.3381	0.3180	1.23
44-4078	HONAKER	VA	33	-82.0000	37.0167	1962	01/1949	09/1980	32	0.1598	0.2138	0.2375	0.44
44-4101	HOPEWELL	VA	9	-77.2772	37.2992	40	01/1918	12/2000	83	0.2111	0.2710	0.1894	0.05
44-4128	HOT SPRINGS	VA	21	-79.8317	37.9969	2236	01/1893	12/2000	104	0.1826	0.2937	0.2372	0.43
44-4148	HUDDLESTON 4 SW	VA	9	-79.5264	37.1264	1045	01/1951	12/2000	50	0.1962	0.1989	0.0762	1.23
44-4234	INDEPENDENCE 2	VA	25	-81.1667	36.6500	2612	03/1940	12/1988	48	0.1594	0.1893	0.1691	1.32
44-4246	INDIAN VALLEY	VA	21	-80.5667	36.9000	2700	08/1948	09/1993	46	0.1744	0.2173	0.1769	0.24
44-4410	JOHN FLANNAGAN RESERVO	VA	33	-82.3436	37.2344	1460	03/1940	12/2000	60	0.1814	0.2525	0.2392	0.17
44-4414	JOHN H KERR DAM	VA	9	-78.3011	36.6003	250	03/1948	12/2000	53	0.1556	0.1959	0.1109	1.25
44-4565	KERRS CREEK 1 WSW	VA	21	-79.5689	37.8706	1500	08/1948	12/2000	48	0.2262	0.2841	0.2034	0.47
44-4676	LAFAYETTE 1 NE	VA	21	-80.1994	37.2392	1320	06/1951	12/2000	50	0.2179	0.2634	0.1592	0.28
44-4720	LANGLEY AIR FORCE BASE	VA	1	-76.3500	37.0833	10	01/1920	12/1999	78	0.1880	0.1843	0.1499	0.78
44-4768	LAWRENCEVILLE 3 E	VA	4	-77.7928	36.7711	325	01/1945	12/2000	54	0.2094	0.3111	0.1795	0.65
44-4876	LEXINGTON	VA	21	-79.4136	37.7950	1125	06/1889	12/2000	110	0.1835	0.2244	0.1058	0.77
44-4909	LINCOLN	VA	8	-77.6928	39.0878	500	01/1901	12/2000	99	0.1992	0.3892	0.2596	1.06
44-5050	LOUISA	VA	9	-78.0061	38.0422	420	05/1916	12/2000	85	0.2315	0.3517	0.2109	0.54
44-5096	LURAY 5 E	VA	21	-78.3728	38.6661	1400	03/1941	12/2000	60	0.2423	0.3682	0.2355	1.26
44-5120	LYNCHBURG WSO AIRPORT	VA	9	-79.2067	37.3208	940	01/1930	12/2000	71	0.1976	0.2857	0.1757	0.19
44-5213	MANASSAS	VA	8	-77.5000	38.7833	331	01/1950	12/1983	33	0.2537	0.4286	0.3429	2.08
44-5271	MARION	VA	34	-81.5167	36.8167	2100	01/1939	12/1987	49	0.1480	0.1975	0.1189	0.32
44-5300	MARTINSVILLE FILTER PL	VA	9	-79.8650	36.7056	760	01/1931	12/2000	66	0.1710	0.2593	0.1542	0.94
44-5338	MATHEWS 2 ENE	VA	1	-76.2689	37.4031	5	08/1950	12/1999	32	0.2526	0.3210	0.1830	1.00
44-5453	MEADOWS OF DAN 5 SW	VA	9	-80.4481	36.6667	2225	01/1951	12/2000	49	0.1845	0.2757	0.2221	0.61
44-5501	MENDOTA	VA	34	-82.3167	36.7000	1352	03/1902	09/1976	75	0.1434	0.1249	0.0674	0.81
44-5685	MONTEBELLO	VA	21	-79.1317	37.8814	2680	07/1937	12/1999	57	0.1937	0.2120	0.1023	0.45
44-5690	MONTEBELLO FISH NURSER	VA	21	-79.1308	37.8494	2649	01/1949	10/1998	50	0.1926	0.2924	0.1490	1.12

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
44-5698	MONTEREY	VA	23	-79.5833	38.4167	2923	01/1931	12/1989	58	0.1799	0.1874	0.1395	0.79
44-5851	MOUNT WEATHER	VA	21	-77.8892	39.0625	1720	01/1907	12/2000	94	0.2260	0.2618	0.1479	0.53
44-6012	NEW CASTLE	VA	21	-80.1242	37.5150	1330	01/1937	12/1985	49	0.1617	0.2906	0.1912	1.80
44-6046	NEWPORT 2 NNW	VA	21	-80.4939	37.2969	2060	06/1945	12/2000	55	0.1366	0.1912	0.2286	2.12
44-6054	NEWPORT NEWS PRESS BLD	VA	2	-76.4500	37.0167	49	01/1899	12/1980	58	0.2064	0.2900	0.2263	0.10
44-6139	NORFOLK WSO AIRPORT	VA	2	-76.1922	36.9033	30	01/1910	12/2000	91	0.2025	0.2139	0.1613	0.13
44-6173	NORTH FORK RESERVOIR	VA	33	-82.6339	37.1244	1675	01/1970	12/2000	31	0.1772	0.1897	0.2621	0.99
44-6199	NORTH RIVER DAM	VA	21	-79.2667	38.3667	2402	08/1930	11/1979	50	0.2091	0.2419	0.1669	0.12
44-6362	ONLEY 1 S	VA	1	-75.7167	37.6833	39	01/1919	11/1955	36	0.2534	0.3180	0.2137	0.88
44-6456	OYSTER 1 W	VA	1	-75.9333	37.2833	27	01/1939	11/1985	45	0.1868	0.1523	0.1184	1.03
44-6475	PAINTER 2 W	VA	1	-75.8217	37.5831	30	01/1956	12/2000	45	0.2016	0.1861	0.0829	0.79
44-6491	PALMYRA 2	VA	9	-78.2533	37.8603	410	04/1957	12/2000	44	0.2570	0.4965	0.3345	2.57
44-6593	PEDLAR DAM	VA	21	-79.2792	37.6708	1010	01/1927	12/2000	64	0.1949	0.2148	0.1502	0.07
44-6626	PENNINGTON GAP 1 W	VA	33	-82.9967	36.7381	1470	01/1932	12/2000	67	0.1808	0.2561	0.2328	0.13
44-6692	PHILPOTT DAM 2	VA	9	-80.0272	36.7764	1123	01/1949	12/2000	52	0.1969	0.3261	0.2185	0.53
44-6712	PIEDMONT RESEARCH STN	VA	9	-78.1208	38.2317	520	05/1931	12/2000	70	0.2138	0.2579	0.1585	0.24
44-6723	PILOT 1 ENE	VA	21	-80.3500	37.0667	2180	04/1940	12/1985	46	0.1870	0.1843	0.1585	0.35
44-6906	POWHATAN	VA	9	-77.8858	37.5144	400	01/1923	12/2000	60	0.1993	0.3063	0.1843	0.35
44-6955	PULASKI	VA	21	-80.7842	37.0556	1850	01/1940	12/2000	57	0.1630	0.1078	0.0968	1.20
44-6979	QUANTICO 1 S	VA	1	-77.3167	38.5000	10	01/1905	12/1975	66	0.2244	0.1721	0.0899	1.11
44-6999	RADFORD	VA	21	-80.5864	37.2008	1800	06/1968	11/1998	31	0.2272	0.2316	0.2200	1.80
44-7025	RANDOLPH 5 NNE	VA	9	-78.7000	36.9833	351	01/1905	12/1982	78	0.2537	0.4196	0.2482	1.50
44-7033	RAPIDAN	VA	9	-78.0667	38.3000	302	01/1945	12/1981	37	0.1935	0.3088	0.2064	0.43
44-7164	RICHARDSVILLE	VA	8	-77.7333	38.4000	345	05/1948	12/1986	36	0.2211	0.3825	0.3273	1.19
44-7201	RICHMOND WSO AIRPORT	VA	9	-77.3203	37.5050	164	01/1921	12/2000	80	0.1997	0.2547	0.2107	0.26
44-7206	RICHMOND WB CITY	VA	9	-77.4167	37.5333	162	01/1921	12/1953	33	0.2045	0.2644	0.1602	0.11
44-7254	RIVERTON	VA	21	-78.2000	38.9333	561	01/1893	12/1977	77	0.2115	0.2638	0.1812	0.11
44-7275	ROANOKE	VA	21	-79.9333	37.2667	912	01/1902	12/1965	59	0.2146	0.2695	0.1585	0.26
44-7285	ROANOKE WSO AIRPORT	VA	21	-79.9742	37.3169	1175	01/1948	12/2000	53	0.1948	0.2745	0.2486	0.36
44-7312	ROCKFISH	VA	9	-78.7500	37.8000	485	01/1938	09/1990	53	0.2885	0.4356	0.3185	3.28
44-7330	ROCKY KNOB	VA	9	-80.3667	36.8500	3081	01/1941	12/1973	33	0.2353	0.2301	0.1291	1.81
44-7338	ROCKY MOUNT	VA	9	-79.8961	36.9769	1315	04/1894	12/2000	105	0.1860	0.2591	0.1648	0.25

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44-7501	SALTVILLE	VA	33	-81.7667	36.8833	1722	01/1930	12/1997	61	0.1659	0.2314	0.1506	0.73
44-7904	SOMERSET	VA	9	-78.2703	38.2456	510	01/1947	12/2000	36	0.2334	0.4593	0.3202	2.08
44-7971	SPEEDWELL	VA	34	-81.1667	36.8167	2343	03/1940	09/1985	45	0.1534	0.1670	0.1565	0.11
44-7997	SPRING CREEK 2	VA	33	-81.6500	37.0167	2372	01/1949	09/1980	32	0.1625	0.2692	0.3004	1.02
44-8022	STAFFORDSVILLE 3 N	VA	21	-80.7131	37.2714	1950	01/1952	12/2000	49	0.1471	0.1770	0.2242	1.82
44-8062	STAUNTON SEWAGE PLANT	VA	21	-79.0903	38.1814	1640	01/1893	12/2000	106	0.2046	0.2331	0.1758	0.12
44-8129	STONY CREEK 3 ESE	VA	4	-77.3936	36.9481	70	08/1948	11/2000	35	0.1787	0.3137	0.2769	1.93
44-8170	STUART 1 SSE	VA	9	-80.2514	36.6364	1375	01/1930	12/2000	66	0.1818	0.2298	0.1168	0.61
44-8172	STUARTS DRAFT	VA	21	-79.0489	38.0100	1450	01/1946	12/1982	34	0.2345	0.2898	0.1073	1.67
44-8192	SUFFOLK LAKE KILBY	VA	2	-76.6014	36.7297	22	04/1945	12/2000	55	0.2050	0.2875	0.2289	0.13
44-8323	TANGIER ISLAND	VA	1	-75.9933	37.8283	5	01/1953	12/2000	44	0.2611	0.4267	0.3570	2.32
44-8354	TAZEWELL	VA	23	-81.5167	37.1167	2451	01/1937	12/1997	61	0.1666	0.1390	0.0612	1.28
44-8396	THE PLAINS 2 NNE	VA	8	-77.7547	38.8956	530	04/1954	12/2000	47	0.2292	0.3261	0.2755	1.29
44-8448	TIMBERVILLE 3 E	VA	19	-78.7167	38.6500	1001	08/1931	12/1989	59	0.1996	0.2356	0.1907	0.48
44-8547	TROUT DALE 3 SSE	VA	34	-81.4053	36.6600	2820	01/1949	12/2000	52	0.1140	-0.0249	0.1359	2.20
44-8600	TYE RIVER 1 SE	VA	9	-78.9344	37.6383	720	01/1938	12/2000	63	0.1789	0.2044	0.1493	0.29
44-8737	VIENNA TYSONS CORNER	VA	8	-77.2664	38.9000	418	01/1942	12/2000	59	0.2094	0.3162	0.1464	1.14
44-8829	WALKERTON 2 NW	VA	1	-77.0533	37.7453	50	07/1932	12/2000	69	0.2236	0.3102	0.2236	0.07
44-8837	WALLACETON LK DRUMMOND	VA	2	-76.4386	36.5942	20	07/1926	12/2000	75	0.2123	0.2862	0.1308	1.33
44-8849	WALLOPS ISLAND WSSF	VA	1	-75.4667	37.9333	33	12/1948	10/1993	33	0.2251	0.2507	0.1650	0.20
44-8888	WARRENTON 3 SE	VA	8	-77.7683	38.6817	500	02/1951	12/2000	50	0.2123	0.3890	0.3016	0.58
44-8894	WARSAW 2 N	VA	1	-76.7769	37.9881	140	01/1893	12/2000	92	0.2070	0.3394	0.2097	0.45
44-8902	WASHINGTON DC 3 SSW	VA	21	-78.1833	38.6667	640	01/1945	12/1980	36	0.1745	0.1553	0.0514	1.19
44-8903	WASHINGTON WB CHANTILL	VA	8	-77.4836	38.9408	290	01/1954	12/2000	44	0.2322	0.4225	0.3483	1.37
44-8906	WASHINGTON REAGAN AP	VA	8	-77.0342	38.8483	10	07/1945	12/2000	56	0.2201	0.2499	0.1094	0.90
44-9025	WEST POINT 2 SW	VA	1	-76.8000	37.5658	20	03/1954	12/2000	47	0.2347	0.4607	0.3293	1.54
44-9060	WHITE GATE	VA	21	-80.8167	37.1833	1850	08/1948	12/1992	43	0.1626	0.0732	0.0458	1.75
44-9151	WILLIAMSBURG 2 N	VA	2	-76.7039	37.3017	70	01/1901	12/2000	96	0.2571	0.4669	0.3335	1.75
44-9186	WINCHESTER 3 ESE	VA	19	-78.1167	39.1833	680	04/1912	12/2000	89	0.1950	0.2336	0.1746	0.20
44-9215	WISE 1 SE	VA	33	-82.5389	36.9986	2549	05/1955	12/2000	46	0.1769	0.3326	0.2729	0.42
44-9263	WOODSTOCK 2 NE	VA	19	-78.4750	38.9022	680	01/1890	12/2000	108	0.1843	0.2641	0.1949	0.07
44-9272	WOOLWINE 4 S	VA	9	-80.2689	36.7817	1520	06/1951	12/2000	50	0.2049	0.2004	0.1718	0.71

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44-9301	WYTHEVILLE POST OFFICE	VA	24	-81.0942	36.9317	2450	01/1893	12/2000	82	0.1787	0.2049	0.1428	0.41
46-0012	ABERDEEN	WV	31	-80.3000	39.0667	1070	06/1924	12/1959	36	0.1832	0.3187	0.2098	0.87
46-0094	ALBRIGHT	WV	31	-79.6275	39.4789	1219	05/1953	12/2000	48	0.1681	0.2206	0.1542	0.07
46-0102	ALDERSON	WV	23	-80.6592	37.7272	1540	01/1945	12/2000	55	0.1788	0.2259	0.1687	0.60
46-0143	ALPENA	WV	22	-79.6667	38.9167	3022	01/1930	08/1973	38	0.1542	0.1928	0.2289	1.75
46-0249	ARBOVALE	WV	23	-79.8167	38.4333	2733	01/1925	12/1973	49	0.1502	0.1431	0.1599	0.43
46-0355	ATHENS CONCORD COLLEGE	WV	23	-81.0256	37.4225	2495	03/1940	12/2000	61	0.1276	0.1162	0.1401	1.01
46-0527	BAYARD	WV	20	-79.3644	39.2736	2375	05/1902	12/2000	96	0.1746	0.2288	0.1531	0.45
46-0580	BECKLEY VA HOSPITAL	WV	31	-81.1944	37.7653	2330	01/1894	12/2000	97	0.1779	0.2081	0.1735	0.28
46-0582	BECKLEY WSO AP	WV	31	-81.1231	37.7836	2514	05/1963	12/2000	38	0.1615	0.2158	0.1966	0.12
46-0633	BELINGTON	WV	31	-79.9331	39.0231	1769	03/1938	12/2000	63	0.1673	0.2164	0.1577	0.03
46-0679	BENSON	WV	31	-80.5500	39.1500	1079	01/1924	09/1964	39	0.1845	0.2814	0.2598	1.06
46-0687	BENS RUN 1 SSE	WV	31	-81.1000	39.4667	640	01/1901	09/1985	82	0.1447	0.0948	0.1697	1.82
46-0918	BLUEFIELD 2 NW	WV	23	-81.2667	37.2667	2612	01/1892	12/1959	65	0.1655	0.1961	0.1477	0.16
46-0921	BLUEFIELD FAA AP	WV	23	-81.2078	37.2958	2870	01/1956	12/2000	44	0.1531	0.2003	0.0819	1.07
46-0939	BLUESTONE LAKE	WV	23	-80.8831	37.6411	1390	03/1943	12/2000	58	0.1650	0.2691	0.1456	0.91
46-1075	BRANCHLAND	WV	31	-82.2036	38.2350	600	01/1941	12/2000	56	0.1613	0.1923	0.0782	1.10
46-1083	BRANDONVILLE	WV	31	-79.6167	39.6667	1798	05/1909	12/1988	59	0.1534	0.1805	0.1613	0.12
46-1091	BRANDYWINE	WV	20	-79.2333	38.6167	1650	06/1916	12/1948	32	0.1463	0.2883	0.1875	1.71
46-1173	BROWNSVILLE	WV	31	-80.4833	39.0000	1030	07/1923	11/1954	31	0.1897	0.1186	0.0458	2.55
46-1204	BRUSHY RUN	WV	20	-79.2500	38.8333	1375	01/1939	12/1983	45	0.2616	0.5158	0.4469	3.21
46-1215	BUCKEYE 1 SE	WV	23	-80.1333	38.1833	2150	01/1953	12/2000	47	0.1341	0.1411	0.1042	0.77
46-1220	BUCKHANNON	WV	31	-80.2206	38.9800	1455	01/1888	12/2000	99	0.1454	0.1930	0.1748	0.31
46-1282	BURNSVILLE LAKE	WV	31	-80.6203	38.8450	785	01/1950	12/2000	50	0.1580	0.2401	0.2048	0.19
46-1324	CACAPON STATE PARK 2	WV	19	-78.3158	39.5064	950	08/1948	12/2000	52	0.1816	0.3194	0.1010	2.53
46-1328	CAIRO 3 S	WV	31	-81.1667	39.1667	679	04/1899	10/1981	69	0.1788	0.1841	0.1093	0.62
46-1363	CAMDEN ON GAULEY	WV	31	-80.6294	38.3567	2220	01/1916	12/2000	81	0.1369	0.1735	0.1570	0.61
46-1397	CANAAN VALLEY 2	WV	22	-79.4500	39.0500	3240	07/1944	12/2000	57	0.1804	0.3022	0.2829	0.37
46-1526	CENTRALIA 2 NNW	WV	31	-80.5664	38.6231	1030	01/1952	08/1993	41	0.1390	0.2897	0.2064	1.83
46-1570	CHARLESTON WSFO AP	WV	31	-81.5914	38.3794	910	01/1944	12/2000	57	0.1599	0.2700	0.2550	0.75
46-1575	CHARLESTON 1	WV	31	-81.6500	38.3500	600	01/1903	12/1973	70	0.1577	0.2112	0.2466	1.07
46-1677	CLARKSBURG 1	WV	31	-80.3528	39.2692	990	01/1923	12/2000	77	0.1761	0.1967	0.1087	0.56

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
46-1696	CLAY	WV	31	-81.0842	38.4603	730	01/1919	12/2000	78	0.1815	0.3201	0.2739	1.15
46-1723	CLENDENIN 2 NE	WV	31	-81.3483	38.4933	700	01/1952	12/2000	47	0.1430	0.1953	0.1074	1.03
46-1959	CORTON	WV	31	-81.2711	38.4864	640	01/1949	12/1995	44	0.1238	0.2253	0.2240	2.00
46-2022	CRAWFORD	WV	31	-80.4333	38.8667	1112	01/1924	11/1958	33	0.1586	0.2977	0.2788	1.25
46-2054	CRESTON 1 SSW	WV	31	-81.2728	38.9628	650	01/1901	12/2000	98	0.1490	0.1688	0.1378	0.23
46-2151	DAILEY 1 NE	WV	31	-79.8911	38.7825	2000	01/1939	12/2000	46	0.1857	0.3320	0.2822	1.40
46-2209	DAVIS	WV	22	-79.4667	39.1333	3123	01/1912	09/1971	42	0.1709	0.2820	0.3132	0.94
46-2462	DRY CREEK	WV	31	-81.4650	37.8594	1264	01/1949	12/2000	52	0.1436	0.1821	0.1417	0.39
46-2522	DUNLOW 1 ESE	WV	31	-82.4044	37.9494	1200	04/1962	12/2000	38	0.1641	0.1982	0.1786	0.09
46-2638	EAST RAINELLE 3 NNE	WV	31	-80.7500	38.0000	2421	01/1945	11/1998	42	0.1723	0.2547	0.1096	1.34
46-2718	ELKINS WSO AIRPORT	WV	31	-79.8528	38.8853	1979	01/1926	12/2000	74	0.1786	0.3093	0.1945	0.81
46-2920	FAIRMONT	WV	31	-80.1333	39.4667	1300	02/1892	12/2000	109	0.1530	0.2049	0.1758	0.11
46-3072	FLAT TOP	WV	23	-81.0925	37.5894	3335	01/1931	12/1998	68	0.1388	0.1254	0.1887	1.11
46-3215	FRANKLIN 2 N	WV	20	-79.3092	38.6756	1900	01/1942	12/2000	59	0.2217	0.4193	0.3204	0.75
46-3238	FREEMANSBURG 5 NE	WV	31	-80.4506	39.1303	1020	01/1949	10/1998	41	0.2050	0.2235	0.1214	1.92
46-3353	GARY	WV	31	-81.5500	37.3667	1430	07/1917	12/1988	72	0.1447	0.2525	0.1996	0.75
46-3361	GASSAWAY	WV	31	-80.7678	38.6650	840	04/1905	12/2000	91	0.1926	0.2525	0.1218	1.32
46-3544	GLENVILLE 1 ENE	WV	31	-80.8325	38.9339	710	01/1888	12/2000	111	0.1576	0.2394	0.1730	0.20
46-3630	GRAFTON	WV	31	-80.0000	39.3500	1230	01/1892	12/1963	67	0.1572	0.1660	0.1595	0.21
46-3648	GRANTSVILLE 2 NW	WV	31	-81.0844	38.9100	713	05/1941	11/1998	49	0.1585	0.2953	0.2007	0.85
46-3749	YAWKEY	WV	31	-81.9853	38.2381	780	05/1949	10/1998	50	0.1554	0.1796	0.1054	0.45
46-3798	HACKER VALLEY	WV	31	-80.3836	38.6189	1590	01/1961	12/2000	40	0.1914	0.3262	0.2542	1.18
46-3846	HAMLIN	WV	31	-82.1114	38.2794	680	01/1942	12/2000	59	0.1308	0.1997	0.1385	1.33
46-3927	HARPERS FERRY	WV	19	-77.7289	39.3233	246	07/1889	06/1972	84	0.1853	0.1724	0.1481	0.41
46-3974	HASTINGS	WV	31	-80.6667	39.5500	761	02/1933	12/1974	42	0.1331	0.2132	0.1491	1.24
46-4128	HICO	WV	31	-81.0081	38.1225	2340	01/1953	12/1997	44	0.1547	0.2067	0.0868	1.28
46-4170	HINTON 1	WV	23	-80.8833	37.6667	1430	01/1901	12/1948	37	0.1492	0.1285	0.0636	1.12
46-4200	HOGSETT GALLIPOLIS DAM	WV	31	-82.1861	38.6831	570	01/1916	12/2000	85	0.1502	0.2147	0.2249	0.62
46-4281	HORNER	WV	31	-80.3667	38.9833	1079	01/1924	12/1966	42	0.1550	0.1370	0.1496	0.51
46-4309	HOULT LOCK 15	WV	31	-80.1333	39.5000	879	01/1922	08/1967	46	0.1729	0.1579	0.1969	1.36
46-4369	HUNDRED	WV	31	-80.4667	39.7000	1000	01/1949	12/1995	43	0.1560	0.3413	0.2525	1.77
46-4378	HUNTINGTON 1	WV	31	-82.3667	38.4167	679	01/1892	09/1957	61	0.1726	0.2192	0.1573	0.09

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
46-4388	HUNTINGTON FEDERAL BLD	WV	31	-82.4500	38.4167	565	05/1943	11/1989	39	0.1285	0.0949	0.1106	1.36
46-4393	HUNTINGTON FAA AIRPORT	WV	31	-82.5550	38.3650	824	01/1961	12/2000	40	0.1267	0.0355	0.0863	2.38
46-4397	HUNTINGTON SEWAGE TRMT	WV	31	-82.5100	38.4183	520	07/1967	12/2000	30	0.1449	0.1011	0.1042	0.85
46-4408	IAEGER 2 NW	WV	31	-81.8236	37.4503	1070	01/1942	12/2000	50	0.1221	0.1322	0.2025	2.27
46-4478	IRELAND	WV	31	-80.4667	38.8167	1142	01/1937	12/1974	34	0.1640	0.1294	0.1023	0.61
46-4559	JANE LEW 1 W	WV	31	-80.4167	39.1167	1010	01/1924	12/1975	49	0.1734	0.2315	0.1748	0.08
46-4755	KAYFORD	WV	31	-81.4500	38.0167	1342	01/1917	11/1952	34	0.1581	0.1628	0.2344	1.83
46-4763	KEARNEYSVILLE	WV	19	-77.8833	39.3833	550	05/1930	12/1994	63	0.1786	0.2034	0.0733	0.77
46-4816	KERMIT	WV	31	-82.4000	37.8333	620	01/1926	12/1979	44	0.1790	0.0985	0.0878	1.85
46-4956	KOPPERSTON	WV	31	-81.5833	37.7333	1660	01/1964	12/1993	30	0.1642	0.2473	0.1579	0.30
46-5002	LAKE LYNN	WV	31	-79.8561	39.7200	900	04/1928	12/2000	72	0.1626	0.2519	0.1966	0.15
46-5224	LEWISBURG 3 N	WV	23	-80.4025	37.8564	2303	01/1900	12/2000	96	0.1665	0.1716	0.1175	0.40
46-5284	LINDSIDE	WV	23	-80.6556	37.4797	1985	04/1940	10/1998	58	0.1395	0.2202	0.1836	0.31
46-5323	LIVERPOOL	WV	31	-81.5311	38.8956	665	01/1949	10/1998	47	0.1704	0.1964	0.1651	0.12
46-5341	LOCKNEY	WV	31	-80.9669	38.8531	720	01/1949	10/1998	41	0.1962	0.1899	0.1056	1.56
46-5353	LOGAN	WV	31	-81.9961	37.8611	640	01/1902	12/2000	88	0.1643	0.2020	0.1684	0.02
46-5365	LONDON LOCKS	WV	31	-81.3706	38.1947	620	07/1934	12/2000	65	0.1480	0.2023	0.1297	0.51
46-5563	MADISON	WV	31	-81.8464	38.1025	710	01/1932	12/2000	68	0.1404	0.1867	0.1320	0.65
46-5621	MANNINGTON 1 N	WV	31	-80.3500	39.5500	981	02/1901	12/1978	76	0.1516	0.2277	0.1818	0.23
46-5626	MANNINGTON 7 WNW	WV	31	-80.4647	39.5436	1100	01/1947	12/2000	53	0.1512	0.1708	0.1323	0.21
46-5672	MARLINTON	WV	23	-80.0914	38.2175	2150	01/1896	12/2000	65	0.1430	0.1469	0.1699	0.43
46-5707	MARTINSBURG FAA AP	WV	19	-77.9844	39.4019	534	01/1899	12/2000	102	0.1751	0.1535	0.0687	0.63
46-5739	MATHIAS	WV	20	-78.8617	38.8722	1540	05/1948	12/2000	49	0.2197	0.4036	0.2397	1.27
46-5847	MC MECHEN DAM 13	WV	30	-80.7333	39.9833	659	07/1933	12/1974	42	0.1439	0.1282	0.1057	0.98
46-5871	MCROSS	WV	31	-80.7500	37.9833	2446	01/1931	12/1988	56	0.1624	0.1636	0.1486	0.21
46-5963	MIDDLEBOURNE 2 ESE	WV	31	-80.8628	39.4731	782	05/1927	12/2000	74	0.1584	0.1785	0.1167	0.25
46-6163	MOOREFIELD	WV	20	-78.9664	39.0461	890	01/1896	12/2000	85	0.1741	0.2735	0.2161	0.15
46-6202	MORGANTOWN FAA AIRPORT	WV	31	-79.9164	39.6428	1240	01/1946	12/2000	54	0.2070	0.3055	0.2197	1.68
46-6207	MORGANTOWN 1	WV	31	-79.9500	39.6333	1050	05/1872	12/1951	70	0.1475	0.1644	0.1810	0.50
46-6212	MORGANTOWN LOCK 1O	WV	31	-79.9667	39.6167	825	01/1922	12/2000	79	0.1668	0.2351	0.1878	0.04
46-6248	MOUNDSVILLE	WV	30	-80.7439	39.9050	620	07/1963	12/2000	35	0.1824	0.2611	0.2428	0.50
46-6442	NEW CUMBERLAND DAM 9	WV	30	-80.6275	40.5261	675	01/1893	12/1987	89	0.1946	0.2393	0.1750	0.69

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46-6467	NEW MARTINSVILLE 4 NNE	WV	31	-80.8500	39.6833	702	07/1892	12/1974	82	0.1527	0.1968	0.1589	0.11
46-6591	OAK HILL	WV	31	-81.1508	37.9714	2040	01/1942	12/2000	58	0.1520	0.1704	0.1769	0.33
46-6849	PARKERSBURG FAA AP	WV	31	-81.4392	39.3450	831	01/1949	09/1997	49	0.1471	0.1145	0.0949	0.71
46-6859	PARKERSBURG 1 E	WV	31	-81.5572	39.2811	620	01/1926	12/2000	75	0.1770	0.2038	0.1131	0.55
46-6867	PARSONS 1 NE	WV	31	-79.6658	39.1031	1826	01/1899	12/2000	99	0.2051	0.2028	0.0885	2.45
46-6954	PETERSBURG WB CITY	WV	20	-79.1167	39.0000	1010	02/1939	12/1970	32	0.2301	0.4028	0.3635	1.06
46-6982	PHILIPPI	WV	31	-80.0411	39.1461	1300	03/1896	12/2000	103	0.1686	0.2623	0.1942	0.18
46-6991	PICKENS 1	WV	31	-80.2167	38.6667	2769	03/1902	08/1986	83	0.1599	0.2355	0.1908	0.09
46-7004	PIEDMONT 1 SE	WV	20	-79.0333	39.4833	1050	01/1915	12/1965	51	0.2098	0.3539	0.2509	0.26
46-7018	PIKE ISLAND LOCK & DAM	WV	30	-80.7014	40.1478	640	01/1926	12/2000	72	0.1482	0.1838	0.1899	0.47
46-7029	PINEVILLE 1 NE	WV	31	-81.5356	37.5744	1280	01/1949	12/2000	52	0.1455	0.2349	0.1612	0.69
46-7105	POINT PLEASANT	WV	31	-82.1333	38.8500	571	01/1890	12/1953	64	0.1567	0.0825	0.1203	1.46
46-7207	PRINCETON 1 SW	WV	23	-81.0822	37.3842	2370	06/1900	12/2000	75	0.1973	0.2562	0.1039	2.42
46-7287	RACINE LOCKS & DAM	WV	31	-81.9114	38.9189	581	07/1931	12/2000	69	0.1446	0.2018	0.1854	0.38
46-7352	RAVENSWOOD DAM 22	WV	31	-81.7667	38.9500	581	07/1915	12/1979	61	0.1393	0.1249	0.1849	1.39
46-7455	RENICK 3	WV	23	-80.3644	37.9914	2080	08/1967	12/2000	33	0.1358	0.1901	0.2285	0.81
46-7552	RIPLEY	WV	31	-81.7119	38.8172	590	01/1942	12/2000	54	0.1822	0.3461	0.3297	2.43
46-7598	ROANOKE	WV	31	-80.4833	38.9333	1050	01/1924	10/1960	37	0.1470	0.2513	0.1474	1.16
46-7730	ROMNEY	WV	19	-78.7728	39.3389	720	01/1897	12/2000	97	0.1698	0.2837	0.1818	0.48
46-7785	ROWLESBURG 1	WV	31	-79.6833	39.3333	1423	01/1885	12/2000	112	0.1724	0.1530	0.1477	0.63
46-7875	ST MARYS	WV	31	-81.2000	39.3833	650	01/1909	09/1964	54	0.1786	0.1012	0.0913	1.76
46-8051	SENECA STATE FOREST	WV	23	-79.9250	38.3333	2450	07/1967	12/1999	33	0.1923	0.3568	0.2724	3.33
46-8286	SMITHVILLE	WV	31	-81.0989	39.0728	760	07/1950	10/1998	46	0.1587	0.0884	0.1021	1.20
46-8384	SPENCER 1 SE	WV	31	-81.3619	38.8008	943	02/1892	12/2000	99	0.1666	0.2058	0.1399	0.11
46-8433	SPRUCE KNOB	WV	22	-79.5167	38.6833	3051	02/1951	10/1988	38	0.2190	0.3246	0.3337	1.61
46-8536	STONY RIVER DAM	WV	22	-79.3000	39.1333	3402	01/1920	12/1971	52	0.2154	0.3312	0.2771	0.87
46-8614	SUMMERSVILLE RESERVOIR	WV	31	-80.8939	38.2206	1760	01/1949	12/2000	50	0.1556	0.2819	0.1860	0.83
46-8662	SUTTON DAM	WV	31	-80.6961	38.6558	835	01/1941	12/2000	59	0.1557	0.2700	0.2186	0.50
46-8777	TERRA ALTA NO 1	WV	31	-79.5469	39.4467	2630	01/1965	12/2000	35	0.1814	0.1341	0.0886	1.31
46-8807	THOMAS	WV	22	-79.5000	39.1500	3010	07/1929	12/1995	67	0.1837	0.2715	0.2014	0.89
46-8924	TRIBBLE	WV	31	-81.8500	38.7000	700	01/1949	09/1994	45	0.1414	0.1806	0.1249	0.63
46-9011	UNION 3 SSE	WV	23	-80.5336	37.5436	2110	02/1894	12/2000	97	0.1505	0.1865	0.1707	0.04

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46-9049	UPPER TRACT	WV	20	-79.2833	38.7833	1540	01/1898	08/1998	51	0.2091	0.2737	0.2985	1.44
46-9072	VALLEY CHAPEL	WV	31	-80.4000	39.1000	1010	01/1924	11/1954	30	0.2242	0.3673	0.3364	5.10
46-9086	VALLEY HEAD	WV	22	-80.0369	38.5453	2425	02/1938	12/2000	63	0.1703	0.3078	0.2287	1.76
46-9104	VANDALIA	WV	31	-80.4000	38.9333	1102	07/1923	12/1979	55	0.1591	0.2249	0.2013	0.14
46-9281	WARDENSVILLE R M FARM	WV	19	-78.5811	39.1139	960	01/1918	12/2000	79	0.2025	0.2961	0.1929	0.34
46-9309	WASHINGTON DAM 19	WV	31	-81.7000	39.2500	600	01/1917	12/1967	50	0.1886	0.2265	0.1604	0.60
46-9333	WEBSTER SPRINGS	WV	31	-80.4167	38.4833	1540	01/1942	11/1998	54	0.2054	0.3256	0.1872	1.89
46-9368	WELLSBURG WTR TRMT PL	WV	30	-80.6119	40.2753	660	01/1900	12/1986	87	0.1592	0.2100	0.1430	0.36
46-9436	WESTON	WV	31	-80.4714	39.0406	925	01/1890	12/2000	94	0.1739	0.1873	0.1762	0.40
46-9458	WEST UNION 2	WV	31	-80.7694	39.2911	790	01/1941	12/2000	54	0.2073	0.3231	0.1520	2.57
46-9522	WHITE SULPHUR SPRINGS	WV	23	-80.3083	37.7889	1920	01/1915	12/2000	85	0.1653	0.2182	0.2075	0.39
46-9605	WILLIAMSON	WV	31	-82.2833	37.6667	670	01/1901	11/1998	96	0.1702	0.2590	0.1330	0.85
46-9610	WILLIAMSON 2	WV	31	-82.2761	37.6731	760	01/1952	12/1997	45	0.1418	0.3265	0.1799	3.35
46-9683	WINFIELD LOCKS	WV	31	-81.9161	38.5272	611	01/1938	12/2000	63	0.1255	0.2315	0.1948	1.82
47-0045	AFTON	WI	53	-89.0644	42.6475	742	01/1949	12/2000	50	0.1662	0.1620	0.1279	0.13
47-0307	ARLINGTON	WI	62	-89.3667	43.3333	1040	04/1931	12/1970	40	0.2208	0.2694	0.1368	0.81
47-0308	ARLINGTON EXP FARM	WI	62	-89.3269	43.3008	1080	06/1962	12/2000	39	0.1732	0.2439	0.1332	1.15
47-0516	BARABOO WATER WORKS	WI	62	-89.7269	43.4583	823	01/1949	12/2000	52	0.2027	0.3819	0.2701	1.63
47-0645	BEAVER DAM	WI	62	-88.8478	43.4447	840	01/1949	12/2000	51	0.1750	0.1553	0.1014	0.96
47-0696	BELOIT COLLEGE	WI	53	-89.0311	42.5039	780	01/1893	12/2000	106	0.1996	0.2381	0.1711	0.67
47-0892	BLANCHARDVILLE POLICE	WI	63	-89.8622	42.8122	833	01/1954	12/2000	46	0.1961	0.2498	0.1749	0.36
47-0929	BLUE MOUNDS 6 SSE	WI	64	-89.7903	42.9511	1050	06/1962	12/2000	38	0.1993	0.2711	0.1376	1.14
47-1078	BRODHEAD 1 SW	WI	64	-89.3861	42.6181	790	01/1898	12/2000	102	0.2107	0.2742	0.1890	0.67
47-1205	BURLINGTON	WI	53	-88.2544	42.6506	751	01/1949	12/2000	52	0.1653	0.2151	0.1713	1.08
47-1213	BURNETT 3 S	WI	62	-88.7000	43.4667	971	01/1904	11/1970	66	0.1934	0.2967	0.1825	0.44
47-1416	CHARMANY FARM	WI	53	-89.4781	43.0603	910	06/1950	11/2000	48	0.1754	0.1700	0.0606	1.60
47-1667	CLINTON 4 N	WI	53	-88.8753	42.5492	960	01/1950	12/2000	51	0.1771	0.1841	0.1771	0.17
47-2001	DARLINGTON	WI	63	-90.1183	42.6708	960	03/1901	12/2000	93	0.2092	0.2820	0.1691	0.85
47-2173	DODGEVILLE	WI	62	-90.1161	42.9608	1110	01/1939	12/2000	58	0.2086	0.2494	0.1671	0.21
47-2302	EAGLE 2 W	WI	53	-88.5167	42.8667	900	07/1942	12/1993	47	0.1643	0.1088	0.1169	0.68
47-2869	FORT ATKINSON 2 SSE	WI	53	-88.8589	42.9050	800	09/1941	12/2000	60	0.1791	0.1716	0.1465	0.06
47-3058	GERMANTOWN 2 W	WI	62	-88.1233	43.2097	850	06/1944	12/2000	57	0.2224	0.2296	0.2024	1.87

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47-3453	HARTFORD SEWAGE PLANT	WI	62	-88.4114	43.3311	980	01/1953	12/2000	48	0.1977	0.2353	0.1402	0.18
47-3756	HORICON	WI	62	-88.6325	43.4406	880	01/1971	12/2000	30	0.1968	0.2721	0.2717	1.24
47-3979	JANESVILLE POWER SUBST	WI	53	-89.0167	42.6667	761	01/1945	12/1986	42	0.1957	0.1923	0.0844	1.88
47-4174	KENOSHA	WI	53	-87.8156	42.5608	600	02/1944	12/2000	57	0.2008	0.1824	0.2064	1.91
47-4457	LAKE GENEVA	WI	53	-88.4347	42.5936	846	04/1945	12/2000	56	0.1595	0.0664	0.0674	1.95
47-4482	LAKE MILLS	WI	53	-88.9117	43.0761	852	01/1892	12/2000	108	0.1825	0.2003	0.1758	0.13
47-4546	LANCASTER 4 WSW	WI	62	-90.7889	42.8278	1040	01/1893	12/2000	100	0.1817	0.2363	0.1969	0.27
47-4821	LONE ROCK TRI CO	WI	62	-90.1833	43.2000	719	01/1947	12/1982	36	0.1776	0.2097	0.1183	0.66
47-4937	LYNXVILLE DAM 9	WI	62	-91.0992	43.2111	633	01/1937	12/2000	64	0.1921	0.3218	0.2505	0.72
47-4961	MADISON WSO AIRPORT	WI	53	-89.3453	43.1406	866	01/1943	12/2000	58	0.1655	0.1148	0.1053	0.57
47-4966	MADISON WB CITY	WI	53	-89.4000	43.0833	974	01/1897	12/1962	66	0.1930	0.1962	0.1368	0.52
47-5148	MARTINTOWN	WI	64	-89.7572	42.5058	940	03/1953	12/1999	41	0.1869	0.2071	0.1458	0.17
47-5474	MILWAUKEE MT MARY COL	WI	62	-88.0294	43.0719	726	01/1947	12/2000	54	0.2164	0.3042	0.2276	0.46
47-5479	MILWAUKEE NB SIDE PORT	WI	62	-87.9044	42.9550	670	05/1927	12/2000	74	0.2125	0.2823	0.2456	0.84
47-5484	MILWAUKEE WB CITY	WI	62	-87.9000	43.0333	722	01/1897	12/1953	57	0.1814	0.2511	0.2561	1.13
47-5573	MONROE	WI	64	-89.6681	42.5994	990	01/1949	12/2000	52	0.2316	0.3188	0.2366	2.75
47-5718	MUSCODA	WI	62	-90.4272	43.1772	685	01/1909	12/1999	65	0.1856	0.3025	0.1874	0.86
47-6200	OCONOMOWOC 1 SW	WI	53	-88.5036	43.1003	856	01/1944	12/2000	56	0.1991	0.2379	0.1796	0.62
47-6646	PLATTEVILLE	WI	63	-90.4656	42.7489	990	03/1936	12/2000	64	0.1815	0.2041	0.1959	0.19
47-6764	PORT WASHINGTON	WI	62	-87.8636	43.3944	594	01/1894	12/2000	105	0.1986	0.2967	0.2627	0.71
47-6827	PRAIRIE DU CHIEN	WI	62	-91.1350	43.0514	658	01/1892	12/2000	109	0.1832	0.2423	0.1268	0.71
47-6838	PRAIRIE DU SAC 2 N	WI	62	-89.7283	43.3100	780	01/1909	12/2000	90	0.1697	0.1941	0.1776	0.73
47-6922	RACINE	WI	53	-87.7861	42.7022	595	05/1896	12/2000	104	0.1602	0.1830	0.1166	0.88
47-7015	READSTOWN	WI	62	-90.7586	43.4500	775	04/1954	11/2000	35	0.2221	0.3100	0.2601	1.19
47-7158	RICHLAND CENTER	WI	62	-90.3778	43.3169	723	01/1920	12/2000	81	0.1949	0.2682	0.1197	1.00
47-8164	STEUBEN 3 NE	WI	62	-90.8372	43.1342	1015	01/1949	12/1996	47	0.1816	0.2022	0.2821	3.57
47-8229	STOUGHTON	WI	64	-89.2133	42.9108	840	02/1931	12/2000	67	0.1653	0.2860	0.2283	1.24
47-8723	UNION GROVE	WI	53	-88.0336	42.6903	730	06/1941	12/2000	60	0.1919	0.2251	0.1633	0.36
47-8919	WATERTOWN	WI	62	-88.7353	43.1750	825	01/1893	12/2000	108	0.2035	0.2321	0.1244	0.41
47-8937	WAUKESHA WATER WORKS	WI	53	-88.2492	43.0064	830	01/1893	12/2000	105	0.1710	0.1970	0.1861	0.46
47-9046	WEST ALLIS	WI	53	-88.0017	43.0175	723	01/1952	11/2000	38	0.1465	0.1287	0.1494	1.20
47-9050	WEST BEND	WI	62	-88.0858	43.3681	940	01/1923	12/2000	78	0.2111	0.3486	0.2470	0.72

ID	Name	ST	Daily Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
47-9190	WHITEWATER	WI	53	-88.7247	42.8508	875	06/1941	12/2000	59	0.1786	0.2105	0.0644	2.56
47-9226	WILLIAMS BAY	WI	53	-88.5333	42.5833	889	04/1921	12/1957	37	0.1987	0.2498	0.1901	0.72
76-0008	USGS08	TN	36	-85.2000	35.3000	1276	01/1900	09/1973	74	0.1614	0.1057	0.0955	0.76
76-0031	USGS31	TN	75	-89.9800	35.5000	230	01/1897	09/1976	80	0.1985	0.3354	0.2849	1.63

Appendix A.6. Daily and hourly station lists for NOAA Atlas 14 Volume 2 showing station ID, station name and state, daily region in which the station resides, longitude, latitude, elevation (feet), begin date of record, end date of record, number of data years (i.e., years for which a reliable annual maximum was extracted), station coefficient of L-variation (L-CV), L-skewness (L-CS), L-kurtosis (L-CK), and discordancy of the station within its region (Disc.).

Table A.6.2. Hourly stations (statistical values for the 60-minute duration)

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
01-0063	ADDISON	AL	15	-87.1814	34.2031	766	6/1948	12/2000	53	0.1689	0.1033	0.1673	1.41
01-0369	ASHLAND 3 ENE	AL	15	-85.7919	33.2836	1000	6/1948	12/2000	52	0.1509	0.1718	0.1548	0.17
01-0748	BERRY 3 S	AL	15	-87.6075	33.6156	425	6/1948	12/2000	47	0.1892	0.2061	0.2167	0.88
01-0831	BIRMINGHAM FAA ARPT	AL	15	-86.7450	33.5656	615	6/1948	12/2000	44	0.1530	0.1089	0.1239	0.58
01-0957	BOAZ	AL	15	-86.1633	34.2008	1070	6/1948	12/2000	46	0.1836	0.2300	0.1339	1.25
01-1819	COLBERT STEAM PLANT	AL	14	-87.8500	34.7500	469	11/1951	12/1980	29	0.1742	0.2433	0.1809	0.11
01-3043	FORT PAYNE	AL	14	-85.7236	34.4406	917	6/1948	12/2000	49	0.1985	0.2868	0.1543	0.37
01-3578	GUNTERSVILLE CITY WATE	AL	15	-86.2833	34.3667	610	7/1948	12/1980	26	0.1537	0.1935	0.2011	0.85
01-3620	HALEYVILLE 2 ENE	AL	15	-87.6347	34.2311	920	6/1948	12/2000	52	0.1390	0.1522	0.1658	0.69
01-3645	HAMILTON 3 S	AL	23	-87.9914	34.0967	435	11/1967	12/2000	32	0.1726	0.1914	0.1807	0.12
01-3655	HANCEVILLE	AL	15	-86.7625	34.0619	530	6/1948	12/2000	50	0.1469	0.2187	0.1697	1.15
01-4064	HUNTSVILLE WSO AP	AL	14	-86.7858	34.6439	624	11/1958	12/2000	42	0.1700	0.3259	0.1725	1.16
01-4209	JACKSONVILLE 1 NW	AL	15	-85.7611	33.8253	720	6/1948	7/2000	48	0.1900	0.2237	0.1359	1.27
01-5625	MOULTON	AL	14	-87.3000	34.4667	630	7/1948	8/1977	29	0.1266	0.2515	0.1937	2.29
01-6226	PAINT ROCK 2 N	AL	14	-86.3333	34.7000	640	7/1948	12/1980	32	0.1925	0.2688	0.0916	1.08
01-8259	TONEY	AL	14	-86.7333	34.9000	830	7/1948	12/1980	32	0.1973	0.3469	0.2797	1.00
01-8385	TUSCALOOSA OLIVER DAM	AL	15	-87.5936	33.2097	152	6/1948	12/2000	41	0.1614	0.1167	0.0822	1.18
01-8517	VERNON 2 N	AL	23	-88.1275	33.7392	298	6/1948	12/2000	49	0.1569	0.1576	0.1765	0.16
01-8670	WARRIOR 2	AL	15	-86.8258	33.7925	520	4/1972	12/2000	23	0.1232	0.1135	0.0692	1.61
03-0064	ALICIA	AR	23	-91.0583	35.9289	252	5/1948	12/2000	51	0.1911	0.0760	0.1227	1.13
03-0326	AUGUSTA 2 NW	AR	23	-91.3878	35.3056	195	5/1948	12/2000	50	0.1583	0.2184	0.2354	0.83
03-0458	BATESVILLE LIVESTOCK	AR	23	-91.7944	35.8306	571	8/1949	12/2000	50	0.1716	0.1722	0.2403	1.10
03-0530	BEEBE	AR	23	-91.8961	35.0644	250	5/1948	12/2000	50	0.2046	0.0392	0.0870	2.50
03-0842	BOTKINBURG 3 NE	AR	23	-92.4708	35.7200	1295	5/1948	12/2000	49	0.1709	0.2411	0.2734	1.75
03-0936	BRINKLEY	AR	23	-91.1878	34.8825	200	5/1948	12/2000	53	0.1756	0.2121	0.1811	0.19
03-1632	CORNING	AR	22	-90.5858	36.4197	300	5/1948	12/2000	49	0.2211	0.2830	0.2286	1.26

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
03-2148	DUMAS	AR	23	-91.5317	33.8847	163	5/1948	12/2000	52	0.1691	0.1828	0.2274	0.72
03-2564	FORREST CITY	AR	23	-90.8000	35.0333	249	5/1948	6/1979	31	0.1552	0.2325	0.1772	0.48
03-2978	GREERS FERRY DAM	AR	23	-91.9997	35.5206	527	2/1965	12/2000	36	0.2060	0.2006	0.1457	1.12
03-3132	HARDY 2 SW	AR	23	-91.5056	36.2747	400	5/1948	12/2000	47	0.1586	0.1085	0.0798	0.77
03-3556	HUTTIG LOCK	AR	23	-92.0833	33.0333	59	5/1948	5/1977	29	0.1297	0.1181	0.1899	1.31
03-3904	KINGSLAND 3 SSE	AR	23	-92.2667	33.8333	289	5/1948	9/1973	22	0.1949	0.1719	0.0100	2.83
03-4248	LITTLE ROCK FAA ARPT	AR	23	-92.2389	34.7272	258	5/1948	12/1976	29	0.1602	0.1397	0.2092	0.57
03-4638	MARIANNA 2 S	AR	23	-90.7661	34.7336	234	5/1948	4/1974	26	0.1467	0.0008	0.1593	1.94
03-4900	MONTICELLO 3 SW	AR	23	-91.8111	33.5972	290	5/1948	12/2000	52	0.1716	0.0585	0.1231	0.75
03-4906	MONTROSE	AR	23	-91.4833	33.3167	131	5/1948	1/1971	20	0.1649	0.2959	0.1018	2.17
03-5036	MOUNTAIN HOME C OF ENG	AR	23	-92.3833	36.3333	800	5/1948	9/1985	38	0.1977	0.0998	0.1455	1.30
03-5228	NORFORK DAM	AR	23	-92.2561	36.2494	425	5/1948	12/2000	53	0.1653	0.0669	0.1258	0.58
03-5320	NORTH LITTLE ROCK WSFO	AR	23	-92.2597	34.8353	563	1/1976	12/2000	25	0.1246	0.2077	0.1379	2.26
03-5754	PINE BLUFF	AR	23	-92.0189	34.2256	215	1/1953	12/2000	48	0.1791	0.2304	0.1534	0.28
03-6920	STUTTGART 9 ESE	AR	23	-91.4172	34.4744	198	6/1948	12/2000	53	0.1549	0.0856	0.1566	0.50
03-7744	WHEELING 3 W	AR	23	-91.9000	36.3167	775	5/1948	6/1987	39	0.1831	0.1756	0.1944	0.50
03-8052	WYNNE	AR	23	-90.7964	35.2547	260	6/1979	12/2000	22	0.1349	0.2144	0.1518	1.39
06-0806	BRIDGEPORT SIKORSKY AP	CT	26	-73.1289	41.1583	5	7/1948	12/2002	55	0.2038	0.2458	0.1771	0.16
06-1093	CANDLEWOOD LAKE	CT	26	-73.4667	41.4833	502	5/1948	4/1975	27	0.2386	0.3203	0.1609	1.16
06-5445	NORFOLK 2 SW	CT	26	-73.2208	41.9725	1340	5/1948	12/2002	54	0.2077	0.1712	0.1252	0.21
06-8330	THOMASTON DAM	CT	26	-73.0600	41.6931	538	9/1961	12/2002	36	0.1772	0.2090	0.1277	0.48
07-3570	GEORGETOWN 5 SW	DE	1	-75.4500	38.6333	45	1/1956	12/1997	35	0.1795	0.0899	0.0797	0.74
07-9595	WILMINGTON WSO ARPT	DE	1	-75.6008	39.6728	74	9/1957	12/2000	43	0.1911	0.2168	0.1579	0.58
09-0041	ADAIRSVILLE	GA	14	-84.9333	34.3667	700	6/1948	9/1986	39	0.2053	0.1713	0.2879	2.94
09-0181	ALLATOONA DAM 2	GA	14	-84.7300	34.1650	975	4/1952	12/2000	47	0.1474	0.1461	0.1412	0.96
09-0221	ALPHARETTA 2 NNW	GA	14	-84.3000	34.1167	1102	6/1948	12/1983	36	0.1493	0.0443	0.0480	2.35
09-0435	ATHENS WSO AIRPORT	GA	4	-83.3275	33.9481	785	8/1948	12/2000	43	0.1497	0.0152	0.0518	0.77
09-0451	ATLANTA WSO AIRPORT	GA	4	-84.4417	33.6300	1010	6/1948	12/2000	53	0.1696	0.2249	0.1804	0.86
09-0495	AUGUSTA WSO AIRPORT	GA	2	-81.9647	33.3697	132	8/1948	12/2000	51	0.2015	0.2150	0.1451	0.25
09-0787	BELLVILLE	GA	25	-81.9667	32.1500	190	6/1948	2/1980	31	0.2007	0.2409	0.2123	1.00
09-1413	BURTON DAM	GA	10	-83.5500	34.7833	1772	6/1948	11/1978	31	0.2036	0.0698	0.0745	1.27
09-1474	CALHOUN EXPERIMENT STN	GA	14	-84.9667	34.4833	655	1/1970	4/1997	26	0.1608	0.2350	0.0675	1.75

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
09-1585	CANTON	GA	14	-84.4956	34.2361	876	6/1948	12/2000	52	0.2175	0.3073	0.2549	0.90
09-1619	CARNESVILLE 3 N	GA	2	-83.2067	34.4125	866	6/1948	12/2000	49	0.1873	0.2109	0.1733	0.04
09-1640	CARROLLTON	GA	4	-85.0806	33.5972	995	6/1948	12/2000	52	0.1350	0.0469	0.0779	1.13
09-1715	CAVE SPRINGS 4 SSW	GA	14	-85.3500	34.0500	801	2/1949	3/1980	31	0.2208	0.3203	0.2956	1.58
09-1863	CHATSWORTH 2	GA	14	-84.7650	34.7589	709	6/1948	12/2000	52	0.1773	0.2756	0.1791	0.24
09-1973	CLAXTON	GA	25	-81.9008	32.1678	188	2/1980	12/2002	21	0.1960	0.1272	0.1305	0.16
09-1998	CLERMONT 4 WSW	GA	10	-83.8550	34.4503	1281	6/1948	12/2000	51	0.2112	0.1823	0.1487	0.39
09-2246	COOPER GAP	GA	10	-84.0500	34.6333	1903	6/1948	5/1970	21	0.2370	0.2406	0.0689	2.44
09-2479	DAHLONEGA 3 NNW	GA	10	-84.0000	34.5719	1382	5/1970	12/2000	30	0.1553	0.1528	0.1065	0.52
09-2485	DALLAS 7 NE	GA	14	-84.7475	33.9881	1100	6/1948	12/2000	53	0.1881	0.2663	0.2114	0.11
09-2578	DAWSONVILLE	GA	10	-84.1039	34.4206	1343	6/1948	12/2000	52	0.1674	0.1364	0.0588	0.55
09-2844	DUBLIN 2	GA	25	-82.8997	32.5569	200	6/1948	12/2002	53	0.1964	0.2002	0.1800	0.45
09-3409	FLEMING	GA	25	-81.4167	31.8833	20	6/1950	3/1980	28	0.1622	0.1771	0.2099	0.93
09-4070	HARALSON	GA	4	-84.5500	33.2333	820	6/1948	4/1997	47	0.1798	0.0877	0.1492	1.25
09-4623	JACKSON DAM	GA	4	-83.8436	33.3200	430	6/1948	4/1997	42	0.1914	0.2271	0.1525	1.74
09-4651	JASPER	GA	14	-84.4564	34.4556	1550	5/1959	12/2000	37	0.1877	0.2464	0.2249	0.22
09-4688	JOHNTOWN	GA	10	-84.2500	34.5500	1310	6/1948	4/1997	45	0.1903	0.2246	0.1653	0.16
09-4941	LAFAYETTE 4 SSW	GA	14	-85.3619	34.6483	817	6/1948	12/2000	50	0.1237	0.1336	0.2006	2.56
09-4949	LA GRANGE	GA	15	-85.0294	33.0650	715	6/1951	12/2000	50	0.1951	0.1828	0.1978	0.96
09-5192	LIME BRANCH	GA	14	-85.2667	33.9333	840	2/1949	10/1970	22	0.2211	0.1772	0.0717	1.59
09-5314	LOUISVILLE 1 E	GA	2	-82.3914	33.0125	322	6/1948	12/2000	50	0.2125	0.2293	0.1204	0.77
09-5876	MILLEDGEVILLE DARDC	GA	4	-83.2197	33.0864	300	2/1981	12/2000	20	0.1885	0.2299	0.2608	1.46
09-7468	RICHMOND HILL	GA	25	-81.3289	31.9586	20	8/1978	12/2002	20	0.2444	0.0562	-0.0125	1.76
09-7605	ROME 8 SW	GA	14	-85.2583	34.1650	700	6/1948	12/2000	53	0.1864	0.2908	0.1963	0.21
09-7610	ROME WSO AIRPORT	GA	14	-85.1667	34.3500	640	6/1948	10/1980	33	0.1799	0.3186	0.1913	0.62
09-7847	SAVANNAH INTL AP	GA	25	-81.2100	32.1300	46	6/1948	12/2002	54	0.1773	0.1100	0.1456	0.90
09-8223	SPARTA	GA	4	-82.9669	33.2725	570	6/1951	7/1999	47	0.1657	0.0502	0.0739	0.75
09-8504	SWEET GUM	GA	10	-84.2167	34.9667	1801	8/1948	12/1980	32	0.1464	0.1391	0.1344	0.94
09-8517	SYLVANIA 2 SSE	GA	25	-81.6178	32.7322	250	6/1948	12/2002	52	0.2025	0.2160	0.2275	1.81
09-8806	TRAY MOUNTAIN	GA	10	-83.7000	34.8000	3904	8/1948	5/1979	30	0.1983	0.2341	0.1878	0.36
09-8935	UNICOI STATE PARK	GA	10	-83.7219	34.7206	1594	12/1978	12/2000	22	0.1938	0.1824	-0.0046	2.52
09-9169	WATKINSVILLE SCS	GA	4	-83.4361	33.8731	750	6/1948	12/2000	51	0.1546	0.1312	0.1793	0.81

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
09-9466	WINDER 1 SSE	GA	4	-83.7117	33.9731	960	6/1948	6/1976	24	0.1632	0.1664	0.1597	0.23
11-0082	ALEXIS 1 SW	IL	22	-90.5639	41.0639	680	7/1948	12/2000	52	0.1880	0.1441	0.0901	0.41
11-0281	ASHLEY	IL	18	-89.1814	38.3306	555	7/1948	12/2000	51	0.1993	0.1402	0.1370	0.36
11-0330	AUGUSTA	IL	22	-90.9456	40.2378	680	7/1948	12/2000	51	0.1838	0.1787	0.1625	0.01
11-0510	BELLEVILLE SIU RESEARC	IL	22	-89.8467	38.5200	450	7/1948	12/2000	51	0.2011	0.1557	0.1214	0.26
11-0583	BELVIDERE	IL	19	-88.8644	42.2550	738	7/1948	12/2000	49	0.2177	0.2280	0.1680	0.43
11-1166	CAIRO 3 N	IL	23	-89.1856	37.0425	310	7/1948	12/2000	48	0.1941	0.1152	0.0487	1.57
11-1284	CARLINVILLE 2	IL	22	-89.8700	39.2881	621	9/1968	12/2000	30	0.1512	0.3227	0.2222	2.13
11-1290	CARLYLE RESERVOIR	IL	22	-89.3658	38.6308	501	7/1970	12/2000	27	0.1611	0.2557	0.1889	0.83
11-1522	CHICAGO CAL TREAT WKS	IL	19	-87.6167	41.6667	590	7/1948	12/1974	26	0.2266	0.1786	0.0780	1.19
11-1523	CHICAGO C WTR FILT PLA	IL	19	-87.6000	41.9000	640	7/1948	7/1980	31	0.2291	0.2229	0.1497	0.90
11-1542	CHICAGO MAYFAIR PUMP S	IL	19	-87.7500	41.9667	650	7/1948	7/1980	30	0.1826	0.1544	0.1355	0.20
11-1549	CHICAGO O'HARE WSO ARP	IL	19	-87.9142	41.9861	658	6/1962	12/2000	39	0.1551	0.0775	0.0634	1.86
11-1552	CHICAGO ROSELAND PUMP	IL	19	-87.6333	41.7000	659	7/1948	7/1980	30	0.1625	0.3776	0.2498	3.82
11-1557	CHICAGO RACINE PUMP	IL	19	-87.6500	41.8167	640	7/1948	12/1974	26	0.1952	0.1127	0.0709	0.31
11-1564	CHICAGO S WTR FILT PLA	IL	19	-87.5500	41.7500	610	7/1948	7/1980	30	0.2177	0.1491	0.2113	1.57
11-1567	CHICAGO SPRINGFLD PUMP	IL	19	-87.7167	41.9167	600	7/1948	7/1980	30	0.2012	0.0816	0.0203	0.91
11-1572	CHICAGO UNIVERSITY	IL	19	-87.6000	41.7833	594	7/1948	1/1995	46	0.1987	0.1235	0.0739	0.28
11-1577	CHICAGO MIDWAY AP 3 SW	IL	19	-87.7775	41.7372	620	7/1948	12/2000	51	0.2039	0.1689	0.1271	0.04
11-1584	CHICAGO WB CITY 2	IL	19	-87.6333	41.8833	591	7/1948	10/1970	23	0.2258	0.1888	0.1749	0.74
11-1664	CISNE BROWN CAMP	IL	18	-88.4094	38.5047	454	7/1946	12/2000	48	0.1811	0.2347	0.1440	0.50
11-1944	COULTERVILLE 3 NW	IL	18	-89.6500	38.2167	500	7/1948	5/1984	32	0.2240	0.3345	0.1927	1.89
11-2011	CRETE	IL	19	-87.6222	41.4492	664	7/1948	12/2000	49	0.1854	0.0548	0.1054	1.12
11-2140	DANVILLE	IL	18	-87.6483	40.1389	558	7/1948	12/2000	51	0.1857	0.2708	0.1846	0.59
11-2332	DIONA 3 SW	IL	18	-88.1667	39.3500	610	7/1948	2/1995	43	0.2015	0.2005	0.1129	0.43
11-2353	DIXON SPRINGS AGR CENT	IL	22	-88.6681	37.4372	540	7/1948	12/2000	51	0.1766	0.1468	0.1458	0.08
11-2417	DOWNS 2 NE	IL	18	-88.8667	40.4333	795	7/1948	4/1987	39	0.2020	0.1622	0.0489	1.32
11-2642	EDELSTEIN	IL	22	-89.6333	40.9333	801	7/1948	2/1984	36	0.2233	0.1502	0.1045	1.14
11-2687	EFFINGHAM	IL	18	-88.6242	39.1189	625	7/1948	12/2000	49	0.2346	0.3063	0.2550	2.62
11-2923	FAIRBURY WATERWORKS	IL	18	-88.5153	40.7372	690	7/1948	12/2000	50	0.1850	0.1652	0.0939	0.40
11-2993	FARMER CITY	IL	18	-88.6508	40.2228	730	7/1948	12/2000	52	0.2188	0.1923	0.1661	0.97
11-3109	FLORA 5 NW	IL	18	-88.5822	38.7156	500	4/1978	12/2000	22	0.2272	0.1730	0.1261	1.62

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
11-3262	FREEPORT WASTE WTR PLT	IL	19	-89.6061	42.2953	750	7/1948	12/2000	50	0.2146	0.2533	0.2082	0.53
11-3290	FULTON LOCK & DAM #13	IL	21	-90.1539	41.8981	592	7/1948	6/1995	42	0.2210	0.2401	0.2144	0.13
11-3522	GOLCONDA 1 SE	IL	22	-88.4894	37.3789	354	7/1948	9/1980	33	0.1549	0.0999	0.0935	0.96
11-3666	GREENFIELD 1 S	IL	22	-90.2058	39.3425	548	7/1948	12/2000	51	0.1758	0.1673	0.1199	0.21
11-4198	HOOPESTON	IL	18	-87.6558	40.4744	710	7/1948	12/2000	53	0.1703	0.3213	0.2588	2.10
11-4317	HUTSONVILLE POWER PLAN	IL	18	-87.6578	39.1333	455	7/1948	12/2000	50	0.2006	0.2400	0.1157	0.76
11-4355	ILLINOIS CITY DAM 16	IL	21	-91.0153	41.4317	550	7/1948	12/2000	50	0.2220	0.2297	0.1707	0.15
11-4442	JACKSONVILLE 2 E	IL	22	-90.2153	39.7353	610	7/1948	12/2000	53	0.1902	0.1052	0.1773	0.46
11-4603	KANKAKEE SEWAGE PLANT	IL	18	-87.8856	41.1381	640	7/1948	12/2000	51	0.1839	0.1298	0.2280	1.39
11-4629	KASKASKIA R NAV LOCK	IL	22	-89.9492	37.9842	380	3/1974	12/2000	25	0.1605	0.1933	0.1056	0.90
11-4710	KEWANEE	IL	21	-89.8992	41.2483	780	5/1951	12/2000	22	0.1802	0.1004	0.0442	1.83
11-4715	KEWANEE BAKER PARK	IL	21	-89.9167	41.2500	801	7/1948	1/1976	23	0.2319	0.2143	0.2496	0.95
11-4879	LANARK 1 SE	IL	21	-89.8422	42.0925	830	7/1948	12/2000	51	0.2203	0.2369	0.2112	0.11
11-5136	LOCKPORT POWER HOUSE	IL	19	-88.0833	41.5667	590	7/1948	12/1974	26	0.1907	0.1195	0.0941	0.20
11-5216	LOUISVILLE	IL	18	-88.5000	38.7667	449	7/1948	4/1978	27	0.1816	0.3246	0.2983	2.17
11-5334	MARIETTA	IL	22	-90.3892	40.5019	640	7/1948	12/2000	51	0.2012	0.1277	0.1556	0.35
11-5413	MASON CITY 1 W	IL	22	-89.6775	40.2003	575	7/1948	12/2000	53	0.2047	0.2602	0.2293	0.72
11-5493	MCHENRY LOCK & DAM	IL	19	-88.2525	42.3103	742	7/1948	12/2000	46	0.2020	0.1565	0.1543	0.13
11-5751	MOLINE WSO AP	IL	21	-90.5233	41.4653	592	7/1948	12/2000	53	0.2334	0.2006	0.1085	0.86
11-5841	MORRISONVILLE	IL	22	-89.4614	39.4158	630	7/1948	12/2000	53	0.1918	0.2462	0.1625	0.21
11-5888	MOUNT CARMEL	IL	18	-87.7578	38.4106	430	7/1948	12/2000	47	0.1920	0.1538	0.1030	0.26
11-5983	MURPHYSBORO 2 SW	IL	18	-89.3656	37.7608	550	7/1948	12/2000	53	0.1914	0.2263	0.1646	0.13
11-6159	NEWTON 6 SSE	IL	18	-88.1183	38.9136	510	7/1948	12/2000	53	0.1832	0.2700	0.1516	0.92
11-6185	NOKOMIS	IL	22	-89.2828	39.3053	680	1/1971	12/2000	30	0.2240	0.2325	0.1077	1.21
11-6490	OREGON 2E	IL	19	-89.3006	42.0153	750	11/1949	12/2000	48	0.1627	0.2190	0.2514	1.91
11-6610	PARIS WATERWORKS	IL	18	-87.6933	39.6356	680	7/1948	12/2000	47	0.1890	0.2055	0.1556	0.05
11-6711	PEORIA WSO AIRPORT	IL	22	-89.6839	40.6675	650	7/1948	12/2000	53	0.1550	-0.0032	0.1412	1.66
11-6819	PIPER CITY	IL	18	-88.1828	40.7569	670	2/1949	12/2000	51	0.1966	0.2018	0.2013	0.30
11-6837	PITTSFIELD NO 2	IL	22	-90.8058	39.6222	670	7/1948	12/2000	48	0.1743	0.1382	0.1739	0.19
11-6973	PRAIRIE DUROCHER 1 WSW	IL	22	-90.0978	38.0811	395	7/1948	12/1995	44	0.2015	0.1714	0.1265	0.23
11-7014	PROPHETSTOWN 1 NW	IL	21	-89.9403	41.6808	605	7/1948	12/2000	53	0.1754	0.0639	0.2082	3.26
11-7077	QUINCY DAM 21	IL	22	-91.4281	39.9058	483	7/1948	12/2000	51	0.2181	0.1803	0.2047	1.00

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
11-7150	RANTOUL	IL	18	-88.1594	40.3131	740	7/1948	12/2000	52	0.1821	0.2533	0.2467	0.81
11-7187	REND LAKE DAM	IL	18	-88.9883	38.0406	455	3/1972	12/2000	27	0.1943	0.1354	0.2048	1.01
11-7382	ROCKFORD WSO AP	IL	19	-89.0925	42.1961	733	1/1951	12/2000	43	0.2061	0.0835	0.1437	1.18
11-7391	ROCK ISLAND L&D 15	IL	21	-90.5644	41.5194	568	8/1948	12/2000	47	0.2064	0.2001	0.2084	0.13
11-7876	SHELBYVILLE DAM	IL	18	-88.7797	39.4106	655	7/1970	12/2000	25	0.1854	0.1795	0.3157	3.38
11-7990	SKOKIE N S TREAT WKS	IL	19	-87.7167	42.0167	600	7/1948	12/1974	26	0.1943	0.2762	0.2531	0.81
11-8147	SPARTA 3 N	IL	18	-89.7167	38.1167	535	1/1971	12/2000	27	0.1695	0.1503	0.1229	0.35
11-8179	SPRINGFIELD WSO AP	IL	22	-89.6839	39.8447	594	7/1948	12/2000	53	0.1954	0.2658	0.2234	0.54
11-8278	STICKNEY W SIDE TREAT	IL	19	-87.7500	41.8167	640	7/1948	12/1974	26	0.1935	0.0234	0.0338	1.20
11-8389	SULLIVAN 5 SSW	IL	18	-88.6067	39.5608	659	7/1948	12/2000	49	0.1919	0.2069	0.1623	0.04
11-8740	URBANA	IL	18	-88.2406	40.0842	721	7/1948	12/2000	49	0.1527	0.0929	0.1526	1.19
11-8781	VANDALIA	IL	22	-89.0922	38.9703	540	7/1948	12/2000	51	0.2057	0.0744	0.0970	0.95
11-8990	WASHINGTON	IL	22	-89.4372	40.6953	755	7/1948	12/2000	51	0.1866	0.2494	0.2026	0.29
11-9010	SHABBONA 5 NNE	IL	19	-88.7561	41.7650	790	7/1948	12/1997	26	0.1901	0.1358	0.0719	0.39
11-9090	WENONA	IL	19	-89.0667	41.0667	690	7/1948	8/1990	40	0.1715	0.1773	0.0604	1.70
11-9193	WEST SALEM	IL	18	-88.0219	38.5306	445	1/1971	12/2000	28	0.1685	0.1510	0.1492	0.29
11-9816	YATES CITY	IL	22	-90.0203	40.7764	675	7/1948	12/2000	49	0.2134	0.3259	0.2370	1.33
12-0132	ALPINE 2 NE	IN	18	-85.1583	39.5736	850	2/1949	12/2000	52	0.1890	0.2804	0.2018	0.62
12-0177	ANDERSON QUARTZ PLANT	IN	18	-85.7175	40.1122	845	7/1948	12/2000	49	0.1578	0.0793	0.1607	1.21
12-0200	ANGOLA	IN	16	-84.9900	41.6397	1010	5/1977	12/2000	23	0.1931	0.1255	0.1309	0.36
12-0328	ATTICA	IN	18	-87.2500	40.2833	520	7/1948	12/1994	39	0.1805	0.1640	0.1253	0.12
12-0482	BATESVILLE WATER WORKS	IN	18	-85.2186	39.2969	970	7/1948	12/2000	53	0.1635	0.0417	0.1242	1.33
12-0830	BLUFFTON 1 N	IN	16	-85.1739	40.7475	825	8/1948	12/2000	47	0.2028	0.1699	0.1045	0.24
12-0922	BRAZIL	IN	17	-87.1242	39.5108	680	7/1948	12/2000	52	0.1946	0.3025	0.2544	1.00
12-1147	BURLINGTON	IN	18	-86.4089	40.4875	724	11/1950	12/2000	49	0.1790	0.1816	0.0870	0.74
12-1212	CAGLES MILL DAM	IN	17	-86.9181	39.4881	760	1/1953	6/1983	26	0.1825	0.2252	0.0416	1.30
12-1256	CANNELTON	IN	13	-86.7072	37.8994	402	8/1948	12/2000	52	0.1606	0.2431	0.2073	0.72
12-1415	CHALMERS	IN	18	-86.8814	40.6628	700	7/1948	12/2000	47	0.2041	0.2191	0.1620	0.26
12-1626	CLINTON	IN	18	-87.3953	39.6564	456	11/1953	1/1994	39	0.1403	0.0833	0.1381	1.93
12-1739	COLUMBIA CITY	IN	16	-85.4897	41.1450	850	7/1948	12/2000	51	0.1875	0.2495	0.1975	0.50
12-1752	COLUMBUS WATER WORKS	IN	17	-85.8883	39.2106	632	7/1948	12/2000	46	0.2380	0.3125	0.3274	1.79
12-1814	CORYDON	IN	18	-86.1178	38.2181	590	1/1971	12/2000	28	0.1544	0.0636	0.0875	1.34

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
12-1873	CRAWFORDSVILLE 2 NW	IN	17	-86.9289	39.9664	778	7/1948	12/2000	46	0.1883	0.1881	0.1802	0.35
12-1929	CROTHERSVILLE	IN	17	-85.8483	38.7908	560	1/1971	12/2000	27	0.2239	0.3276	0.2363	0.86
12-2039	DANVILLE	IN	17	-86.5167	39.7667	860	1/1953	6/1983	26	0.1721	0.1829	0.2145	1.09
12-2309	DUBOIS S IND FORAGE FR	IN	18	-86.7000	38.4558	690	1/1957	12/2000	40	0.1790	0.1140	0.0381	1.26
12-2645	EMINENCE	IN	17	-86.6333	39.5333	781	1/1953	6/1983	25	0.1825	0.2732	0.0809	1.78
12-2725	EVANS LANDING	IN	13	-86.0000	38.0000	430	7/1948	12/1976	25	0.1599	0.1954	0.0843	1.20
12-2738	EVANSVILLE WSO AP	IN	18	-87.5203	38.0431	400	7/1948	12/2000	53	0.1907	0.2606	0.1983	0.38
12-2825	FARMLAND 5 NNW	IN	18	-85.1483	40.2539	965	3/1949	12/2000	50	0.1825	0.2730	0.2230	0.71
12-3037	FORT WAYNE WSO AP	IN	16	-85.2056	41.0061	791	7/1948	12/2000	53	0.1713	0.2188	0.1584	0.95
12-3062	FOWLER	IN	18	-87.3167	40.6167	820	7/1948	4/1973	23	0.1714	0.2622	0.1515	1.26
12-3082	FRANKFORT DISPOSAL PLA	IN	18	-86.5067	40.2986	824	7/1948	12/2000	53	0.1865	0.1251	0.1713	0.46
12-3095	FRANKLIN	IN	17	-86.0667	39.5167	771	7/1948	6/1971	20	0.1687	0.1236	-0.0526	2.18
12-3134	FREMONT 1 WSW	IN	16	-84.9500	41.7333	1020	5/1950	12/1976	23	0.2200	0.3031	0.1776	1.04
12-3206	GARRETT	IN	16	-85.1292	41.3411	880	12/1960	12/2000	40	0.2160	0.2580	0.1431	0.64
12-3418	GOSHEN COLLEGE	IN	16	-85.8825	41.5575	875	7/1948	12/2000	52	0.1768	0.1631	0.1153	0.59
12-3714	HARRISON CRAWFORD S F	IN	18	-86.2686	38.1975	850	3/1973	12/2000	24	0.2264	0.3813	0.1530	3.59
12-3777	HARTFORD CITY 5 SSW	IN	18	-85.2892	40.4356	942	7/1948	12/2000	48	0.2281	0.1482	0.1055	1.97
12-4181	HUNTINGTON	IN	16	-85.4981	40.8556	725	7/1948	12/2000	51	0.1979	0.1879	0.1556	0.02
12-4259	INDIANAPOLIS WSFO AP	IN	17	-86.2789	39.7317	790	7/1948	12/2000	53	0.2235	0.2481	0.1483	0.34
12-4286	INDIANAPOLIS ZOO	IN	17	-86.1806	39.7681	710	7/1948	12/2000	50	0.2344	0.1366	0.0888	2.52
12-4356	JAMESTOWN	IN	17	-86.4569	39.9222	945	1/1953	6/1983	26	0.1893	0.2561	0.2070	0.36
12-4364	JASONVILLE 1 E	IN	17	-87.1833	39.1667	615	7/1948	4/1997	41	0.1833	0.2402	0.1375	0.33
12-4372	JASPER	IN	18	-86.9408	38.3861	460	7/1948	12/2000	51	0.1942	0.1508	0.1760	0.36
12-4407	JOHNSON EXPERIMENT FAR	IN	18	-87.7500	38.2667	440	11/1949	3/1980	30	0.1667	0.2931	0.2957	2.39
12-4497	KENDALLVILLE	IN	16	-85.2614	41.4428	975	7/1948	12/2000	45	0.2082	0.0501	0.0797	1.63
12-4527	KENTLAND	IN	18	-87.4353	40.7592	695	4/1973	12/2000	27	0.2127	0.2486	0.1174	1.06
12-4730	LAGRANGE SEWAGE PLANT	IN	16	-85.4142	41.6508	895	7/1948	12/2000	50	0.1734	0.1274	0.1656	1.01
12-4782	LAKEVILLE	IN	16	-86.2692	41.5269	841	7/1948	12/2000	53	0.1893	0.1620	0.1179	0.23
12-4837	LA PORTE	IN	16	-86.7297	41.6117	845	4/1978	12/2000	22	0.2256	0.1419	0.0217	2.16
12-4900	LEAVENWORTH DAM 44	IN	18	-86.3333	38.1833	420	7/1948	1/1973	23	0.1691	0.2825	0.2061	1.34
12-4908	LEBANON WATERWORKS	IN	17	-86.4750	40.0517	950	7/1948	12/2000	53	0.1943	0.1248	0.1300	1.16
12-4973	LEWISVILLE	IN	18	-85.3483	39.8061	1065	7/1948	12/2000	50	0.1861	0.2599	0.2891	1.59

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12-5337	MARION 2 N	IN	18	-85.6586	40.5800	790	6/1953	12/2000	46	0.1932	0.1046	0.0167	1.74
12-5407	MARTINSVILLE 2 SW	IN	17	-86.4517	39.4042	610	6/1962	12/2000	35	0.1500	0.1185	0.0753	1.11
12-5535	MEDARYVILLE STATE NURS	IN	18	-86.9014	41.1589	695	7/1948	12/2000	47	0.1984	0.2470	0.0901	1.38
12-6056	NASHVILLE	IN	17	-86.2294	39.2400	685	7/1948	6/1983	29	0.2530	0.3123	0.2059	1.34
12-6151	NEWBURGH LOCK & DAM	IN	18	-87.3744	37.9325	380	12/1961	12/2000	34	0.1988	0.1018	0.1073	0.73
12-6304	NEW WHITELAND	IN	17	-86.1000	39.5500	785	7/1971	10/1997	25	0.2244	0.3208	0.2261	0.76
12-6580	BEDFORD	IN	17	-86.5519	38.8894	650	7/1948	12/2000	53	0.1485	0.1630	0.1395	1.15
12-6697	PALMYRA	IN	18	-86.1106	38.4075	770	7/1948	12/2000	50	0.1848	0.1985	0.2005	0.20
12-6864	PERU WATERWORKS	IN	18	-86.0717	40.7453	645	7/1948	12/2000	51	0.1864	0.1316	0.1108	0.21
12-7125	PRINCETON 1 W	IN	18	-87.5906	38.3567	480	1/1971	12/2000	24	0.1284	0.1191	0.1054	3.22
12-7298	RENSSELAER	IN	18	-87.1564	40.9356	650	7/1948	12/2000	43	0.1873	0.1884	0.1509	0.01
12-7370	RICHMOND WTRWRKS 2 NNE	IN	18	-84.8833	39.8833	1015	7/1948	12/2000	51	0.1853	0.1528	0.1320	0.06
12-7482	ROCHESTER	IN	16	-86.2094	41.0658	770	10/1948	12/2000	48	0.2203	0.2509	0.2344	0.67
12-7601	ROYAL CENTER	IN	18	-86.5089	40.8628	720	7/1948	12/2000	47	0.1818	0.0538	0.2053	2.61
12-7783	SANDBORN	IN	18	-87.1833	38.8833	460	11/1949	3/1985	32	0.1725	0.2004	0.2721	1.60
12-7930	SEYMOUR HIGHWAY GARAGE	IN	17	-85.8608	38.9617	595	7/1948	12/2000	50	0.1857	0.1940	0.1908	0.41
12-7991	SHELBY	IN	18	-87.3425	41.1828	640	7/1948	6/1992	44	0.1988	0.1659	0.0907	0.51
12-7999	SHELBYVILLE	IN	17	-85.7917	39.5283	750	1/1971	12/2000	27	0.2236	0.2478	0.1192	0.56
12-8036	SHOALS HIWAY 50 BRIDGE	IN	18	-86.7978	38.6728	550	7/1948	12/2000	53	0.1996	0.2042	0.1633	0.13
12-8187	SOUTH BEND WSO AIRPORT	IN	16	-86.3331	41.7072	773	7/1948	12/2000	53	0.1773	0.0994	0.0172	1.93
12-8352	SPURGEON 2 N	IN	18	-87.2500	38.2500	500	7/1948	11/1994	46	0.1958	0.0790	0.1576	1.38
12-8784	TIPTON 5 SW	IN	17	-86.1086	40.2233	895	7/1948	12/2000	50	0.2300	0.1923	0.1019	1.08
12-8967	UNIONTOWN LOCK & DAM	IN	18	-87.9931	37.7953	340	8/1948	12/2000	45	0.2106	0.2607	0.2553	1.29
12-8999	VALPARAISO WATER WORKS	IN	18	-87.0378	41.5114	800	7/1948	12/2000	50	0.2121	0.2077	0.1095	0.80
12-9069	VERSAILLES WATERWORKS	IN	18	-85.2453	39.0717	939	7/1948	12/2000	52	0.1830	0.1850	0.0967	0.52
12-9174	WALDRON 2 W	IN	17	-85.6964	39.4539	825	12/1950	12/2000	47	0.1876	0.1739	0.1105	0.16
12-9300	WAVELAND 2 NE	IN	17	-87.0372	39.8778	781	7/1948	12/2000	47	0.1746	0.1759	0.1503	0.36
12-9430	WEST LAFAYETTE 6 NW	IN	18	-86.9919	40.4750	715	8/1953	12/2000	45	0.1672	0.1770	0.1754	0.39
13-0608	BELLEVUE LOCK & DAM 12	IA	21	-90.4233	42.2614	603	8/1948	12/2000	50	0.1554	0.1766	0.1646	1.36
13-1060	BURLINGTON RADIO KBUR	IA	22	-91.1667	40.8167	703	8/1948	12/2000	49	0.1357	0.1037	0.1289	1.62
13-1257	CASCADE	IA	21	-91.0131	42.2975	850	8/1948	12/2000	50	0.1931	0.2440	0.1744	0.38
13-1363	CENTRAL CITY	IA	20	-91.5286	42.2011	870	12/1955	12/2000	37	0.1836	0.1727	0.1698	0.33

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
13-2367	DUBUQUE WSO AP	IA	21	-90.7036	42.3978	1056	2/1951	12/2000	49	0.2066	0.2255	0.1777	0.03
13-4101	IOWA CITY 1 S	IA	21	-91.5328	41.6489	640	8/1948	12/2000	50	0.1760	0.2680	0.2794	1.20
13-4111	IOWA CITY RALSTON CREE	IA	21	-91.5000	41.6667	-999	8/1948	12/1974	26	0.1925	0.2241	0.1001	1.17
13-4116	IOWA CITY RALSTON CREE	IA	21	-91.4667	41.6833	-999	8/1948	12/1982	32	0.2151	0.2920	0.2254	0.44
13-4131	IOWA CITY RALSTON CREE	IA	21	-91.5167	41.6833	-999	8/1948	12/1982	34	0.2005	0.1933	0.1408	0.19
13-4381	KEOKUK	IA	22	-91.3767	40.3969	527	8/1948	12/2000	50	0.1696	0.1212	0.1431	0.24
13-4963	LOWDEN	IA	21	-90.9300	41.8564	715	6/1962	12/2000	36	0.2069	0.2085	0.1578	0.08
13-5315	MCGREGOR	IA	20	-91.1747	43.0239	627	10/1951	12/2000	48	0.1845	0.1494	0.1261	0.21
13-5732	MORSE	IA	21	-91.4333	41.7500	751	8/1948	2/1979	30	0.2218	0.2149	0.2331	0.42
13-5737	MORSE 1 NE	IA	21	-91.4167	41.7500	771	8/1948	3/1979	29	0.2843	0.2610	0.2047	3.07
13-5796	MOUNT PLEASANT 1 SSW	IA	22	-91.5647	40.9486	730	1/1948	12/2000	51	0.1690	0.1511	0.0916	0.61
13-6076	NORTH ENGLISH	IA	21	-92.0667	41.5167	797	8/1948	12/2000	45	0.1782	0.2315	0.3073	1.50
13-6186	OASIS 1 NW	IA	21	-91.4000	41.7167	810	8/1948	3/1979	29	0.2189	0.1411	0.0570	1.41
13-7855	SPILLVILLE	IA	20	-91.9536	43.2053	1080	8/1948	12/2000	51	0.1823	0.1032	0.2352	1.99
13-8009	STRAWBERRY POINT	IA	20	-91.5353	42.6842	1200	8/1948	12/2000	51	0.1949	0.0856	0.1289	0.81
13-8315	TRAER	IA	20	-92.4706	42.1853	950	8/1948	12/2000	51	0.2131	0.2201	0.1163	0.67
13-8688	WASHINGTON	IA	22	-91.7069	41.2828	690	8/1948	12/2000	50	0.1968	0.2388	0.2005	0.28
13-8706	WATERLOO WSO AP	IA	20	-92.4011	42.5544	868	5/1956	12/2000	45	0.2495	0.2233	0.0694	1.93
15-0381	BARBOURVILLE WATER WOR	KY	14	-83.8819	36.8825	990	8/1948	12/2000	47	0.1765	0.3651	0.3475	2.46
15-0450	HARLAN	KY	14	-83.3303	36.8583	1164	8/1948	12/2000	50	0.1899	0.2927	0.1974	0.20
15-0611	BENTON	KY	23	-88.3364	36.8581	365	8/1948	12/2000	49	0.1858	0.1291	0.1257	0.40
15-1080	BUCKHORN	KY	14	-83.3833	37.3500	936	8/1960	12/2000	39	0.1967	0.2424	0.0772	1.07
15-1120	BURDINE 2 NE	KY	14	-82.5833	37.2167	1560	5/1952	12/2000	42	0.2203	0.2304	0.1719	0.69
15-1227	RUMSEY LOCK 2	KY	13	-87.2667	37.5317	402	8/1948	12/2000	48	0.1839	0.2271	0.1513	0.51
15-1345	CARROLLTON LOCK 1	KY	18	-85.1456	38.6583	450	8/1948	12/2000	45	0.1870	0.1113	0.1158	0.33
15-1631	CLINTON 4 S	KY	23	-88.9608	36.6267	350	8/1948	12/2000	49	0.1885	0.2184	0.1534	0.39
15-1855	COVINGTON WSO AIRPORT	KY	18	-84.6717	39.0431	869	4/1949	12/2000	52	0.1750	0.2081	0.1383	0.42
15-1932	GREENVILLE 13 SW	KY	13	-87.3500	37.0833	761	8/1948	3/1978	20	0.1992	0.1921	0.1625	0.48
15-1980	DYER	KY	13	-86.2214	37.7056	780	8/1948	12/2000	49	0.1857	0.2034	0.1862	0.09
15-2053	DAVELLA	KY	12	-82.6000	37.7833	725	8/1948	12/2000	47	0.1891	0.1288	0.1112	0.16
15-2358	DUNDEE	KY	13	-86.7769	37.5806	450	8/1948	12/2000	51	0.1405	0.1621	0.1275	1.08
15-2469	EDMONTON 3 W	KY	13	-85.6500	36.9833	780	8/1948	7/1977	29	0.1876	0.1464	0.2352	1.66

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
15-2908	FLEMINGSBURG 2	KY	12	-83.7500	38.4167	879	8/1948	12/1978	30	0.1511	0.1863	0.1601	1.33
15-2961	FORDS FERRY DAM 5O	KY	13	-88.1000	37.4667	361	8/1948	12/1980	32	0.1655	0.1507	0.1593	0.30
15-2979	FORDSVILLE	KY	13	-86.7206	37.6372	480	5/1971	12/2000	29	0.1673	0.1832	0.1109	0.40
15-3203	GEST LOCK 3	KY	18	-84.8819	38.4169	490	8/1948	12/2000	50	0.2126	0.1026	0.1278	1.49
15-3709	HAZARD	KY	14	-83.2000	37.2500	869	8/1948	10/1984	36	0.1821	0.2738	0.2354	0.30
15-3741	HEIDELBERG	KY	14	-83.7667	37.5500	665	8/1948	12/2000	51	0.1923	0.1829	0.1751	0.30
15-3798	HERNDON 3 SW	KY	13	-87.5589	36.6703	560	8/1948	12/2000	46	0.1613	0.1503	0.0812	0.68
15-3929	HODGENVILLE-LINCOLN NP	KY	13	-85.7350	37.5317	788	8/1948	12/2000	51	0.1647	0.1557	0.1351	0.20
15-4202	JACKSON WSO	KY	14	-83.3144	37.5914	1365	2/1981	12/2000	20	0.1736	0.2121	0.0490	1.54
15-4746	LEXINGTON WSO AIRPORT	KY	13	-84.6058	38.0408	980	8/1948	12/2000	52	0.1603	0.1540	0.1104	0.38
15-4755	LIBERTY	KY	13	-84.9328	37.2508	870	8/1948	5/1998	46	0.1846	0.1605	0.1463	0.19
15-4825	LITTLE HICKMAN LOCK 8	KY	13	-84.5833	37.7500	522	8/1948	12/1981	31	0.1845	0.0819	0.1642	2.36
15-4882	LOGLICK 1 S	KY	13	-84.0333	37.8500	771	8/1948	10/1973	25	0.1576	0.2457	0.2215	0.92
15-4893	LONDON 5 SSE	KY	14	-84.0833	37.1475	1282	8/1948	12/2000	42	0.2429	0.1405	0.1362	3.13
15-4948	LOUISA 5 W	KY	12	-82.6947	38.1250	753	8/1948	12/2000	50	0.1788	0.2413	0.1253	0.96
15-4954	LOUISVILLE WSO AIRPORT	KY	13	-85.7297	38.1772	481	8/1948	12/2000	52	0.1697	0.1881	0.1870	0.11
15-4955	LOUISVILLE UPPER GAGE	KY	18	-85.8000	38.2833	440	8/1948	12/2000	48	0.1914	0.1161	0.0425	1.14
15-5002	LUCAS	KY	13	-86.0333	36.8833	741	8/1948	12/1976	28	0.2120	0.2457	0.1369	2.26
15-5067	MADISONVILLE	KY	13	-87.5244	37.3467	440	3/1949	12/2000	51	0.1853	0.2298	0.2268	0.33
15-5243	MAYSVILLE SEWAGE PLANT	KY	18	-83.7872	38.6869	515	8/1948	12/2000	35	0.1862	0.2876	0.1966	0.79
15-5301	MC KINNEYSBURG	KY	18	-84.2667	38.6000	659	8/1948	1/1974	24	0.1538	0.2233	0.2071	1.48
15-5370	META 4 SE	KY	12	-82.3833	37.5333	880	10/1958	11/1998	37	0.2170	0.1177	0.0191	1.56
15-5389	MIDDLESBORO	KY	14	-83.7333	36.6333	1180	8/1948	5/1998	45	0.1896	0.2496	0.2558	0.60
15-5430	MILLERSBURG	KY	18	-84.1333	38.3000	840	8/1948	2/1985	29	0.1851	0.1841	0.1832	0.09
15-5555	MOREHEAD 3 NW	KY	12	-83.4833	38.2167	830	8/1948	12/2000	47	0.1874	0.2140	0.1501	0.19
15-5684	MUNFORDVILLE 7 NW	KY	13	-85.9503	37.3347	680	9/1948	12/2000	45	0.2097	0.2011	0.1625	1.03
15-6012	OLIVE HILL	KY	12	-83.1036	38.3422	891	8/1948	12/2000	40	0.1819	0.1208	0.1069	0.28
15-6091	OWENSBORO 3 W	KY	13	-87.1500	37.7667	405	8/1948	7/1999	44	0.2023	0.2665	0.2894	1.50
15-6117	PADUCAH SEWAGE PLANT	KY	23	-88.5500	37.0500	340	8/1948	1/1996	43	0.1695	0.1922	0.1216	0.23
15-6170	PARIS	KY	18	-84.2392	38.2047	810	11/1971	12/2000	26	0.1791	0.0619	0.0579	1.06
15-6357	PIKEVILLE 2	KY	14	-82.5167	37.4833	686	8/1948	10/1978	28	0.1810	0.1142	0.0505	1.27
15-6580	PRINCETON EXP STN	KY	13	-87.8672	37.1244	497	1/1971	12/2000	25	0.1733	0.1031	0.0410	1.42

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
15-7074	SADIEVILLE WATER WORKS	KY	18	-84.6836	38.4078	945	8/1948	12/2000	47	0.2368	0.2417	0.1734	2.10
15-7096	ST MARY 2 SE	KY	13	-85.3500	37.5833	743	4/1949	12/2000	37	0.1938	0.2030	0.2355	0.62
15-7129	SALYERSVILLE 1 W	KY	14	-83.0833	37.7500	910	8/1948	5/1994	42	0.2251	0.3632	0.1399	2.11
15-7215	SCOTTSVILLE	KY	13	-86.2172	36.7222	850	9/1959	12/2000	38	0.1749	0.1387	0.1049	0.39
15-7473	SMITHFIELD 4 S	KY	18	-85.2861	38.3333	850	8/1948	12/2000	50	0.1670	0.1133	0.0566	1.17
15-7508	SOMERSET 2 NE	KY	13	-84.6000	37.1167	955	8/1948	12/2000	50	0.1440	0.1176	0.1832	2.10
15-7677	STEARNS 2 S	KY	14	-84.4833	36.6667	1220	8/1948	12/2000	42	0.2080	0.1798	0.1342	0.60
15-7946	TAYLORSVILLE NO 2	KY	13	-85.3500	38.0333	500	1/1971	12/2000	29	0.2187	0.2212	0.2097	1.52
15-8060	TOMPKINSVILLE	KY	13	-85.6667	36.7833	991	8/1948	8/1977	25	0.1953	0.1277	0.1959	1.57
15-8482	WAYLAND 1 S	KY	14	-82.8000	37.4167	892	4/1957	2/1984	24	0.2248	0.2392	0.0894	1.46
15-8719	WILLISBURG 4 N	KY	13	-85.1131	37.8014	870	10/1968	12/2000	31	0.2038	0.2128	0.2116	0.68
15-8807	WOLF CREEK DAM	KY	13	-85.1500	36.8667	591	8/1948	1/1971	22	0.1557	0.3090	0.3659	4.44
15-8824	WOODBURY	KY	13	-86.6353	37.1842	465	8/1948	12/2000	52	0.1823	0.2046	0.1732	0.06
18-0015	ABERDEEN PHILLIPS FLD	MD	1	-76.1697	39.4717	57	5/1948	12/2000	21	0.2145	0.1051	0.2014	0.78
18-0465	BALTIMORE WSO ARPT	MD	1	-76.6839	39.1722	148	8/1948	12/2000	53	0.2018	0.0339	0.1077	1.05
18-0470	BALTIMORE WSO CITY	MD	1	-76.6167	39.2833	14	5/1948	6/1999	46	0.2164	0.2567	0.2072	0.65
18-0700	BELTSVILLE	MD	1	-76.9314	39.0303	145	5/1948	12/2000	52	0.2247	0.2435	0.1264	0.94
18-0705	BELTSVILLE PLANT STN 5	MD	1	-76.9500	39.0167	98	1/1949	9/1978	30	0.2046	0.0749	0.1021	0.53
18-1530	CATOCTIN MOUNTAIN PARK	MD	7	-77.4831	39.6453	1610	1/1971	7/1994	22	0.1907	0.2595	0.2318	0.69
18-1995	COLLEGE PARK	MD	1	-76.9500	38.9833	90	2/1954	3/1996	38	0.1668	0.2501	0.3104	3.06
18-3795	GRANTSVILLE	MD	7	-79.1500	39.7000	2382	9/1948	9/1971	23	0.1862	0.1496	0.2188	0.62
18-4030	HANCOCK	MD	7	-78.1775	39.6969	384	2/1955	4/1997	37	0.2199	0.1412	0.1184	0.73
18-5201	LEONARDTOWN 3 NW	MD	1	-76.6667	38.3167	112	5/1948	3/1976	26	0.1987	0.0321	-0.0171	1.80
18-6408	NEW GERMANY	MD	7	-79.1167	39.6333	2592	5/1949	8/1974	24	0.1988	0.1112	0.1540	0.47
18-6844	PARKTON 2 SW	MD	3	-76.7000	39.6333	600	11/1953	4/1987	33	0.1897	0.1723	0.1612	0.03
18-6980	PERRY POINT	MD	1	-76.0667	39.5500	39	3/1954	5/1979	23	0.1985	0.1161	0.1779	0.17
18-8065	SAVAGE RIVER DAM	MD	7	-79.1400	39.5103	1495	5/1949	12/2000	49	0.1990	0.2156	0.1099	0.34
18-8315	SINES DEEP CREEK	MD	7	-79.4117	39.5242	2040	9/1948	10/1985	36	0.2313	0.2766	0.1263	0.81
18-9030	UNIONVILLE	MD	3	-77.1833	39.4500	430	5/1948	11/1996	45	0.1821	0.0867	0.1177	0.43
20-0128	ALLEGAN 5 NE	MI	16	-85.7894	42.5797	750	7/1948	12/2000	44	0.2099	0.1410	0.2097	1.40
20-0230	ANN ARBOR UNIV OF MICH	MI	16	-83.7108	42.2947	900	7/1948	12/2000	51	0.2328	0.2672	0.1479	1.08
20-0735	BERRIEN SPRINGS 5 W	MI	16	-86.4369	41.9647	750	7/1948	11/1996	49	0.2182	0.2438	0.2802	1.65

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20-1133	BURNSIDE 1 E	MI	16	-83.0500	43.2000	781	7/1948	2/1971	23	0.2192	0.2589	0.2547	0.95
20-1680	COLDWATER WATER WORKS	MI	16	-85.0183	41.9400	950	1/1948	12/2000	46	0.2267	0.2511	0.1911	0.50
20-1704	COLOMA 3 NNW	MI	16	-86.3167	42.2333	700	7/1948	9/1999	44	0.1724	0.0272	0.0489	2.07
20-2102	DETROIT CITY AIRPORT	MI	11	-83.0081	42.4072	625	7/1948	11/2000	45	0.1754	0.1910	0.1149	1.67
20-2103	DETROIT METRO WSO AP	MI	11	-83.3308	42.2314	631	10/1959	12/2000	41	0.1957	0.1198	0.1357	0.53
20-2395	EAST LANSING 4 S	MI	16	-84.4850	42.6742	880	8/1954	12/2000	41	0.2426	0.1693	0.1036	1.54
20-2846	FLINT WSO AP	MI	16	-83.7494	42.9667	770	1/1958	12/2000	41	0.2047	0.1905	0.1313	0.07
20-3295	GRAND HAVEN WASTEWTR P	MI	16	-86.2047	43.0608	605	7/1948	12/2000	47	0.2033	0.2337	0.1550	0.19
20-3333	GRAND RAPIDS WSO ARPT	MI	16	-85.5239	42.8825	803	11/1963	12/2000	37	0.1870	0.2634	0.1303	1.36
20-3947	HOWELL WWTP	MI	16	-83.9322	42.5936	917	4/1961	12/2000	38	0.1951	0.1211	0.1207	0.37
20-4155	JACKSON 4 N	MI	16	-84.4167	42.2833	950	7/1948	12/2000	50	0.1778	0.0714	0.1366	1.52
20-4239	KALAMAZOO	MI	16	-85.6167	42.3000	900	7/1948	12/1986	38	0.2097	0.2712	0.1591	0.62
20-4320	KENT CITY 2 SW	MI	16	-85.7717	43.1994	840	7/1948	12/2000	48	0.2200	0.1877	0.1764	0.37
20-4641	LANSING WSO AIRPORT	MI	16	-84.5789	42.7803	841	7/1948	12/2000	48	0.1806	0.2612	0.2141	0.90
20-5567	MONTAGUE 4 NW	MI	16	-86.4175	43.4614	650	7/1948	12/2000	50	0.2313	0.2423	0.2075	0.74
20-5712	MUSKEGON WSO AIRPORT	MI	16	-86.2367	43.1711	625	7/1948	12/2000	53	0.1795	0.1367	0.1142	0.51
20-6300	OWOSSO 3 NNW	MI	16	-84.1800	43.0161	730	9/1955	12/2000	35	0.2169	0.2875	0.1922	0.62
20-7828	STANTON	MI	16	-85.0922	43.2908	930	6/1956	12/2000	39	0.2156	0.0881	0.1306	1.36
20-8443	VASSAR	MI	16	-83.5828	43.3656	630	1/1959	12/2000	41	0.2095	0.0468	0.1126	2.03
20-9218	YPSILANTI	MI	16	-83.6253	42.2475	780	1/1948	12/2000	27	0.2264	0.2206	0.1076	0.91
22-0021	ABERDEEN	MS	24	-88.5214	33.8297	198	8/1951	12/2000	48	0.1658	0.2472	0.1313	0.20
22-0237	ARKABUTLA DAM	MS	23	-90.1336	34.7497	240	10/1947	12/2000	52	0.1543	0.1848	0.2155	0.54
22-0955	BOONEVILLE	MS	24	-88.5700	34.6686	490	2/1961	12/2000	39	0.1756	0.1380	0.2060	1.98
22-1262	BYHALIA	MS	23	-89.6833	34.8667	320	1/1948	7/1996	46	0.1648	0.0592	0.0662	1.14
22-1314	CALHOUN CITY 2 NW	MS	23	-89.3158	33.8586	255	10/1947	12/2000	53	0.1591	0.1133	0.1064	0.39
22-1707	CLARKSDALE	MS	23	-90.5572	34.1864	173	6/1951	12/2000	46	0.1968	0.2202	0.1709	0.75
22-1743	CLEVELAND 3 N	MS	23	-90.7167	33.8000	140	6/1951	12/2000	48	0.1710	0.0755	0.0828	0.78
22-1962	CORINTH CITY	MS	24	-88.5228	34.9175	385	6/1949	12/2000	48	0.1638	0.2533	0.1204	0.37
22-2773	ENID DAM	MS	23	-89.9167	34.1500	300	6/1948	12/2000	50	0.1486	0.0857	0.0915	0.92
22-2896	EUPORA 2 E	MS	23	-89.2356	33.5625	440	4/1951	12/2000	45	0.1942	0.2647	0.1019	1.42
22-3614	GREENWOOD 2	MS	23	-90.1758	33.5222	134	5/1952	12/2000	49	0.1622	0.1258	0.0963	0.44
22-3650	GRENADA DAM	MS	23	-89.7711	33.8056	280	2/1954	12/2000	46	0.1508	0.0464	0.0748	1.34

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
22-4001	HICKORY FLAT	MS	24	-89.1825	34.6261	400	6/1948	12/2000	52	0.1621	0.1982	0.0384	1.29
22-4173	HOLLY SPRINGS 4 N	MS	23	-89.4347	34.8219	483	10/1947	12/2000	53	0.1485	0.2490	0.1624	0.98
22-4265	HOUSTON	MS	24	-89.0081	33.9278	273	6/1948	12/2000	48	0.1764	0.3301	0.2484	0.82
22-5062	LEXINGTON 2 NNW	MS	23	-90.0667	33.1333	315	6/1948	12/2000	52	0.1667	0.2541	0.2241	0.76
22-5247	LOUISVILLE	MS	23	-89.0711	33.1353	581	6/1965	12/2000	36	0.1841	0.1739	0.2100	0.80
22-5361	MACON 2 E	MS	23	-88.5583	33.1542	252	6/1948	12/2000	50	0.1841	0.1631	0.1540	0.23
22-6400	NOXAPATER 1 N	MS	23	-89.0631	33.0042	440	6/1980	12/2000	21	0.1763	0.2301	0.1798	0.27
22-7467	RIPLEY	MS	24	-88.9486	34.7356	520	6/1948	12/2000	53	0.1628	0.2956	0.2467	1.52
22-7815	SARDIS DAM	MS	23	-89.7903	34.3961	230	10/1947	12/2000	53	0.1446	0.1315	0.1784	0.53
22-7820	SAREPTA 1 NNE	MS	23	-89.3000	34.1167	365	10/1947	12/2000	52	0.1812	0.1777	0.1565	0.14
22-8374	STATE UNIVERSITY	MS	23	-88.7833	33.4667	185	6/1948	12/2000	52	0.1714	0.2356	0.2206	0.62
22-8445	STONEVILLE EXP STN	MS	23	-90.9244	33.4475	127	6/1948	12/2000	53	0.1378	0.1779	0.2059	0.95
22-9003	TUPELO WSO ARPT	MS	24	-88.7697	34.2667	361	6/1948	12/2000	53	0.1824	0.2058	0.1609	1.11
22-9079	UNIVERSITY	MS	23	-89.5358	34.3803	380	6/1948	12/2000	52	0.1582	0.2681	0.1674	0.85
23-0022	ADVANCE 1 S	MO	22	-89.9058	37.0956	360	8/1948	12/2000	43	0.1868	0.2465	0.1032	0.78
23-0127	ALTON	MO	22	-91.3044	36.6300	810	8/1948	7/1982	33	0.1462	-0.0663	0.0512	3.06
23-0539	BELLEVIEW	MO	22	-90.7800	37.6900	1085	8/1948	10/1999	49	0.2148	0.2834	0.2228	0.98
23-1283	CAP AU GRIS L & D 25	MO	22	-90.6886	39.0031	450	8/1948	12/2000	44	0.2243	0.1722	0.1814	1.11
23-1640	CLARKSVILLE L & D 24	MO	22	-90.9053	39.3731	460	8/1948	12/2000	45	0.1689	0.2221	0.1613	0.36
23-1674	CLEARWATER DAM	MO	22	-90.7853	37.1289	660	8/1948	12/2000	40	0.1971	-0.0059	0.0918	1.72
23-1790	COLUMBIA WB AP	MO	22	-92.3667	38.9667	778	9/1948	9/1969	21	0.1657	-0.1577	0.2850	9.83
23-1791	COLUMBIA WSO AP	MO	22	-92.2183	38.8169	893	10/1969	12/2000	31	0.1648	0.1979	0.1808	0.36
23-2302	DORA	MO	22	-92.2328	36.7797	990	8/1948	12/2000	41	0.1709	0.0799	0.1217	0.46
23-2318	DOWNING	MO	22	-92.3636	40.4822	870	8/1948	12/2000	34	0.2135	0.2691	0.1107	1.09
23-2547	ELLINGTON	MO	22	-90.9700	37.2333	730	8/1948	11/1988	30	0.1895	0.2671	0.2449	0.78
23-2809	FARMINGTON	MO	22	-90.4086	37.7939	900	8/1948	12/2000	41	0.1554	0.1805	0.1190	0.86
23-3079	FULTON	MO	22	-91.9300	38.8581	870	8/1948	12/2000	51	0.1835	0.1700	0.1194	0.15
23-3601	HANNIBAL WATER WORKS	MO	22	-91.3719	39.7233	712	4/1950	12/2000	48	0.2313	0.2184	0.0960	1.63
23-3835	HIGBEE 4 S	MO	22	-92.5067	39.2414	845	5/1949	12/1987	34	0.1668	0.3286	0.3422	3.58
23-3999	HORNERSVILLE	MO	23	-90.1114	36.0436	250	8/1948	12/2000	44	0.1625	0.1146	0.1239	0.21
23-4271	JEFFERSON CITY WATER P	MO	22	-92.1833	38.5833	670	12/1948	12/2000	50	0.1421	0.2411	0.2259	1.83
23-4273	JEFFERSON BARRACKS 2 S	MO	22	-90.2800	38.5039	490	4/1959	12/2000	33	0.1797	0.2019	0.1275	0.22

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
23-4301	JEWETT 7 E	MO	22	-90.3631	37.3656	620	9/1955	12/1996	38	0.1993	0.2720	0.2659	1.22
23-5130	LURAY	MO	22	-91.8781	40.4892	740	1/1961	12/2000	33	0.2153	0.1983	0.2025	0.77
23-5207	MALDEN MUNICIPAL AP	MO	22	-89.9894	36.5994	290	2/1954	12/2000	35	0.2019	0.1427	0.2086	0.75
23-5415	MC CREDIE EXPERIMENT S	MO	22	-91.9000	38.9500	850	8/1948	12/2000	50	0.2077	0.2184	0.1056	0.65
23-5565	MIDDLETOWN 5 ENE	MO	22	-91.3333	39.1500	761	8/1948	9/1972	24	0.2027	0.2163	0.1610	0.19
23-5834	MOUNTAIN GROVE 2 N	MO	22	-92.2636	37.1528	1450	8/1948	12/2000	51	0.1686	0.0366	0.0981	0.92
23-6438	OWENSVILLE	MO	22	-91.5000	38.3500	942	8/1948	10/1978	28	0.1869	0.3078	0.2317	0.89
23-6633	PERRY 1 E	MO	22	-91.6667	39.4333	710	8/1948	8/1982	29	0.2162	0.0722	0.1106	1.33
23-6826	POTOSI 3 N	MO	22	-90.8600	37.8908	1030	8/1948	12/2000	42	0.2133	0.2164	0.2077	0.70
23-7122	RICHWOODS	MO	22	-90.8333	38.1500	807	8/1948	4/1982	31	0.2095	0.0934	0.1097	0.85
23-7214	ROBY	MO	22	-92.1333	37.5000	1401	9/1955	9/1978	23	0.1781	0.1293	0.1366	0.12
23-7263	ROLLA UNI OF MISSOURI	MO	22	-91.7758	37.9572	1167	1/1948	12/2000	52	0.1825	0.1643	0.1509	0.01
23-7265	ROLLA 3 W	MO	22	-91.8333	37.9500	869	8/1948	12/1976	28	0.1960	0.3375	0.2537	1.37
23-7424	ST JAMES 3 NW	MO	22	-91.6667	38.0167	991	8/1948	2/1977	28	0.1779	0.1862	0.1485	0.07
23-7455	ST LOUIS WSCMO AIRPORT	MO	22	-90.3736	38.7525	531	8/1948	12/2000	52	0.1414	0.1186	0.1306	1.27
23-7506	SALEM	MO	22	-91.5358	37.6336	1200	8/1948	12/2000	44	0.1682	0.1293	0.1155	0.35
23-8043	STEELVILLE 2 N	MO	22	-91.3706	38.0053	700	8/1948	12/2000	44	0.1536	0.1053	0.1466	0.72
23-8051	STEFFENVILLE	MO	22	-91.8872	39.9714	690	8/1948	12/2000	50	0.1591	0.2049	0.1884	0.59
23-8171	SULLIVAN 3 SE	MO	22	-91.1528	38.2147	940	8/1948	6/1997	37	0.1982	0.1006	0.1955	0.88
23-8498	TYRONE 2 NNW	MO	22	-91.8833	37.2333	1322	9/1949	1/1977	27	0.1615	0.1675	0.1617	0.37
23-8609	VIBURNUM	MO	22	-91.1328	37.7119	1276	5/1971	12/2000	21	0.2079	0.1300	0.0001	2.58
23-8620	VIENNA 2 WNW	MO	22	-91.9811	38.2017	770	11/1948	12/2000	47	0.2020	0.2660	0.0811	1.41
23-8700	WAPPAPELLO DAM	MO	22	-90.2836	36.9231	410	8/1948	12/2000	45	0.1931	0.2352	0.1553	0.17
23-8746	WASHINGTON	MO	22	-90.9719	38.5425	490	8/1948	12/2000	40	0.2156	0.1710	0.0773	1.11
23-8827	WENTZVILLE	MO	22	-90.8561	38.8128	580	1/1971	12/2000	21	0.1631	0.2759	0.0848	2.18
23-8880	WEST PLAINS	MO	22	-91.8347	36.7425	1010	8/1948	12/2000	52	0.1648	0.2075	0.2198	0.65
28-0311	ATLANTIC CITY WSO AP	NJ	1	-74.5672	39.4494	60	8/1958	12/2000	43	0.2389	0.2702	0.1428	1.73
28-1351	CAPE MAY 3 W	NJ	1	-74.9358	38.9536	20	5/1948	12/2000	51	0.2078	0.2101	0.0718	0.87
28-1512	CENTERTON	NJ	1	-75.1667	39.5167	79	11/1949	10/1972	20	0.1994	0.1440	0.0341	0.83
28-1582	CHARLOTTEBURG	NJ	3	-74.4233	41.0347	760	5/1948	12/2000	26	0.1829	0.2614	0.2113	0.61
28-1754	CLINTON 2 N	NJ	3	-74.9167	40.6667	350	8/1970	12/2000	26	0.2089	0.1600	-0.0421	2.65
28-2768	ESSEX FELLS SEWAGE PLA	NJ	3	-74.2858	40.8314	350	7/1949	12/2000	46	0.2052	0.2426	0.1272	0.44

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
28-3181	FREEHOLD	NJ	1	-74.2511	40.3142	194	5/1948	10/1988	36	0.2121	0.2160	0.0994	0.64
28-3291	GLASSBORO	NJ	1	-75.0953	39.7358	100	5/1948	9/1998	50	0.2026	0.1492	0.0874	0.27
28-4887	LITTLE FALLS WATER CO	NJ	3	-74.2261	40.8858	150	5/1948	12/2000	40	0.1680	0.2204	0.1511	0.70
28-5244	MARLBORO SCS	NJ	1	-74.2333	40.3333	121	5/1948	12/1967	20	0.2146	0.1139	0.1474	0.42
28-5576	MILLVILLE	NJ	1	-75.0500	39.4000	69	5/1948	12/1967	20	0.2251	0.2054	0.3134	1.65
28-5866	MOUNT HOLLY	NJ	1	-74.8000	39.9833	10	5/1948	12/2000	45	0.1688	0.0855	0.1512	1.07
28-6026	NEWARK WSO AIRPORT	NJ	3	-74.1694	40.7158	7	5/1948	12/2000	53	0.1865	0.2306	0.1322	0.39
28-6055	NEW BRUNSWICK 3 SE	NJ	3	-74.4364	40.4719	86	8/1964	12/2000	36	0.1992	0.0512	0.0911	0.76
28-6146	NEW MILFORD	NJ	3	-74.0156	40.9611	12	5/1948	8/1979	32	0.2040	0.1368	0.1543	0.19
28-7393	RAHWAY	NJ	3	-74.2569	40.6006	20	5/1948	12/2000	46	0.1775	0.1841	0.1593	0.20
28-8423	SPRINGFIELD	NJ	3	-74.3364	40.6964	90	5/1948	12/2000	47	0.2281	0.2319	0.1577	0.88
28-8880	TRENTON STATE COLLEGE	NJ	1	-74.7833	40.2667	100	5/1948	12/2000	50	0.2112	0.2112	0.2032	0.23
28-9187	WANAQUE RAYMOND DAM	NJ	3	-74.2933	41.0444	245	5/1948	12/2000	41	0.1819	0.2418	0.1684	0.41
28-9271	WATCHUNG	NJ	3	-74.4164	40.6622	260	6/1948	12/2000	47	0.1792	0.1912	0.1175	0.36
28-9761	WINDSOR	NJ	1	-74.5861	40.2378	90	5/1948	6/1993	25	0.1768	0.0992	0.0893	0.79
28-9832	WOODCLIFF LAKE	NJ	3	-74.0425	41.0139	103	8/1948	12/1978	30	0.1810	0.1166	0.1336	0.24
30-0270	ARNOT FOREST	NY	7	-76.6333	42.2667	1200	1/1955	12/2000	44	0.1957	0.2426	0.1551	0.28
30-0331	AURORA RESEARCH FARM	NY	7	-76.6500	42.7333	830	11/1958	12/2000	39	0.2297	0.2205	0.2330	0.61
30-0687	BINGHAMTON WSO AP	NY	7	-75.9814	42.2078	1600	7/1951	12/2000	50	0.2157	0.2921	0.2064	0.35
30-0766	BOLIVAR	NY	7	-78.2064	42.1225	1790	5/1948	9/1999	49	0.2028	0.1859	0.1448	0.04
30-0785	BOONVILLE 2 SSW	NY	6	-75.3500	43.4500	1580	10/1949	12/2000	51	0.1895	0.0823	0.1123	0.20
30-0862	BRENTWOOD	NY	26	-73.2500	40.7833	102	5/1948	8/1976	25	0.1901	0.2224	0.2158	0.66
30-1012	BUFFALO WSCMO AP	NY	11	-78.7358	42.9408	705	5/1948	12/2000	53	0.2114	0.2742	0.1596	0.37
30-1207	CARMEL	NY	26	-73.6833	41.4333	530	12/1953	2/1996	34	0.1898	0.1560	0.1570	0.11
30-1265	CAYUGA LOCK NO 1	NY	7	-76.7333	42.9500	380	10/1979	12/2000	21	0.1728	-0.0086	0.1258	2.07
30-1466	CHINA	NY	6	-75.4000	42.1667	1460	5/1948	10/1967	20	0.2052	-0.0514	0.0974	3.04
30-1559	CLINTON CORNERS	NY	26	-73.7667	41.8167	280	1/1978	12/2002	22	0.2618	0.3876	0.3174	2.59
30-1623	COLDEN 1 N	NY	12	-78.6831	42.6631	1025	8/1957	12/2000	43	0.1972	0.1746	0.1452	0.00
30-1987	DAVENPORT 2 E	NY	5	-74.8000	42.4667	1350	5/1948	1/1994	41	0.1731	0.2486	0.1694	0.69
30-2277	EAST BLOOMFIELD	NY	7	-77.4333	42.9000	870	11/1956	12/1984	28	0.1977	0.2068	0.0948	0.46
30-2454	EAST SIDNEY	NY	5	-75.2333	42.3333	1155	4/1950	12/2000	49	0.1992	0.2835	0.3120	1.96
30-2526	EDMESTON	NY	5	-75.2500	42.6833	1180	5/1948	4/1990	42	0.1745	0.2190	0.0983	1.82

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
30-2582	ELLENVILLE	NY	5	-74.4000	41.7167	350	8/1949	12/1983	26	0.2698	0.2342	0.1227	0.75
30-2953	FORT PLAIN	NY	5	-74.6228	42.9383	305	10/1949	12/2000	51	0.1891	0.1975	0.1831	0.35
30-3033	FREDONIA	NY	11	-79.2286	42.4494	760	5/1948	12/2000	50	0.2254	0.2110	0.0920	0.86
30-3184	GENEVA RESEARCH FARM	NY	7	-77.0303	42.8778	718	5/1968	12/2000	33	0.2188	0.1798	0.2270	0.60
30-3970	HOPE	NY	5	-74.2478	43.3117	880	5/1948	3/1999	47	0.2156	0.3301	0.2089	0.58
30-3979	HORNBY	NY	7	-77.0500	42.2333	1795	8/1975	12/2000	25	0.2185	0.1770	0.0229	1.83
30-3983	HORNELL ALMOND DAM	NY	7	-77.7000	42.3500	1325	2/1950	12/2000	51	0.2105	0.2403	0.1988	0.08
30-4070	HUNTS CORNERS	NY	6	-76.1278	42.4325	1300	5/1948	12/2000	49	0.1958	0.1388	0.1190	0.16
30-4174	ITHACA CORNELL UNIV	NY	7	-76.4500	42.4500	960	5/1948	12/2000	52	0.1600	0.0543	0.1183	1.22
30-4207	JAMESTOWN 4 NE	NY	12	-79.1525	42.1183	1250	9/1960	12/2000	28	0.2187	0.1885	0.1113	0.42
30-4424	KINGSTON	NY	5	-74.0000	41.9333	279	5/1948	12/1972	25	0.1718	0.2697	0.2709	0.93
30-4613	LARCHMONT	NY	26	-73.7500	40.9333	39	5/1948	6/1976	27	0.1849	0.0109	0.0778	1.27
30-5072	MARCELLUS SCS	NY	6	-76.3833	42.9833	1030	5/1948	12/1967	20	0.2169	0.0816	0.1170	0.88
30-5346	MILLERTON	NY	26	-73.5167	41.9500	732	5/1948	9/1985	37	0.2217	0.0566	0.1172	2.45
30-5377	MINEOLA	NY	26	-73.6183	40.7328	96	5/1948	12/2002	51	0.1808	0.1388	0.1082	0.11
30-5435	MONGAUP VALLEY 4 SSW	NY	5	-74.8167	41.6167	1200	9/1974	12/2000	22	0.3020	0.3273	0.0953	2.35
30-5597	MOUNT MORRIS 2 W	NY	7	-77.9053	42.7314	880	6/1950	12/2000	50	0.1995	0.1414	0.1457	0.19
30-5604	MOUNT PLEASANT FARM	NY	7	-76.3667	42.4500	1650	7/1957	4/1978	21	0.1885	0.2599	0.0483	2.07
30-5682	NEWARK VALLEY	NY	7	-76.1728	42.2411	990	10/1950	12/2000	47	0.2236	0.2193	0.1627	0.23
30-5796	NEW YORK AVE V BROOKLYN	NY	26	-73.9808	40.5939	20	5/1948	12/1977	29	0.1451	0.1852	0.1715	2.51
30-5801	NY CITY CENTRAL PARK	NY	26	-73.9669	40.7889	130	5/1948	12/2002	55	0.1729	0.1059	0.1102	0.25
30-5803	NEW YORK JFK INTL AP	NY	26	-73.7622	40.6386	11	1/1949	12/2002	36	0.2220	0.2952	0.2732	1.16
30-5806	NEW YORK UNIVERSITY ST	NY	26	-73.9167	40.8500	180	5/1948	6/1973	23	0.1590	0.1041	0.0803	0.62
30-5811	NEW YORK LA GUARDIA AP	NY	26	-73.8800	40.7792	11	5/1948	12/2002	54	0.1951	0.2211	0.1306	0.16
30-5821	NY WESTERLEIGH STAT IS	NY	3	-74.1167	40.6333	80	5/1948	7/1988	36	0.1889	0.3245	0.2787	1.78
30-6119	OAKLAND VALLEY 1 S	NY	5	-74.6500	41.5000	920	5/1948	12/2000	43	0.2307	0.1779	0.1497	0.45
30-6314	OSWEGO EAST	NY	6	-76.4928	43.4617	350	5/1948	12/2000	49	0.1487	0.0335	0.1906	2.01
30-6464	PAVILION	NY	7	-77.9833	42.8667	1040	11/1956	9/1992	33	0.2291	0.2670	0.3004	1.20
30-6623	PISECO	NY	5	-74.5231	43.4614	1730	5/1948	12/2000	48	0.2114	0.2490	0.2240	0.34
30-6674	PLEASANTVILLE	NY	26	-73.7758	41.1314	320	8/1976	11/2000	20	0.1786	0.1917	0.0328	1.44
30-6685	PLYMOUTH 2 SSE	NY	5	-75.6000	42.6167	1280	5/1948	10/1996	43	0.1878	0.4009	0.3116	2.66
30-6768	PORT JEFFERSON	NY	26	-73.0667	40.9500	10	5/1953	7/1976	23	0.1683	0.0776	-0.0023	1.38

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
30-6825	POUGHKEEPSIE 1 N	NY	26	-73.9333	41.7167	50	2/1953	12/2002	35	0.2094	0.1529	0.0703	0.86
30-6839	PRATTSVILLE	NY	5	-74.4422	42.3281	1207	5/1948	12/2000	50	0.1852	0.2032	0.0597	2.40
30-7167	ROCHESTER WSO AP	NY	7	-77.6767	43.1167	600	5/1948	12/2000	53	0.1965	0.2625	0.1763	0.38
30-7398	SALAMANCA	NY	12	-78.7217	42.1581	1372	1/1951	12/2000	47	0.1672	0.2225	0.1409	0.94
30-7497	SCARSDALE	NY	26	-73.8000	40.9833	199	5/1948	2/1990	38	0.2104	0.2653	0.1174	0.62
30-7830	SMITHVILLE FLATS	NY	6	-75.8167	42.3833	1080	5/1948	12/2000	47	0.1566	0.0958	0.1896	1.14
30-8383	SYRACUSE WSO AIRPORT	NY	6	-76.1033	43.1092	410	5/1948	12/2000	51	0.1692	0.1881	0.1482	0.57
30-8406	TANNERSVILLE 2 SW	NY	5	-74.1572	42.1625	1950	12/1976	12/2000	24	0.1752	0.2427	0.1874	0.47
30-8498	THURSTON	NY	7	-77.3333	42.2000	1620	5/1948	12/2000	52	0.2445	0.2705	0.1823	0.81
30-8586	TRIBES HILL	NY	5	-74.2886	42.9464	300	5/1948	12/2000	52	0.2066	0.2220	0.1383	0.19
30-8739	UTICA	NY	5	-75.2000	43.0833	580	10/1952	11/1991	36	0.2340	0.2429	0.1104	0.30
30-8910	WALES	NY	12	-78.5097	42.7417	1090	7/1948	12/2000	52	0.2010	0.2972	0.2262	0.90
30-9072	WELLSVILLE	NY	7	-77.9564	42.1219	1510	12/1955	12/2000	44	0.1852	0.1198	0.2024	0.69
30-9229	WEST JASPER	NY	7	-77.5667	42.1500	2169	5/1948	12/2000	46	0.1684	0.1773	0.2104	1.01
30-9400	WHITE PLAINS MPL MOOR	NY	26	-73.7333	41.0167	150	5/1948	2/1992	40	0.1934	0.1526	0.1487	0.07
30-9442	WHITNEY POINT DAM	NY	6	-75.9667	42.3500	1040	5/1948	12/2000	53	0.1834	0.1972	0.1904	0.96
30-9576	WOODLANDS ARDSLEY	NY	26	-73.8500	41.0167	140	5/1948	12/1989	38	0.2281	0.3412	0.2093	0.83
30-9670	YORKTOWN HEIGHTS 1 W	NY	26	-73.7975	41.2664	670	5/1970	12/2002	32	0.1609	-0.0255	0.1713	2.92
31-0300	ASHEVILLE WSO AP	NC	10	-82.5392	35.4358	2140	9/1964	12/2000	36	0.2285	0.1049	0.0333	1.79
31-0301	ASHEVILLE	NC	10	-82.5333	35.6000	2240	8/1902	12/2000	98	0.1954	0.1586	0.1445	0.24
31-0312	ASHFORD	NC	10	-81.9500	35.8833	1790	6/1948	12/2000	42	0.2151	0.1667	0.1557	0.71
31-0438	BADIN	NC	2	-80.1192	35.4111	530	4/1948	12/2000	50	0.2015	0.1731	0.0675	1.53
31-0909	BLUE RIDGE POST OFFICE	NC	10	-82.3667	35.3500	2280	9/1948	8/1972	24	0.1824	0.1091	0.0722	0.38
31-0967	BOOMER 5W	NC	9	-81.3517	36.0694	1120	6/1948	12/2000	53	0.2009	0.2862	0.2471	0.20
31-1159	BRYSON CITY	NC	10	-83.4500	35.4333	1762	9/1948	11/1973	25	0.1458	0.0218	0.0216	2.25
31-1241	BURLINGTON 3 NNE	NC	3	-79.4069	36.1278	640	6/1948	12/2000	45	0.2137	0.2043	0.1467	0.28
31-1458	CAPE HATTERAS WSO	NC	2	-75.6225	35.2322	10	6/1948	12/2000	53	0.1512	0.1768	0.2424	1.37
31-1515	CARTHAGE 8 SE	NC	2	-79.4078	35.3314	440	3/1958	12/2000	38	0.2007	0.2636	0.2730	2.01
31-1564	CATALOOCHEE	NC	10	-83.1000	35.6167	2620	9/1964	12/1987	22	0.1487	0.2496	0.1082	2.08
31-1614	CEDAR MOUNTAIN	NC	10	-82.6333	35.1500	2753	9/1948	9/1980	32	0.2116	0.2606	0.1991	0.74
31-1690	CHARLOTTE WSO ARPT	NC	2	-80.9542	35.2225	728	6/1948	12/2000	53	0.1652	0.2151	0.1423	0.54
31-1881	CLINTON 2 NE	NC	2	-78.2758	35.0247	158	2/1971	12/2000	27	0.1183	-0.0757	0.0934	4.14

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
31-2230	DALTON	NC	3	-80.4000	36.3000	1010	6/1948	6/1999	48	0.1711	0.2665	0.1879	0.91
31-2388	DOBSON	NC	3	-80.7192	36.4119	1285	10/1942	12/2000	58	0.1686	0.0921	0.0558	1.21
31-2631	EDEN	NC	3	-79.7433	36.4742	678	9/1950	12/2000	48	0.2184	0.0441	0.0734	1.25
31-2719	ELIZABETH CITY	NC	2	-76.2050	36.3097	8	6/1948	12/2000	47	0.2242	0.1842	0.1461	1.40
31-2732	ELIZABETHTOWN LOCK 2	NC	2	-78.5783	34.6267	60	6/1948	12/2000	49	0.1545	0.2224	0.1720	0.80
31-3017	FAYETTEVILLE	NC	2	-78.8583	35.0583	96	7/1972	12/2000	24	0.1674	0.2057	0.2075	0.39
31-3232	FRANKLINTON	NC	2	-78.4592	36.1050	375	6/1948	12/2000	51	0.1428	0.0959	0.1135	1.09
31-3364	GATESVILLE	NC	2	-76.7167	36.4333	39	6/1948	4/1973	22	0.1207	0.1410	0.1717	1.99
31-3630	GREENSBORO WSO AIRPORT	NC	3	-79.9436	36.0975	897	6/1948	12/2000	53	0.1711	0.1109	0.1573	0.51
31-3638	GREENVILLE 2	NC	2	-77.4000	35.6333	32	6/1948	12/2000	46	0.1868	0.2072	0.1546	0.04
31-3917	HAW KNOB STRATTON MD	NC	10	-84.0333	35.3500	4642	9/1948	1/1972	23	0.1547	0.2697	0.2176	1.52
31-3925	HAYWOOD GAP	NC	10	-82.9167	35.3000	5404	9/1948	9/1980	32	0.1971	0.3104	0.2139	1.25
31-3957	HELTON	NC	9	-81.4947	36.5567	2840	4/1958	12/2000	41	0.1606	0.0138	0.0990	1.93
31-4136	HOBUCKEN BRIDGE	NC	2	-76.6000	35.2333	8	6/1948	12/2000	37	0.2422	0.2383	0.1314	2.12
31-4649	KILL DEVIL HILLS N M	NC	2	-75.6667	36.0167	10	6/1948	4/1981	29	0.1608	0.1118	0.2160	1.18
31-4764	LAKE LURE 2	NC	10	-82.1881	35.4206	1040	6/1948	12/2000	39	0.1740	0.0987	0.0991	0.56
31-4860	LAURINBURG	NC	2	-79.4664	34.7508	210	6/1948	12/2000	49	0.1758	0.2835	0.2387	1.15
31-4970	LEXINGTON	NC	3	-80.2597	35.8458	760	6/1948	12/2000	52	0.2059	0.2345	0.2260	0.67
31-5402	MAX PATCH MOUNTAIN	NC	10	-82.9500	35.8167	4022	9/1948	9/1980	32	0.2097	0.2723	0.1884	0.75
31-5814	MOORESVILLE	NC	2	-80.8333	35.6000	870	3/1949	12/2000	51	0.2034	0.2111	0.0613	1.91
31-5830	MOREHEAD CITY 2 WNW	NC	2	-76.7333	34.7333	10	6/1948	12/2000	47	0.1730	0.1664	0.0700	1.45
31-5945	MOUNT PLEASANT	NC	2	-80.4308	35.4117	740	6/1948	12/2000	51	0.1858	0.2513	0.2558	1.26
31-6231	NORTH FORK	NC	10	-82.3333	35.7000	2772	9/1948	9/1980	32	0.1604	0.2048	0.2019	0.90
31-6261	N WILKESBORO 11 SE	NC	2	-80.9775	36.0731	1050	6/1948	12/2000	51	0.1761	0.0993	0.1649	0.70
31-6867	POLKTON 2 NE	NC	2	-80.1639	35.0203	305	6/1948	12/2000	45	0.2021	0.1787	0.0909	0.98
31-6891	POPE AFB	NC	2	-79.0089	35.1739	218	6/1948	11/1971	23	0.1880	0.2552	0.2097	0.40
31-7069	RALEIGH DURHAM WSFO AP	NC	2	-78.7864	35.8706	416	6/1948	12/2000	53	0.1888	0.2053	0.1503	0.06
31-7079	RALEIGH NC STATE UNIV	NC	2	-78.6989	35.7944	400	6/1948	12/2000	41	0.1780	0.1437	0.1634	0.18
31-7319	ROANOKE RAPIDS	NC	2	-77.6717	36.4783	210	9/1971	12/2000	24	0.2325	0.1494	0.2232	4.28
31-7324	ROARING GAP 1 NW	NC	9	-80.9964	36.4081	2820	10/1942	12/2000	58	0.2042	0.2538	0.2350	0.18
31-7850	SHELBY 2	NC	2	-81.5500	35.2667	780	6/1948	12/1993	44	0.1988	0.1844	0.1272	0.36
31-8037	SNEADS FERRY	NC	2	-77.4000	34.5500	10	6/1948	6/1987	37	0.1408	0.1645	0.1155	1.54

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
31-8216	SPRUCE MOUNTAIN	NC	10	-83.2000	35.6167	4603	9/1948	6/1976	27	0.1741	0.1886	0.1359	0.10
31-9191	WELDON 2	NC	2	-77.6000	36.4333	79	6/1948	9/1971	23	0.2191	0.3024	0.1818	0.91
31-9457	WILMINGTON WSO AIRPORT	NC	2	-77.9061	34.2683	30	6/1948	12/2000	53	0.1663	0.1408	0.2347	1.29
31-9476	WILSON 3 SW	NC	2	-77.9456	35.6939	110	6/1948	12/2000	48	0.2141	0.2654	0.1065	1.26
31-9675	YADKINVILLE 6 E	NC	2	-80.5481	36.1306	875	6/1948	12/2000	53	0.1738	0.2262	0.1425	0.40
33-0058	AKRON CANTON WSO AP	OH	12	-81.4333	40.9167	1208	8/1948	12/2000	50	0.1976	0.1373	0.0858	0.27
33-0059	AKRON WPCS	OH	12	-81.5667	41.1500	750	8/1948	12/2000	49	0.1730	0.2317	0.2636	1.59
33-0107	ALLIANCE 3 NNW	OH	12	-81.1169	40.9550	1055	8/1948	12/2000	49	0.1810	0.2116	0.2079	0.50
33-0256	ASHLAND 2 SW	OH	12	-82.3500	40.8333	1265	8/1967	12/2000	28	0.1958	0.2213	0.2584	1.27
33-0493	BEACH CITY LAKE	OH	12	-81.5667	40.6333	985	8/1948	12/2000	51	0.1715	0.0484	0.0918	1.14
33-0639	BERLIN LAKE	OH	12	-81.0167	41.0333	1040	8/1948	12/2000	48	0.2007	0.1918	0.1448	0.02
33-1042	BRYAN 2 SE	OH	16	-84.5272	41.4619	730	4/1970	12/2000	31	0.1878	0.0734	0.1426	1.44
33-1113	BURTON	OH	12	-81.1667	41.4667	1160	7/1950	1/1990	40	0.2230	0.1271	0.1464	0.93
33-1182	CALDWELL HIWAY DEPT	OH	12	-81.5333	39.7500	740	8/1948	9/1981	28	0.2248	0.1790	0.1168	0.55
33-1197	CAMBRIDGE	OH	12	-81.5833	40.0167	800	8/1948	12/2000	43	0.2173	0.1552	0.1108	0.37
33-1259	CANTON HIWAY DEPT	OH	12	-81.3833	40.7667	1020	10/1948	8/1984	31	0.1880	0.1378	0.0822	0.36
33-1404	CENTERBURG 2 SE	OH	12	-82.6500	40.3000	1205	11/1950	12/2000	46	0.1855	0.1440	0.1923	0.65
33-1466	CHARLES MILL LAKE	OH	12	-82.3569	40.7400	1025	8/1948	12/2000	52	0.1682	0.0463	0.1278	1.49
33-1528	CHILLICOTHE MOUND CITY	OH	12	-83.0033	39.3744	650	1/1971	12/2000	28	0.2302	0.1882	0.0930	0.95
33-1536	CHILO MELDAHL L&D	OH	18	-84.1731	38.7983	500	8/1948	12/2000	47	0.1783	0.1557	0.1497	0.08
33-1541	CHIPPEWA LAKE	OH	12	-81.9361	41.0517	1180	8/1948	12/2000	52	0.2048	0.1331	0.0595	0.63
33-1561	CINCINNATI ABBE WSO CI	OH	18	-84.5167	39.1500	760	8/1948	12/1982	34	0.1750	0.0817	0.1033	0.59
33-1581	CINCINNATI WB CITY	OH	18	-84.5167	39.1000	636	8/1948	3/1971	22	0.1880	0.1149	0.0924	0.42
33-1592	CIRCLEVILLE	OH	16	-82.9547	39.6106	673	8/1948	12/2000	52	0.1689	0.2559	0.1499	1.76
33-1642	CLENDENING DAM	OH	12	-81.2833	40.2667	924	8/1948	8/1975	22	0.1633	0.0031	0.1040	2.27
33-1651	CLEVELAND EASTERLY	OH	11	-81.5833	41.5667	550	9/1955	12/2000	40	0.1961	0.2554	0.2204	0.50
33-1657	CLEVELAND WSFO AP	OH	11	-81.8528	41.4050	770	8/1948	12/2000	52	0.1680	0.0093	0.1081	1.35
33-1770	COLUMBIANA 2 SE	OH	12	-80.6833	40.8833	1112	8/1948	3/1975	22	0.2279	0.0247	0.1017	2.79
33-1786	COLUMBUS WSO AIRPORT	OH	16	-82.8808	39.9914	810	8/1948	12/2000	52	0.1814	0.1927	0.0923	0.99
33-1788	COLUMBUS WSO CITY	OH	16	-83.0000	39.9667	725	8/1948	10/1984	24	0.1902	0.1828	0.0837	0.78
33-1818	CONNEAUT	OH	11	-80.5667	41.9833	640	8/1948	12/2000	49	0.1824	0.1660	0.1364	0.22
33-1905	COSHOCTON AGR RES STN	OH	12	-81.8000	40.3667	1140	1/1971	12/2000	25	0.1787	0.2528	0.2175	0.77

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
33-2075	VANDALIA WB AIRPORT	OH	18	-84.2186	39.9061	1000	8/1948	12/2000	52	0.1820	0.1436	0.1335	0.09
33-2090	DEER CREEK DAM	OH	16	-83.2128	39.6253	860	9/1970	12/2000	30	0.2058	0.3353	0.3457	2.98
33-2098	DEFIANCE	OH	16	-84.3833	41.2833	700	8/1948	12/2000	51	0.2006	0.1589	0.0904	0.38
33-2205	DILLON DAM	OH	12	-82.0833	40.0000	820	2/1961	1/1989	27	0.1843	0.2632	0.0741	2.45
33-2272	DOVER DAM	OH	12	-81.4167	40.5667	930	4/1966	12/2000	29	0.2108	0.0559	0.1256	1.54
33-2305	DUFFY DAM 15	OH	12	-80.8833	39.6333	630	8/1948	4/1975	24	0.2022	0.3288	0.2275	1.34
33-2485	EATON	OH	18	-84.6336	39.7347	1002	8/1948	12/2000	30	0.1845	0.2471	0.1854	0.33
33-2512	EDGERTON WATER WORKS	OH	16	-84.7333	41.4500	830	8/1948	7/1975	25	0.2398	0.2364	0.0626	2.77
33-2651	FAIRFIELD	OH	18	-84.5833	39.3500	575	8/1948	12/2000	49	0.2204	0.2235	0.1542	0.93
33-2791	FINDLAY WPCC	OH	16	-83.6622	41.0461	768	8/1948	12/2000	50	0.1895	0.2155	0.0923	1.10
33-2905	FOSTORIA WEST END SUBS	OH	16	-83.4333	41.1500	781	8/1948	5/1975	26	0.2174	0.2219	0.2197	0.53
33-2956	FREDERICKTOWN 4 S	OH	12	-82.5333	40.4167	1050	5/1949	12/2000	46	0.1537	0.2079	0.1773	1.32
33-2974	FREMONT WATER WORKS	OH	11	-83.1167	41.3333	600	8/1948	12/2000	48	0.2013	0.1880	0.1961	0.85
33-3021	GALION WATER WORKS	OH	12	-82.8000	40.7167	1170	8/1948	12/2000	50	0.2191	0.1504	0.1447	0.51
33-3042	GAMBIER	OH	12	-82.4000	40.3833	1089	8/1948	8/1971	21	0.1733	0.0008	0.0280	2.02
33-3120	GERMANTOWN DAM	OH	18	-84.4003	39.6358	740	8/1948	12/2000	49	0.1669	0.1336	0.0867	0.76
33-3356	GREENFIELD SEWAGE PLAN	OH	18	-83.4056	39.3542	970	9/1948	12/2000	48	0.1854	0.2678	0.2032	0.53
33-3375	GREENVILLE SEWAGE PLAN	OH	16	-84.6500	40.1000	1024	6/1949	12/2000	47	0.1635	0.1884	0.2033	1.43
33-3421	GROVER HILL	OH	16	-84.4725	41.0181	730	5/1955	7/1975	20	0.1537	0.2232	0.1826	2.10
33-3758	HILLSBORO	OH	18	-83.6167	39.2000	1100	5/1964	12/2000	35	0.1859	0.2532	0.2254	0.51
33-4189	KENTON	OH	16	-83.6061	40.6489	995	8/1948	12/2000	47	0.2084	0.2299	0.1744	0.08
33-4403	LANCASTER	OH	12	-82.6072	39.7156	840	3/1949	12/2000	50	0.1761	0.1382	0.0974	0.42
33-4459	LEBANON	OH	18	-84.2394	39.3689	680	8/1948	12/2000	45	0.1987	0.0850	0.1189	1.00
33-4473	LEESVILLE DAM	OH	12	-81.2000	40.4667	980	5/1967	12/2000	23	0.1344	0.2580	0.1576	3.56
33-4551	LIMA WWTP	OH	16	-84.1294	40.7247	850	8/1948	12/2000	48	0.2038	0.2052	0.1480	0.03
33-4672	LOGAN	OH	12	-82.3850	39.5292	722	8/1948	12/2000	46	0.2003	0.1428	0.2002	0.89
33-4681	LONDON	OH	16	-83.4500	39.8833	1020	4/1966	12/2000	28	0.2209	0.2169	0.1661	0.24
33-4789	LYONS HIGH SCHOOL	OH	16	-84.0667	41.7000	771	8/1948	7/1975	23	0.2073	0.2175	0.2297	0.58
33-4865	MANSFIELD WSO AP	OH	12	-82.5178	40.8203	1295	12/1959	12/2000	41	0.2044	0.1015	0.0609	0.65
33-4924	MARIETTA LOCK 1	OH	12	-81.4536	39.4108	610	8/1948	7/1975	26	0.1694	0.2049	0.1524	0.59
33-4942	MARION 2 N	OH	16	-83.1333	40.6167	965	8/1948	12/2000	49	0.1826	0.3138	0.2547	1.69
33-4979	MARYSVILLE	OH	16	-83.3669	40.2411	1000	9/1948	12/2000	50	0.2097	0.1124	0.0598	0.90

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
33-5029	MC ARTHUR 2 N	OH	12	-82.4822	39.2503	785	8/1948	12/2000	49	0.1713	0.1951	0.1316	0.56
33-5041	MC CONNELSVILLE LOCK 7	OH	12	-81.8569	39.6539	760	8/1948	12/2000	43	0.2143	0.2484	0.2508	1.21
33-5297	MILLERSBURG	OH	12	-81.9167	40.5500	819	3/1953	12/2000	30	0.2160	0.2024	0.1564	0.25
33-5315	MILLPORT 2 NW	OH	12	-80.9000	40.7167	1150	1/1975	12/2000	21	0.1978	0.0370	0.0107	1.68
33-5398	MOHAWK DAM	OH	12	-82.0908	40.3486	865	4/1966	12/2000	29	0.1954	0.0189	0.0793	1.57
33-5505	MOSQUITO CREEK DAM	OH	12	-80.7667	41.3000	910	8/1948	6/1986	26	0.2258	0.2859	0.0853	2.40
33-5573	MOUNT STERLING GAS PUM	OH	16	-83.2833	39.7333	922	8/1948	11/1998	36	0.2675	0.2473	0.1549	3.06
33-5585	MOUNT VERNON	OH	12	-82.4667	40.3833	980	9/1971	12/2000	27	0.1397	0.0142	0.0747	2.87
33-5747	NEWARK WATER WORKS	OH	12	-82.4131	40.0875	835	8/1948	12/2000	49	0.1618	0.1191	0.1901	1.37
33-5878	NEW MATAMORAS DAM 16	OH	12	-81.1167	39.4667	620	8/1948	2/1975	26	0.1987	0.1334	0.0722	0.42
33-5904	NEW PHILADELPHIA 1 A	OH	12	-81.4500	40.5000	920	8/1948	5/1990	39	0.1749	0.1888	0.1848	0.43
33-6123	NORWALK 5 SE	OH	16	-82.5667	41.1833	925	9/1948	12/2000	36	0.1969	0.2863	0.2524	0.92
33-6196	OBERLIN	OH	12	-82.2167	41.2667	816	8/1948	12/2000	51	0.2234	0.1260	0.1261	0.80
33-6375	OXFORD WATER WORKS	OH	18	-84.7333	39.5167	860	8/1948	12/2000	44	0.2221	0.1861	0.2113	1.82
33-6384	PAINESVILLE HIWAY DEPT	OH	11	-81.2167	41.7167	702	8/1948	5/1977	24	0.2210	0.3927	0.2697	1.79
33-6405	PANDORA	OH	16	-83.9617	40.9542	770	6/1953	2/2000	44	0.2263	0.3118	0.2752	1.46
33-6493	PEEBLES 1 S	OH	12	-83.4167	38.9500	810	8/1948	11/1980	32	0.2131	0.1587	0.0868	0.44
33-6650	PIQUA WWTP	OH	16	-84.2333	40.1333	800	8/1948	12/2000	45	0.1812	0.1779	0.1453	0.34
33-6702	PLEASANT HILL DAM	OH	12	-82.3333	40.6167	1125	4/1966	12/2000	32	0.1950	0.2543	0.1776	0.37
33-6781	PORTSMOUTH SCIOTOVILLE	OH	12	-82.8872	38.7569	540	8/1948	12/2000	50	0.2030	0.1413	0.1773	0.55
33-6882	PUT-IN-BAY	OH	11	-82.8000	41.6500	580	8/1948	8/1997	39	0.2256	0.1643	0.0443	1.61
33-6949	RAVENNA 2 S	OH	12	-81.2833	41.1333	1107	8/1948	12/2000	45	0.1848	0.1761	0.2042	0.54
33-7179	ROCKFORD	OH	16	-84.6500	40.6833	805	8/1948	10/1983	32	0.1773	0.1285	0.1628	0.84
33-7333	RUSSELLS POINT LAKEVIE	OH	16	-83.9000	40.5167	1015	8/1948	12/1982	28	0.2303	0.2002	0.1955	0.83
33-7375	ST MARTIN URSULINE SCH	OH	18	-83.8833	39.2167	985	8/1948	4/1984	35	0.1686	0.1587	0.1255	0.39
33-7383	ST MARYS 2 W	OH	16	-84.4375	40.5447	875	5/1949	12/2000	47	0.2155	0.2171	0.1516	0.16
33-7559	SENECAVILLE DAM	OH	12	-81.4347	39.9222	875	4/1966	12/2000	29	0.1943	0.1527	0.1947	0.59
33-7698	SIDNEY HIGHWAY DEPT	OH	16	-84.1633	40.2983	1030	8/1948	12/2000	52	0.2083	0.1773	0.1523	0.07
33-7854	NEW LYME POST OFFICE	OH	12	-80.8000	41.5833	902	5/1950	7/1972	21	0.2116	0.2694	0.1833	0.54
33-7935	SPRINGFIELD NEW WTR WK	OH	18	-83.8167	39.9667	930	8/1948	12/2000	49	0.1669	0.1070	0.1039	0.56
33-8020	STEUBENVILLE DAM 1O	OH	12	-80.6167	40.3667	741	8/1948	11/1978	25	0.2725	0.2646	0.1642	3.57
33-8357	TOLEDO EXPRESS WSO AP	OH	16	-83.8014	41.5886	669	1/1955	12/2000	46	0.1886	0.0772	0.0843	0.93

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
33-8378	TOM JENKINS DAM-BURR O	OH	12	-82.0586	39.5442	760	7/1953	12/2000	47	0.2063	0.1240	0.1110	0.28
33-8539	UPPER SANDUSKY WATER W	OH	16	-83.2833	40.8167	820	8/1948	12/2000	48	0.1998	0.2843	0.2538	0.88
33-8552	URBANA WWTP	OH	16	-83.7833	40.1000	1000	11/1949	12/2000	50	0.2105	0.1310	0.1820	1.03
33-8774	WARREN PUBLIC SERVICE	OH	12	-80.8000	41.2167	902	8/1948	6/1971	22	0.1766	0.1504	-0.0157	3.30
33-8794	WASHINGTON COURT HOUSE	OH	18	-83.4281	39.5269	960	1/1971	11/2000	23	0.1558	-0.0198	0.0595	2.51
33-8810	WATERLOO	OH	12	-82.4736	38.7003	625	6/1956	12/2000	22	0.2003	0.0249	0.0909	1.59
33-9211	WILLS CREEK DAM	OH	12	-81.8500	40.1500	780	4/1966	12/2000	29	0.1455	0.3355	0.3519	5.43
33-9224	WILMINGTON	OH	18	-83.8500	39.4333	975	8/1948	12/2000	51	0.1881	0.1661	0.2005	0.40
33-9298	WOODSFIELD	OH	12	-81.1000	39.7833	1220	8/1948	3/1993	39	0.2119	0.2213	0.1738	0.24
33-9312	WOOSTER EXP STN	OH	12	-81.9167	40.7833	1020	8/1948	12/2000	51	0.1901	0.2924	0.1161	1.92
33-9357	XENIA TREATMENT PLANT	OH	18	-83.9667	39.7167	820	7/1952	12/2000	47	0.1791	0.0852	0.1932	1.42
33-9406	YOUNGSTOWN WSO AP	OH	12	-80.6739	41.2544	1180	8/1948	12/2000	52	0.1852	0.2441	0.1854	0.41
33-9422	ZANESVILLE WWTP	OH	12	-82.0000	39.9167	700	8/1948	12/2000	40	0.2003	0.1722	0.1005	0.21
36-0106	ALLENTOWN BETHLEHEM EA	PA	3	-75.4492	40.6508	390	5/1948	12/2000	53	0.2019	0.2294	0.1652	0.22
36-0147	ALVIN R BUSH DAM	PA	7	-77.9267	41.3583	930	4/1960	12/2000	40	0.2013	0.2981	0.1849	0.66
36-0204	VANDERGRIFT 2 W	PA	12	-79.6000	40.5833	1060	5/1948	11/1998	46	0.2414	0.2552	0.2102	1.60
36-0313	AUSTINBURG 2 W	PA	7	-77.5333	42.0000	1591	5/1948	10/1981	32	0.2171	0.2305	0.3727	3.07
36-0634	BETHLEHEM LEHIGH UNIV	PA	3	-75.3667	40.6000	361	6/1948	1/1978	22	0.1917	0.2393	0.1052	0.65
36-0651	BIG COVE TANNERY	PA	7	-78.0833	39.8167	912	5/1948	6/1973	25	0.1953	0.3074	0.2503	1.16
36-0725	BLAIN 5 SW	PA	7	-77.5892	40.3025	820	5/1948	12/2000	49	0.2562	0.3874	0.2122	1.84
36-0743	BLAKESLEE CORNERS	PA	5	-75.6000	41.1000	1650	5/1948	12/1982	35	0.2099	0.2887	0.1716	0.20
36-0763	BLOSERVILLE 1 N	PA	7	-77.3639	40.2636	700	6/1973	12/2000	28	0.2480	0.1555	0.1463	2.03
36-0821	BOSWELL 1 SW	PA	7	-78.9956	40.2078	1820	5/1960	12/2000	38	0.1807	0.2823	0.2456	1.48
36-1073	BUCKSTOWN 1 SE	PA	7	-78.8422	40.0631	2460	5/1948	10/1986	36	0.2203	0.2574	0.2418	0.38
36-1139	BUTLER 2 SW	PA	12	-79.9167	40.8500	1000	6/1967	12/2000	34	0.1954	0.1907	0.1233	0.10
36-1215	CANTON 1 NW	PA	6	-76.8667	41.6667	1522	5/1948	11/1975	23	0.1432	0.1135	0.0934	1.18
36-1262	CARTER CAMP 2 W	PA	7	-77.7500	41.6167	2031	5/1948	10/1972	25	0.1794	0.1252	0.0443	1.01
36-1354	CHAMBERSBURG	PA	7	-77.6394	39.9353	640	5/1948	7/1989	41	0.1965	0.2184	0.2166	0.25
36-1372	CHARLEROI	PA	12	-79.9167	40.1333	1040	5/1948	12/2000	44	0.1956	0.1247	0.1831	0.78
36-1400	CHERRY SPRINGS	PA	7	-77.8167	41.6667	2300	5/1978	12/2000	21	0.1928	0.1682	0.0457	1.00
36-1485	CLARION 3 SW	PA	12	-79.4356	41.1922	1040	5/1948	6/1969	21	0.2098	0.2024	0.0176	2.49
36-1529	CLERMONT	PA	12	-78.5000	41.6833	2103	10/1951	1/1985	26	0.1795	0.1856	0.1732	0.25

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
36-1589	COATESVILLE 1 SW	PA	3	-75.8333	39.9667	341	5/1948	12/1982	34	0.1850	0.2228	0.1834	0.24
36-1705	CONFLUENCE 1 SW DAM	PA	12	-79.3669	39.7994	1490	5/1948	12/2000	46	0.1607	0.0843	0.1407	1.20
36-1726	CONNELLSVILLE 2	PA	12	-79.6000	40.0000	900	9/1964	12/2000	20	0.1670	0.2014	0.1775	0.66
36-1961	CURWENSVILLE 1 S	PA	7	-78.5294	40.9583	1165	7/1969	12/2000	32	0.1697	0.2199	0.0754	1.65
36-2160	DINGMANS FERRY	PA	5	-74.8667	41.2167	430	6/1948	1/1983	35	0.1988	0.2147	0.1505	0.21
36-2245	DRIFTWOOD	PA	7	-78.1403	41.3419	820	5/1948	12/2000	46	0.1932	0.1930	0.0949	0.42
36-2260	DUBOIS FAA AP	PA	12	-78.8989	41.1783	1814	5/1967	12/2000	25	0.2295	0.0590	0.1500	2.76
36-2265	DU BOIS 7 E	PA	12	-78.6333	41.1000	1670	5/1948	12/1974	27	0.1715	0.0506	-0.0060	2.23
36-2298	DUNLO	PA	7	-78.7242	40.2872	2360	5/1948	12/2000	48	0.2399	0.3645	0.2868	1.41
36-2325	DUSHORE 2 SSW	PA	6	-76.4181	41.4775	1890	8/1959	9/1999	35	0.1546	0.0434	0.0780	1.03
36-2343	EAGLES MERE	PA	6	-76.5833	41.4000	1991	5/1948	8/1987	27	0.2227	0.1272	0.1847	1.62
36-2537	EISENHOWER NATL HIST S	PA	3	-77.2292	39.8050	540	5/1948	12/2000	47	0.1997	0.1820	0.2020	0.31
36-2629	EMPORIUM	PA	7	-78.2275	41.5067	1040	5/1969	12/2000	31	0.1904	0.1856	0.1048	0.32
36-2644	ENGLISH CENTER	PA	6	-77.2833	41.4333	879	5/1948	11/1984	37	0.1270	-0.0200	0.1767	3.06
36-2682	ERIE WSO ARPT	PA	11	-80.1825	42.0800	730	10/1956	12/2000	44	0.1508	0.0809	0.1458	1.25
36-2721	EVERETT	PA	7	-78.3653	40.0136	1000	5/1948	12/2000	42	0.2587	0.2728	0.1928	1.51
36-2838	FAYETTEVILLE 9 NE	PA	7	-77.4086	39.9914	2050	1/1973	12/2000	25	0.1830	0.2107	0.1569	0.36
36-2942	FORD CITY 4 S DAM	PA	12	-79.5000	40.7167	930	5/1948	2/1991	40	0.2402	0.2619	0.2102	1.54
36-3018	BEAR CREEK DAM	PA	5	-75.7333	41.1167	1509	7/1958	12/2000	39	0.1932	0.2971	0.2238	0.39
36-3028	FRANKLIN	PA	12	-79.8167	41.3833	990	5/1948	12/2000	44	0.2191	0.2417	0.1598	0.46
36-3295	GLENCOE	PA	7	-78.8333	39.8167	1611	5/1948	12/1979	31	0.1935	0.2591	0.2083	0.47
36-3311	GLEN HAZEL 2 NE DAM	PA	12	-78.6014	41.5631	1720	1/1953	12/2000	38	0.2493	0.2604	0.1649	1.82
36-3321	LYNDELL 2 NW	PA	3	-75.7506	40.0997	500	1/1971	12/2000	29	0.1813	0.1676	0.1799	0.17
36-3330	GLEN ROCK	PA	3	-76.7333	39.8000	620	5/1948	3/1970	22	0.2176	0.0255	0.1671	2.24
36-3515	GREENSBURG 2 E	PA	12	-79.5167	40.3000	1230	5/1948	12/2000	42	0.2085	0.1166	0.0617	0.65
36-3699	HARRISBURG CAPITAL CIT	PA	3	-76.8500	40.2167	340	5/1948	9/1991	38	0.2184	0.1286	0.1113	0.46
36-3761	HAWLEY 1 S WALLEN DAM	PA	5	-75.1833	41.4667	1201	12/1951	12/1973	21	0.3015	0.2789	0.0622	2.07
36-3762	HAWLEY 3 ESE	PA	5	-75.1333	41.4667	850	2/1974	12/2000	25	0.1941	0.1999	0.1768	0.27
36-4001	HOLLIDAYSBURG	PA	7	-78.4169	40.4383	990	5/1948	12/2000	51	0.2029	0.1964	0.0936	0.41
36-4019	HOLTWOOD	PA	3	-76.3333	39.8333	190	5/1948	6/1974	26	0.2281	0.1900	0.2470	1.95
36-4027	HOME	PA	12	-79.1000	40.7500	1220	5/1948	9/1992	44	0.1843	0.1456	0.1975	0.73
36-4044	HONESDALE 6 N	PA	6	-75.2667	41.6500	1040	5/1948	9/1980	32	0.1510	0.0678	0.1468	0.56

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
36-4166	HUNTSDALE	PA	7	-77.3000	40.1000	620	5/1948	5/1986	35	0.2035	0.2408	0.2128	0.18
36-4214	INDIANA 3 SE	PA	12	-79.1167	40.6000	1102	5/1948	12/2000	45	0.1963	0.1383	0.1572	0.26
36-4304	JACKSON SUMMIT	PA	7	-77.0167	41.9500	1690	5/1948	12/1983	33	0.2145	0.2737	0.1930	0.22
36-4325	JAMESTOWN 2 NW	PA	12	-80.4667	41.5000	1040	5/1948	12/2000	48	0.1731	0.1742	0.2349	1.32
36-4390	JOHNSTOWN 2	PA	7	-78.9167	40.3167	1280	5/1948	12/2000	47	0.1707	0.1582	0.1828	0.68
36-4397	JOLIETT	PA	6	-76.4642	40.6075	1625	6/1973	12/2000	26	0.1574	0.2094	0.1543	1.22
36-4432	KANE 1 NNE	PA	12	-78.8036	41.6767	1750	1/1949	12/2000	48	0.2155	0.1970	0.1311	0.25
36-4763	LANCASTER 2 NE FILT PL	PA	3	-76.2742	40.0500	270	5/1948	12/2000	46	0.2295	0.2360	0.1280	0.95
36-4778	LANDISVILLE	PA	3	-76.4333	40.1167	360	4/1952	12/2000	48	0.2200	0.2286	0.1816	0.65
36-4896	LEBANON 4 WNW	PA	3	-76.4667	40.3333	450	5/1948	12/2000	44	0.1959	0.1365	0.2259	0.83
36-4934	LEHIGHTON	PA	5	-75.6961	40.8222	580	5/1948	6/1978	27	0.2746	0.2286	0.1152	0.90
36-4984	LEWIS RUN 3 SE	PA	12	-78.6433	41.8417	1740	5/1954	12/2000	35	0.2131	0.1532	0.0624	0.76
36-4992	LEWISTOWN	PA	7	-77.5697	40.5869	460	5/1948	1/1976	27	0.1989	0.1067	0.0262	1.40
36-5109	LOCK HAVEN 2	PA	6	-77.4500	41.1167	566	6/1948	6/1969	21	0.1633	0.1620	0.1401	0.42
36-5336	MADERA 2 SE	PA	7	-78.4000	40.8000	1600	11/1949	3/1993	41	0.1732	0.0954	0.1071	0.63
36-5400	MARIENVILLE	PA	12	-79.1000	41.4833	1779	5/1948	11/1998	44	0.2212	0.3653	0.2762	2.40
36-5601	MEADOW RUN PONDS	PA	5	-75.6333	41.2167	1910	7/1948	12/2000	49	0.2084	0.2424	0.1734	0.02
36-5606	MEADVILLE 1 S	PA	12	-80.1667	41.6333	1065	5/1948	7/1999	46	0.2358	0.1979	0.1844	1.22
36-5627	MEDIX RUN	PA	7	-78.4000	41.2833	1102	5/1948	7/1969	21	0.1661	0.0016	0.1286	1.89
36-5654	MERCER HIWAY SHED	PA	12	-80.2500	41.2333	1250	5/1948	7/1986	27	0.2237	0.1610	0.1706	0.82
36-5676	MERWINSBURG	PA	5	-75.4667	40.9667	985	7/1948	12/1995	44	0.2304	0.2881	0.2009	0.32
36-5731	MILAN	PA	7	-76.5472	41.9281	850	5/1948	12/2000	42	0.2551	0.2628	0.2075	1.34
36-5775	MILLERSBURG 2 E	PA	6	-76.9167	40.5333	449	5/1948	11/1980	25	0.2036	0.2044	0.1287	0.68
36-5790	MILLHEIM	PA	7	-77.4744	40.8839	1120	10/1969	12/2000	28	0.2354	0.2164	0.1780	0.60
36-5817	MILLVILLE 2 SW	PA	6	-76.5667	41.1000	860	10/1950	8/1992	41	0.2181	0.1908	0.1818	1.18
36-5825	MILROY	PA	7	-77.6333	40.7333	1030	7/1975	12/2000	23	0.1861	0.2945	0.1769	1.18
36-5915	MONTROSE 1 E	PA	7	-75.8500	41.8667	1420	8/1949	12/2000	49	0.2291	0.2884	0.1686	0.48
36-6004	MOUNT CARMEL 2 W	PA	6	-76.4508	40.7875	1000	4/1978	12/2000	23	0.1422	0.1033	0.1159	0.79
36-6066	MOUNT UNION	PA	7	-77.8789	40.3850	560	5/1948	12/2000	51	0.1718	0.0867	0.1986	1.20
36-6111	MURRYSVILLE 2 SW	PA	12	-79.7333	40.4167	860	5/1948	12/2000	49	0.2166	0.2037	0.1252	0.33
36-6233	NEW CASTLE 1 N	PA	12	-80.3619	41.0169	825	5/1948	12/2000	47	0.1972	0.2125	0.2030	0.31
36-6419	N E PHILADELPHIA ARPT	PA	1	-75.0167	40.0833	100	1/1965	11/1988	24	0.2046	0.0541	0.2731	2.29

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
36-6681	PALM	PA	3	-75.5022	40.3856	300	1/1971	12/2000	30	0.1536	0.2548	0.2420	1.64
36-6689	PALMERTON	PA	5	-75.6167	40.8000	410	5/1948	5/1998	50	0.2150	0.1547	0.1904	0.98
36-6724	PARKER 1 E	PA	12	-79.6719	41.0964	1100	5/1948	12/2000	50	0.1865	0.1286	0.0362	1.12
36-6792	PEN ARGYL	PA	5	-75.3333	40.8667	718	5/1948	12/2000	49	0.2225	0.0323	0.1653	4.25
36-6852	PERULACK	PA	7	-77.6544	40.3550	810	7/1975	12/2000	21	0.2573	0.3746	0.2984	1.95
36-6889	PHILADELPHIA WSO AP	PA	1	-75.2311	39.8683	5	1/1900	12/2000	101	0.1753	0.1140	0.1576	0.66
36-6916	PHILIPSBURG 8 E	PA	7	-78.0667	40.9167	1945	5/1948	12/2000	51	0.1615	0.0209	0.1995	2.42
36-6927	PHOENIXVILLE 1 E	PA	3	-75.5011	40.1200	105	5/1948	12/2000	47	0.1641	0.1754	0.1317	0.70
36-6993	PITTSBURGH WSCOM 2 AP	PA	12	-80.2311	40.5014	1150	1/1900	12/2000	96	0.1778	0.1892	0.1603	0.25
36-6997	PITTSBURGH WB CITY	PA	12	-80.0000	40.4500	1017	5/1948	9/1979	32	0.1913	0.2167	0.2830	2.00
36-7029	PLEASANT MOUNT 1 W	PA	6	-75.4500	41.7333	1799	5/1948	12/2000	45	0.2063	0.1997	0.2049	1.53
36-7116	PORT CLINTON 1 S	PA	6	-76.0333	40.5833	449	5/1948	7/1979	31	0.2287	0.0833	0.0882	1.63
36-7186	PROMPTON DAM	PA	6	-75.3300	41.5892	1230	5/1966	12/2000	30	0.1523	0.1304	0.0930	1.01
36-7217	PUNXSUTAWNEY 1	PA	12	-79.0000	40.9500	1300	5/1948	5/1996	43	0.1814	0.1829	0.1853	0.31
36-7229	PUTNEYVILLE 2 SE DAM	PA	12	-79.2825	40.9250	1280	5/1948	12/2000	51	0.1743	0.1116	0.1644	0.76
36-7310	RAYMOND	PA	7	-77.8667	41.8500	2300	5/1948	11/1992	43	0.2032	0.2111	0.2175	0.19
36-7312	RAYSTOWN LAKE 2	PA	7	-78.0047	40.4314	840	6/1974	12/2000	27	0.2077	0.2148	0.1469	0.06
36-7318	READING WB CITY	PA	3	-75.9667	40.3333	289	5/1948	1/1973	22	0.1262	0.2072	0.2839	3.55
36-7322	READING 4 NNW	PA	3	-75.9319	40.4269	360	1/1973	12/2000	25	0.1889	0.1274	0.2476	1.24
36-7410	RENOVO 5 S	PA	7	-77.7667	41.2333	2039	5/1948	9/1997	45	0.2297	0.1584	0.2641	1.78
36-7540	ROCHESTER 1 N	PA	12	-80.3000	40.7167	900	5/1948	6/1991	43	0.1810	0.1294	0.1260	0.23
36-7732	SAFE HARBOR	PA	3	-76.3833	39.9167	233	10/1951	12/2000	39	0.2326	0.2400	0.1624	1.13
36-7846	SAXTON	PA	7	-78.2500	40.2000	780	5/1948	10/1975	28	0.2131	0.1275	0.0742	0.97
36-7855	SCANDIA 2 E	PA	12	-79.0333	41.9167	2120	5/1948	5/1998	49	0.1992	0.1368	0.0761	0.38
36-7931	SELINSGROVE 2 S	PA	6	-76.8611	40.7831	420	5/1948	12/2000	50	0.2009	0.1840	0.1259	0.45
36-7938	SELLERSVILLE 2 NW	PA	3	-75.3222	40.3589	340	5/1948	12/2000	38	0.1493	0.0599	0.1101	1.84
36-7965	SHADE GAP 2 NE	PA	7	-77.8667	40.1833	922	5/1948	10/1980	33	0.2283	0.0866	0.1543	2.00
36-8026	SHEFFIELD 6 W	PA	12	-79.1464	41.7089	1920	5/1948	12/2000	53	0.2145	0.2331	0.1817	0.35
36-8184	SLIPPERY ROCK	PA	12	-80.0667	41.0500	1250	1/1971	12/2000	25	0.2086	0.2406	0.0899	1.15
36-8190	SMETHPORT HIWAY SHED	PA	12	-78.4333	41.8167	1469	5/1948	3/1991	39	0.1985	0.2156	0.1728	0.10
36-8275	SOUTH CANAAN 1 NE	PA	6	-75.4000	41.5167	1400	7/1948	9/1992	43	0.1624	0.0659	0.0901	0.58
36-8379	SPRING GROVE	PA	3	-76.8667	39.8667	450	5/1948	3/1990	42	0.2328	0.1718	0.1303	0.93

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
36-8449	STATE COLLEGE	PA	7	-77.8672	40.7933	1170	5/1948	10/1973	26	0.1622	0.1501	0.1060	0.98
36-8469	STEVENSON DAM	PA	7	-78.0167	41.4000	932	7/1969	12/2000	25	0.1841	0.1901	0.1408	0.26
36-8491	STILLWATER LAKE	PA	6	-75.4833	41.6833	1650	3/1960	12/2000	40	0.2055	0.2092	0.1434	0.68
36-8589	STRONGSTOWN	PA	12	-78.9167	40.5500	1880	5/1948	12/2000	46	0.2280	0.3163	0.2295	1.52
36-8596	STROUDSBURG 2 E	PA	5	-75.1906	41.0125	460	5/1948	9/1997	36	0.2639	0.2292	0.0924	0.69
36-8725	SWEET VALLEY	PA	6	-76.1333	41.2833	1342	5/1948	6/1970	22	0.1935	0.0796	0.0882	0.56
36-8758	TAMAQUA	PA	6	-75.9753	40.7947	925	1/1973	12/2000	28	0.1754	0.0885	0.0684	0.96
36-8763	TAMAQUA 4 N DAM	PA	6	-75.9833	40.8500	1110	5/1948	9/2000	46	0.1948	0.1391	0.1217	0.13
36-8868	TIOGA HAMMOND DAM	PA	7	-77.1419	41.8983	1230	4/1975	12/2000	25	0.2588	0.4486	0.2858	2.74
36-8873	TIONESTA 2 SE LAKE	PA	12	-79.4333	41.4833	1200	5/1948	12/2000	46	0.2113	0.2661	0.2004	0.54
36-8885	TITUSVILLE	PA	12	-79.6667	41.6333	1552	5/1948	11/1976	29	0.1703	0.1069	0.1247	0.59
36-8893	TOBYHANNA	PA	5	-75.2225	41.1386	1916	5/1948	12/2000	44	0.2017	0.3017	0.1683	0.46
36-8905	TOWANDA 1 ESE	PA	7	-76.4281	41.7503	750	5/1948	12/2000	53	0.1576	0.1809	0.1449	1.31
36-8989	TUNNELTON	PA	12	-79.3833	40.4500	889	5/1948	3/1984	34	0.1952	0.1215	0.1440	0.31
36-9022	TYRONE	PA	7	-78.2192	40.6644	890	10/1972	12/2000	23	0.1701	0.1453	0.1982	0.83
36-9024	TYRONE 4 NE BALD EAGLE	PA	7	-78.2000	40.7167	1020	5/1948	9/1972	25	0.2498	0.1658	0.0240	3.58
36-9042	UNION CITY	PA	12	-79.8167	41.9000	1400	3/1950	12/2000	48	0.1981	0.2549	0.1872	0.35
36-9312	WASHINGTON	PA	12	-80.2333	40.1833	1150	5/1948	11/1989	37	0.2132	0.1400	0.1352	0.36
36-9367	WAYNESBURG 1 E	PA	12	-80.1667	39.9000	940	5/1948	12/2000	48	0.2232	0.1519	0.1368	0.60
36-9408	WELLSBORO 3 S	PA	7	-77.3894	41.7003	1818	11/1957	12/2000	36	0.2009	0.2828	0.1672	0.53
36-9705	WILKES BARRE WB-SCRANT	PA	6	-75.7267	41.3389	930	4/1955	12/2000	46	0.2038	0.1910	0.1284	0.53
36-9728	WILLIAMSPORT WSO AP	PA	6	-76.9219	41.2419	520	5/1948	4/1984	36	0.1867	0.0695	0.1171	0.24
36-9938	YORK 2 S FILTER PLANT	PA	3	-76.7253	39.9400	640	5/1948	12/2000	50	0.2117	0.2351	0.0936	0.71
36-9966	YOUNGSVILLE	PA	12	-79.3167	41.8500	1217	5/1948	4/1985	33	0.1687	0.1152	0.0812	0.78
38-0613	BELTON 7 NNE	SC	2	-82.4336	34.6014	660	6/1958	12/2000	42	0.2156	0.2582	0.1464	0.67
38-1544	CHARLESTON WSO AP	SC	2	-80.0408	32.8986	40	2/1954	12/2000	47	0.1614	0.2353	0.2012	0.67
38-1549	CHARLESTON WSO CITY	SC	2	-79.9333	32.7833	10	6/1948	12/2000	53	0.1943	0.2269	0.1747	0.11
38-1726	CLARK HILL 1 W	SC	2	-82.1897	33.6631	380	1/1952	12/2000	47	0.1895	0.2559	0.1798	0.23
38-1770	CLEMSON COLLEGE	SC	2	-82.8236	34.6603	824	6/1949	12/2000	26	0.1553	0.2065	0.1947	0.61
38-1939	COLUMBIA WSFO AP	SC	2	-81.1219	33.9456	213	12/1953	12/2000	47	0.1650	0.1340	0.1897	0.44
38-3468	GEORGETOWN 2 E	SC	2	-79.2239	33.3619	10	6/1948	12/2000	48	0.1754	0.1694	0.1619	0.03
38-3747	GRNVL SPART WSO AP	SC	2	-82.2239	34.8847	943	10/1962	12/2000	38	0.2025	0.3919	0.1565	2.92

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
38-4581	JOCASSEE 8 WNW	SC	10	-83.0667	34.9833	2500	6/1948	12/2000	49	0.1907	0.1747	0.0814	0.26
38-4918	LANCASTER 2 SE	SC	2	-80.7533	34.7003	535	6/1948	12/2000	48	0.2001	0.2131	0.1745	0.23
38-5017	LAURENS	SC	2	-82.0219	34.4989	589	6/1948	12/2000	49	0.1935	0.1725	0.1393	0.22
38-5232	LOCKHART	SC	2	-81.4547	34.7811	400	6/1948	12/2000	50	0.1798	0.1072	0.1578	0.60
38-5278	LONGCREEK	SC	10	-83.2592	34.7744	1660	1/1961	12/2000	21	0.2142	0.1818	0.2334	2.12
38-5306	LORIS	SC	2	-78.8583	34.0464	90	6/1948	9/1992	44	0.1530	0.1374	0.1979	0.64
38-5493	MANNING	SC	2	-80.2364	33.6950	100	6/1948	12/2000	47	0.1834	0.0665	0.0900	1.49
38-6114	MULLINS 4 W	SC	2	-79.2478	34.1944	110	5/1966	12/2000	31	0.1832	0.1354	0.2006	0.83
38-6209	NEWBERRY	SC	2	-81.6269	34.2825	476	6/1948	12/2000	50	0.2041	0.3838	0.2511	2.41
38-6831	PICKENS 5 SE	SC	2	-82.7189	34.8819	1162	8/1951	12/2000	44	0.1800	0.1797	0.1680	0.02
38-6893	MONCKS CORNER 4 N	SC	2	-79.9833	33.2500	49	6/1948	12/2000	46	0.1228	0.0719	0.1318	1.83
38-7542	ST GEORGE	SC	2	-80.5833	33.1833	103	6/1948	12/2000	46	0.1491	0.1196	0.1369	0.61
38-7560	ST MATTHEWS	SC	2	-80.7806	33.6525	280	6/1948	12/2000	52	0.1664	0.1587	0.1069	0.61
38-7712	SANTEE COOPER SPILLWAY	SC	2	-80.1500	33.4500	75	6/1948	12/2000	52	0.1823	0.2411	0.1691	0.19
38-8707	TRAVELERS REST 1 S	SC	2	-82.4428	34.9494	1030	1/1971	12/2000	27	0.1657	0.1075	0.1671	0.48
38-8879	WAGENER 1 SW	SC	2	-81.3833	33.6333	430	6/1948	12/2000	51	0.1865	0.0765	0.1307	1.21
38-9327	WINNSBORO	SC	2	-81.0928	34.3739	560	7/1948	12/2000	40	0.1789	0.3054	0.1830	1.11
40-0603	BELVIDERE	TN	14	-86.2000	35.1333	971	9/1948	2/1976	27	0.1509	0.1488	0.1807	0.99
40-0724	BIG SYCAMORE	TN	14	-83.3333	36.5167	2031	9/1948	1/1979	30	0.1959	0.3318	0.2324	0.55
40-0876	BOLIVAR 2	TN	24	-88.9892	35.2622	455	9/1948	12/2000	43	0.1785	0.3080	0.2267	0.72
40-1094	TRI-CITIES AP	TN	14	-82.4044	36.4731	1500	9/1948	12/2000	52	0.2050	0.3262	0.2275	0.53
40-1150	BROWNSVILLE SEWAGE PLA	TN	23	-89.2692	35.5847	355	9/1948	12/2000	48	0.1643	0.1919	0.1341	0.17
40-1295	BUTLER	TN	10	-82.0167	36.3500	1991	9/1948	9/1980	32	0.1696	0.1495	0.1212	0.20
40-1323	CAGLE	TN	14	-85.4500	35.4667	2060	9/1948	9/1980	32	0.1674	0.2500	0.1966	0.28
40-1480	CARTHAGE	TN	13	-85.9444	36.2456	515	7/1959	12/2000	32	0.1472	0.2040	0.0913	1.66
40-1561	CELINA	TN	14	-85.4589	36.5400	540	9/1948	12/2000	42	0.2027	0.2836	0.2402	0.42
40-1656	LOVELL FIELD	TN	14	-85.2014	35.0311	671	9/1948	12/2000	52	0.1898	0.1824	0.1518	0.19
40-1663	NEPTUNE 3 S	TN	13	-87.2244	36.3244	392	3/1960	12/2000	41	0.1579	0.1973	0.1715	0.33
40-1978	CONASAUGA 4 N	TN	14	-84.7239	35.0289	840	6/1948	12/2000	46	0.1806	0.0768	0.0738	1.50
40-2489	DICKSON	TN	13	-87.3936	36.0747	780	9/1948	12/2000	52	0.1594	0.1567	0.1080	0.42
40-2608	DRUMMONDS	TN	23	-89.9167	35.4667	450	3/1958	12/1981	20	0.1383	0.0908	0.1297	0.94
40-2680	DYERSBURG	TN	23	-89.3808	36.0383	385	9/1948	12/2000	48	0.1673	0.1397	0.0898	0.48

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
40-3697	GREENFIELD 1 E	TN	23	-88.7978	36.1681	400	9/1948	12/2000	48	0.1942	0.0889	0.1790	1.70
40-4392	HUMBOLDT	TN	23	-88.9333	35.8167	331	9/1948	12/1988	39	0.1537	0.2747	0.2114	1.07
40-4561	JACKSON EXP STN	TN	23	-88.8333	35.6167	400	12/1977	12/2000	23	0.1380	-0.0248	0.1951	3.29
40-4613	JEFFERSON CITY 3 ENE	TN	14	-83.4739	36.1222	1108	9/1948	2/1995	45	0.1679	0.1657	0.0405	1.47
40-4678	JOHNSONVILLE STEAM PLA	TN	23	-87.9833	36.0333	410	9/1949	9/1980	31	0.1976	0.3017	0.2833	3.13
40-4950	MCGHEE TYSON AP	TN	14	-83.9858	35.8181	962	9/1948	12/2000	52	0.1964	0.3257	0.2003	0.50
40-5108	LEBANON 3 W	TN	13	-86.3192	36.2283	525	9/1948	12/2000	51	0.1743	0.1581	0.1193	0.19
40-5187	LEWISBURG EXP STN	TN	14	-86.8000	35.4167	787	9/1948	12/2000	52	0.1800	0.2516	0.1473	0.21
40-5210	LEXINGTON	TN	23	-88.3975	35.6467	540	9/1948	12/2000	48	0.1553	0.2798	0.1726	1.10
40-5327	LIVINGSTON 5 NE	TN	14	-85.2833	36.4333	960	9/1948	12/1991	42	0.1350	0.0529	0.1378	2.62
40-5720	MASON	TN	23	-89.5314	35.4156	319	10/1948	12/2000	50	0.1332	0.1420	0.1611	0.99
40-5954	MEMPHIS WSCMO AP	TN	23	-89.9864	35.0564	254	9/1948	12/2000	49	0.1296	0.1222	0.1752	1.22
40-6170	MONTEREY 1 E	TN	14	-85.2639	36.1542	1860	9/1948	12/2000	48	0.2032	0.2385	0.1895	0.19
40-6358	MUNFORD	TN	23	-89.8114	35.4556	448	9/1948	12/2000	28	0.1941	0.2562	0.1281	0.96
40-6371	MURFREESBORO 5 N	TN	14	-86.3786	35.9211	550	9/1948	12/2000	52	0.1722	0.2331	0.1730	0.12
40-6402	NASHVILLE WSO AIRPORT	TN	13	-86.6764	36.1253	600	9/1948	12/2000	52	0.1912	0.1670	0.1007	0.73
40-6750	OAK RIDGE ATDL	TN	14	-84.2486	36.0028	905	1/1953	12/2000	48	0.1816	0.2748	0.2708	0.73
40-6977	PARIS 2 NW	TN	23	-88.2958	36.2872	443	9/1948	12/1971	23	0.1879	0.3251	0.1205	2.10
40-7359	PORTLAND 2	TN	13	-86.5258	36.5875	794	6/1953	12/2000	47	0.1829	0.3302	0.2618	2.48
40-7811	ROCK ISLAND 2 NW	TN	14	-85.6333	35.8000	870	9/1948	12/2000	51	0.2052	0.2475	0.2139	0.33
40-7850	RODDY	TN	14	-84.7772	35.7656	810	9/1948	12/2000	51	0.1614	0.2335	0.1971	0.40
40-8065	SAMBURG WILDLIFE REF	TN	23	-89.3028	36.4528	310	9/1948	12/2000	52	0.1800	0.1686	0.0585	1.17
40-8113	SAVANNAH TVA	TN	23	-88.2167	35.2333	430	9/1948	9/1980	32	0.1965	0.1959	0.1144	0.74
40-8203	SHADY GROVE	TN	14	-87.2833	35.7500	551	9/1948	9/1980	32	0.1456	0.2629	0.1412	1.55
40-8562	SPRINGFIELD EXP STN	TN	13	-86.8472	36.4739	745	9/1948	12/2000	52	0.1473	0.1398	0.1552	0.99
40-8598	STANLEY KNOBS	TN	14	-82.9333	36.4833	1302	9/1948	10/1980	32	0.2103	0.2858	0.1498	0.55
40-8704	SUGAR HILL	TN	14	-87.8167	35.5333	531	9/1948	9/1976	28	0.1523	0.1431	0.1142	0.88
40-8758	SUMMITVILLE	TN	14	-85.9833	35.5500	1122	9/1948	9/1980	32	0.2045	0.3559	0.1984	0.95
40-8766	SUNBRIGHT 2 SW	TN	14	-84.6969	36.2492	1495	9/1948	12/2000	52	0.2006	0.1239	0.1006	1.09
40-9219	UNION CITY	TN	23	-89.0317	36.3925	350	9/1948	12/2000	49	0.1987	0.2556	0.1824	1.05
40-9339	VICTORY	TN	14	-87.8167	35.0833	971	9/1948	9/1980	32	0.1933	0.2778	0.2004	0.11
40-9701	WHITE HOLLOW	TN	14	-83.9000	36.3667	1503	9/1948	1/1979	30	0.1956	0.3459	0.2654	0.85

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
44-0013	ABINGDON 7 WSW	VA	14	-82.1000	36.6667	2001	10/1950	9/1980	30	0.1977	0.1362	0.1485	0.87
44-0166	ALTAVISTA	VA	3	-79.1650	37.0633	515	8/1950	12/2000	51	0.1782	0.0297	0.2018	1.94
44-0778	BLACKSTONE WATER WORKS	VA	3	-78.0167	37.0833	420	8/1948	4/1974	24	0.2115	0.2737	0.0177	2.68
44-1322	CAMP PICKETT	VA	3	-77.9486	37.0372	330	4/1974	12/2000	22	0.1789	0.2109	0.1108	0.57
44-1598	CHARLOTTESVILLE 1 SW	VA	3	-78.5167	38.0333	541	8/1948	4/1971	21	0.1759	-0.0049	0.1558	2.05
44-1614	CHATHAM	VA	3	-79.4106	36.8225	640	1/1961	12/2000	37	0.1926	-0.0386	0.0813	2.27
44-1708	CHURCHVILLE	VA	8	-79.1667	38.2333	1480	5/1948	12/1972	25	0.1731	0.2183	0.1062	1.22
44-1929	COLUMBIA 2SSE	VA	3	-78.1500	37.7333	290	8/1948	12/1985	36	0.2144	0.2131	0.1290	0.35
44-2044	COVINGTON FILTER PLANT	VA	8	-79.9883	37.8106	1230	2/1973	12/2000	25	0.2156	0.3091	0.1489	1.21
44-2269	DAVENPORT 2 NE	VA	14	-82.1000	37.1167	1601	8/1957	11/1998	38	0.1857	0.2413	0.2031	0.07
44-2326	DELAPLANE 1 N	VA	7	-77.9333	38.9333	522	5/1948	3/1969	20	0.1960	0.1717	0.2267	0.47
44-3272	GALAX WATER PLANT	VA	9	-80.9183	36.6542	2360	2/1958	12/2000	38	0.1919	0.1793	0.0488	1.21
44-3310	GATHRIGHT DAM	VA	8	-79.9542	37.9458	1770	5/1980	12/2000	20	0.2280	0.2513	0.1768	0.97
44-3623	GROSECLOSE	VA	9	-81.3500	36.8667	2552	1/1949	9/1980	32	0.1674	0.3007	0.3251	1.62
44-4078	HONAKER	VA	14	-82.0000	37.0167	1962	11/1948	9/1980	32	0.1487	0.1585	0.2174	1.37
44-4128	HOT SPRINGS	VA	8	-79.8317	37.9969	2236	8/1948	12/2000	48	0.1978	0.2168	0.1690	0.16
44-4180	HURLEY	VA	14	-82.0561	37.3653	1088	10/1964	12/2000	34	0.2108	0.1371	0.1682	1.47
44-4185	HURLEY 1 SE	VA	12	-82.0167	37.4167	991	8/1948	11/1998	24	0.2255	0.1484	0.0365	1.53
44-4246	INDIAN VALLEY	VA	8	-80.5667	36.9000	2700	8/1948	9/1993	46	0.2102	0.1606	0.1316	0.43
44-4410	JOHN FLANNAGAN RESERVO	VA	14	-82.3436	37.2344	1460	7/1957	12/1991	32	0.2233	0.2472	0.0948	1.35
44-4414	JOHN H KERR DAM	VA	3	-78.3011	36.6003	250	10/1948	12/2000	46	0.2058	0.2575	0.2283	0.78
44-4452	JORDAN MINES	VA	8	-80.1000	37.6833	1401	8/1948	12/1972	25	0.1933	0.0703	0.0691	2.64
44-5120	LYNCHBURG WSO AIRPORT	VA	3	-79.2067	37.3375	940	8/1948	12/2000	53	0.1864	0.2412	0.2582	0.91
44-5423	MC GAHEYSVILLE 3 S	VA	8	-78.7333	38.3500	1089	5/1948	12/1983	36	0.1934	0.2043	0.1853	0.45
44-5595	MILLGAP 1 NNE	VA	8	-79.7264	38.3569	2520	9/1976	12/2000	22	0.2051	0.2357	0.0795	1.27
44-5690	MONTEBELLO FISH NURSER	VA	8	-79.1308	37.8494	2649	10/1948	12/2000	50	0.1481	0.1575	0.1972	3.01
44-5851	MOUNT WEATHER	VA	7	-77.8892	39.0625	1720	5/1948	9/1986	38	0.2005	0.1884	0.0997	0.32
44-6139	NORFOLK WSO AIRPORT	VA	2	-76.1922	36.9033	30	8/1953	12/2000	47	0.1788	0.2330	0.1552	0.24
44-6475	PAINTER 2 W	VA	1	-75.8217	37.5831	30	2/1959	12/2000	33	0.2206	0.1596	0.2491	0.90
44-6692	PHILPOTT DAM 2	VA	3	-80.0272	36.7764	1123	10/1953	12/2000	44	0.1789	0.1658	0.1497	0.15
44-6712	PIEDMONT RESEARCH STN	VA	3	-78.1208	38.2317	520	5/1971	12/2000	30	0.1861	0.0684	-0.0367	2.46
44-6955	PULASKI	VA	8	-80.7842	37.0556	1850	12/1952	12/2000	44	0.2244	0.1556	0.1647	1.39

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
44-7025	RANDOLPH 5 NNE	VA	3	-78.7000	36.9833	351	11/1948	12/1983	28	0.2561	0.1611	0.1098	2.39
44-7201	RICHMOND WSO AIRPORT	VA	3	-77.3203	37.5050	164	8/1948	12/2000	53	0.1866	0.1538	0.0879	0.32
44-7285	ROANOKE WSO AIRPORT	VA	8	-79.9742	37.3169	1149	8/1948	12/2000	53	0.2052	0.2389	0.1510	0.14
44-7338	ROCKY MOUNT	VA	3	-79.8961	36.9769	1315	10/1969	12/2000	26	0.2052	0.0529	0.0419	1.03
44-7997	SPRING CREEK 2	VA	9	-81.6500	37.0167	2372	11/1950	2/1981	30	0.2320	0.3866	0.2064	0.71
44-8046	STAR TANNERY	VA	7	-78.4442	39.0858	950	5/1948	12/2000	51	0.1891	0.2473	0.2321	0.67
44-8396	THE PLAINS 2 NNE	VA	3	-77.7547	38.8956	530	1/1970	12/2000	31	0.2049	0.0583	-0.0048	1.59
44-8547	TROUT DALE 3 SSE	VA	9	-81.4053	36.6600	2820	8/1948	12/2000	50	0.2430	0.2685	0.0715	0.99
44-8849	WALLOPS ISLAND WSSF	VA	1	-75.4667	37.9333	33	10/1966	10/1993	23	0.1741	0.1738	0.2668	1.37
44-8906	WASHINGTON REAGAN AP	VA	1	-77.0342	38.8650	10	5/1948	12/2000	53	0.2146	0.2743	0.2517	0.95
44-9060	WHITE GATE	VA	8	-80.8167	37.1833	1850	8/1948	9/1993	43	0.2150	0.1679	0.1155	0.60
44-9151	WILLIAMSBURG 2 N	VA	2	-76.7039	37.3017	70	8/1948	12/2000	42	0.1970	0.2978	0.2193	0.80
44-9215	WISE 1 SE	VA	14	-82.5389	36.9986	2549	11/1955	12/2000	42	0.1923	0.1831	0.2371	1.06
44-9272	WOOLWINE 4 S	VA	3	-80.2689	36.7817	1520	6/1951	12/2000	49	0.2005	0.1878	0.0997	0.22
44-9301	WYTHEVILLE POST OFFICE	VA	9	-81.0942	36.9317	2450	8/1948	12/2000	50	0.2429	0.2507	0.2336	1.90
46-0582	BECKLEY WSO AP	WV	12	-81.1247	37.7950	2504	6/1963	12/2000	38	0.2354	0.2580	0.1328	1.28
46-0939	BLUESTONE LAKE	WV	8	-80.8831	37.6411	1390	10/1952	6/1988	33	0.1742	0.1636	0.1351	0.58
46-1323	CACAPON STATE PARK	WV	7	-78.2942	39.5058	950	6/1978	12/2000	23	0.1527	-0.0403	0.0985	2.68
46-1393	CANAAN VALLEY	WV	7	-79.4167	39.0500	3249	10/1971	3/1996	22	0.2381	0.2900	0.2814	1.05
46-1570	CHARLESTON WSFO AP	WV	12	-81.5914	38.3794	910	8/1948	12/2000	52	0.2046	0.1458	0.2271	1.57
46-1677	CLARKSBURG 1	WV	12	-80.3528	39.2692	990	8/1948	12/2000	46	0.1649	0.1064	0.0803	0.92
46-1959	CORTON	WV	12	-81.2711	38.4864	640	4/1955	7/1996	35	0.1964	0.1231	0.1156	0.18
46-2209	DAVIS	WV	7	-79.4667	39.1333	3123	8/1948	9/1971	24	0.2141	0.2001	0.1631	0.08
46-2462	DRY CREEK	WV	12	-81.4650	37.8594	1264	8/1948	12/2000	50	0.1856	0.1672	0.1287	0.09
46-2718	ELKINS WSO AIRPORT	WV	12	-79.8528	38.8853	1948	8/1948	12/2000	52	0.1840	0.1593	0.0464	1.21
46-3072	FLAT TOP	WV	8	-81.0925	37.5894	3335	8/1948	12/2000	51	0.1993	0.1808	0.1230	0.13
46-3215	FRANKLIN 2 N	WV	8	-79.3092	38.6756	1900	5/1948	3/1994	42	0.2182	0.1732	0.1979	1.52
46-3238	FREEMANSBURG 5 NE	WV	12	-80.4506	39.1303	1020	8/1948	12/2000	40	0.2196	0.2260	0.1353	0.47
46-3353	GARY	WV	9	-81.5500	37.3667	1430	8/1948	5/1989	35	0.2266	0.3306	0.1844	0.27
46-3361	GASSAWAY	WV	12	-80.7678	38.6650	840	4/1951	12/2000	47	0.1685	0.2317	0.2146	0.95
46-3749	YAWKEY	WV	12	-81.9853	38.2381	780	5/1949	12/2000	51	0.1878	0.1924	0.1506	0.07
46-3816	HALL	WV	12	-80.1167	39.0500	1381	8/1948	8/1976	27	0.2062	0.1383	0.0543	0.74

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
46-4369	HUNDRED	WV	12	-80.4667	39.7000	1000	8/1948	12/2000	43	0.2236	0.3823	0.2138	2.62
46-4388	HUNTINGTON FEDERAL BLD	WV	12	-82.4500	38.4167	565	8/1948	12/1989	36	0.1505	0.1979	0.1636	1.44
46-4393	HUNTINGTON FAA AIRPORT	WV	12	-82.5550	38.3650	824	1/1962	12/2000	39	0.1873	0.2512	0.1838	0.43
46-4763	KEARNEYSVILLE	WV	7	-77.8833	39.3833	550	2/1967	12/1994	20	0.1790	0.2462	0.0808	1.57
46-5002	LAKE LYNN	WV	12	-79.8561	39.7200	900	8/1948	12/2000	49	0.1959	0.3456	0.2485	1.76
46-5284	LINDSIDE	WV	8	-80.6711	37.4558	2000	7/1957	12/2000	43	0.2119	0.3022	0.1474	1.05
46-5323	LIVERPOOL	WV	12	-81.5311	38.8956	665	8/1948	12/2000	48	0.2005	0.1848	0.1275	0.05
46-5341	LOCKNEY	WV	12	-80.9669	38.8531	720	8/1948	12/2000	43	0.2109	0.1487	0.2076	1.19
46-5353	LOGAN	WV	12	-81.9961	37.8611	640	8/1948	12/2000	41	0.1804	0.0340	0.0226	1.57
46-5672	MARLINTON	WV	8	-80.0914	38.2175	2150	8/1948	12/2000	53	0.2004	0.2263	0.0903	0.85
46-5712	MARTINSBURG 2 W	WV	7	-78.0000	39.4667	541	5/1948	7/1971	23	0.2276	0.1236	0.2215	1.71
46-5739	MATHIAS	WV	7	-78.8617	38.8722	1540	5/1948	5/1993	44	0.2204	0.2279	0.0860	0.84
46-6163	MOOREFIELD	WV	7	-78.9664	39.0461	890	5/1948	12/2000	52	0.2155	0.2550	0.2587	0.52
46-6293	MOUNT STORM	WV	7	-79.2333	39.2833	2851	5/1951	6/1972	21	0.1916	0.0639	0.0037	1.94
46-6591	OAK HILL	WV	12	-81.1508	37.9714	2040	8/1948	12/2000	50	0.2075	0.2869	0.1670	0.80
46-6859	PARKERSBURG 1 E	WV	12	-81.5572	39.2811	620	8/1948	1/1983	34	0.1907	0.2514	0.1843	0.38
46-7730	ROMNEY	WV	7	-78.7728	39.3389	720	2/1967	12/2000	28	0.2100	0.3039	0.1923	0.54
46-8286	SMITHVILLE	WV	12	-81.0989	39.0728	760	7/1950	12/2000	46	0.2047	0.1561	0.1276	0.09
46-8777	TERRA ALTA NO 1	WV	12	-79.5469	39.4467	2630	8/1948	12/2000	51	0.1604	0.2053	0.1150	1.35
46-8924	TRIBBLE	WV	12	-81.8500	38.7000	700	8/1948	9/1994	45	0.2364	0.2225	0.1491	0.98
46-8986	TYGART DAM	WV	12	-80.0300	39.3139	1200	8/1948	12/2000	51	0.1923	0.1309	0.1352	0.16
46-9011	UNION 3 SSE	WV	8	-80.5336	37.5436	2110	8/1948	12/2000	53	0.2006	0.2701	0.1856	0.75
46-9086	VALLEY HEAD	WV	8	-80.0369	38.5453	2425	8/1948	12/2000	51	0.1729	0.1658	0.1489	0.64
46-9333	WEBSTER SPRINGS	WV	12	-80.4167	38.4833	1540	8/1948	11/1998	47	0.1870	0.2269	0.1489	0.31
46-9458	WEST UNION 2	WV	12	-80.7694	39.2911	790	8/1948	12/2000	47	0.1906	0.2107	0.1468	0.13
47-0045	AFTON	WI	19	-89.0644	42.6475	742	8/1948	12/2000	47	0.1970	0.1919	0.0996	0.45
47-0308	ARLINGTON EXP FARM	WI	20	-89.3269	43.3008	1080	6/1975	12/2000	22	0.2124	0.1874	0.1502	0.40
47-0890	BLANCHARDVILLE	WI	19	-89.8628	42.8169	830	9/1948	12/2000	50	0.2349	0.2874	0.1655	1.95
47-1416	CHARMANY FARM	WI	20	-89.4781	43.0603	910	6/1950	12/2000	50	0.2166	0.1556	0.0611	0.52
47-1913	CUBA CITY	WI	21	-90.4592	42.6253	900	8/1948	12/2000	44	0.1991	0.2178	0.2721	0.69
47-2302	EAGLE 2 W	WI	19	-88.5167	42.8667	900	8/1948	3/1994	44	0.2012	0.2101	0.2059	0.30
47-2745	FENNIMORE 1 NE	WI	21	-90.6500	43.0000	1181	8/1948	12/1969	21	0.2269	0.3985	0.3142	2.62

ID	Name	ST	Hourly Region	LON	LAT	Elev (ft)	Begin	End	Data yrs	L-CV	L-CS	L-CK	Disc.
47-3453	HARTFORD SEWAGE PLANT	WI	20	-88.4114	43.3311	980	8/1948	12/2000	50	0.1791	0.0713	0.0282	1.17
47-3756	HORICON	WI	20	-88.6325	43.4406	880	8/1948	12/2000	48	0.1975	0.2167	0.1705	0.63
47-4546	LANCASTER 4 WSW	WI	21	-90.7889	42.8278	1040	8/1948	12/2000	50	0.1957	0.2780	0.1653	1.01
47-4821	LONE ROCK TRI CO	WI	20	-90.1833	43.2000	719	8/1948	3/1983	31	0.1838	0.0903	0.0823	0.28
47-4937	LYNXVILLE DAM 9	WI	20	-91.0992	43.2111	633	8/1948	12/2000	42	0.1550	0.1853	0.2813	2.35
47-4961	MADISON WSO AIRPORT	WI	20	-89.3453	43.1406	866	8/1948	12/2000	52	0.1627	0.0534	0.0581	1.31
47-5479	MILWAUKEE NB SIDE PORT	WI	19	-87.9044	42.9550	670	9/1948	12/2000	52	0.1875	0.2641	0.3021	1.86
47-8163	STEUBEN 1 NW	WI	20	-90.8667	43.1833	685	8/1948	5/1997	46	0.1641	0.0132	0.1264	1.40

Appendix A.7. Average L-moment statistics and heterogeneity measures for regions used to prepare NOAA Atlas 14 Volume 2.

Table A.7.1. Number of daily and hourly stations, H1 statistic, mean number of data years, and weighted L-statistics of 24-hour data for each daily region and at-site.

region	# daily stations	# hourly stations	H1	Mean number of data years*	Coeff. of L-variation Weighted Mean	L-Skewness Weighted Mean	L-Kurtosis Weighted Mean
1	76	13	-1.22	58	0.214	0.290	0.197
2	30	10	-0.42	58	0.210	0.267	0.196
3	23	7	-0.44	65	0.211	0.300	0.210
4	37	9	-1.59	60	0.203	0.258	0.179
5	21	2	-1.47	66	0.201	0.307	0.222
6	31	11	-2.75	58	0.205	0.280	0.212
7	62	15	-2.56	60	0.188	0.244	0.176
8	57	20	-1.28	56	0.206	0.298	0.197
9	48	16	1.91	57	0.202	0.266	0.183
10	20	4	0.65	64	0.180	0.202	0.141
11	51	12	-0.32	62	0.186	0.218	0.144
12	22	6	-2.16	59	0.196	0.302	0.223
13	36	8	-1.51	69	0.184	0.250	0.179
14	12	4	0.37	52	0.172	0.175	0.139
15	31	8	-0.96	58	0.178	0.223	0.171
16	46	17	-1.59	55	0.189	0.256	0.214
17	78	29	-0.11	53	0.169	0.199	0.171
18	96	41	-0.98	49	0.196	0.268	0.192
19	46	22	-0.72	53	0.183	0.240	0.168
20	23	13	-1.03	51	0.192	0.307	0.242
21	41	13	1.97	55	0.198	0.247	0.177
22	7	3	-0.9	45	0.183	0.283	0.257
23	22	6	0.8	59	0.155	0.191	0.161
24	34	8	-0.56	60	0.194	0.226	0.165
25	16	2	1.5	54	0.202	0.252	0.170
26	51	15	1.29	57	0.173	0.206	0.154
27	6	1	-0.05	59	0.185	0.272	0.208
28	51	21	-1.16	55	0.170	0.154	0.118
29	5	1	-1.43	60	0.189	0.303	0.241
30	122	48	-1.84	53	0.169	0.222	0.179
31	126	39	0.76	56	0.163	0.211	0.168
32	33	12	0.19	48	0.159	0.196	0.163
33	20	9	-2.64	46	0.173	0.251	0.222
34	22	7	1.42	48	0.144	0.154	0.140
35	9	2	-0.33	52	0.173	0.275	0.214
36	88	20	-0.46	56	0.168	0.193	0.149
37	10	2	-0.33	50	0.187	0.252	0.161
38	58	13	-0.35	57	0.183	0.226	0.164
39	45	17	-0.52	51	0.174	0.209	0.159

region	# daily stations	# hourly stations	H1	Mean number of data years*	Coeff. of L-variation Weighted Mean	L-Skewness Weighted Mean	L-Kurtosis Weighted Mean
40	47	21	-0.75	53	0.187	0.277	0.208
41	20	8	-0.68	58	0.189	0.237	0.179
42	7	2	0.01	71	0.197	0.281	0.238
43	34	15	-1.01	64	0.173	0.225	0.167
44	4	1	-0.41	69	0.182	0.261	0.221
45	78	34	0.64	59	0.170	0.179	0.149
46	41	20	-1.22	59	0.181	0.251	0.186
47	62	22	-1.84	56	0.168	0.214	0.161
48	6	3	-0.89	50	0.170	0.297	0.220
49	6	1	-0.42	62	0.205	0.330	0.297
50	4	2	-0.69	67	0.222	0.331	0.261
51	10	5	-0.38	63	0.206	0.265	0.205
52	99	45	-1.71	64	0.185	0.218	0.164
53	25	5	0.64	63	0.176	0.179	0.150
54	6	2	-0.02	64	0.219	0.326	0.271
55	22	19	-1.41	45	0.209	0.253	0.195
56	12	5	1.34	68	0.178	0.230	0.193
57	25	10	-2.41	61	0.170	0.202	0.156
58	21	10	-1.44	59	0.188	0.250	0.175
59	3	2	0.1	58	0.195	0.260	0.209
60	46	19	-1.8	64	0.182	0.216	0.163
61	25	9	0.36	55	0.185	0.236	0.164
62	53	15	-1.6	62	0.196	0.257	0.181
63	25	15	-1.1	55	0.190	0.195	0.163
64	17	4	-0.62	63	0.186	0.237	0.172
65	22	6	-1.57	70	0.199	0.258	0.186
66	15	3	0.75	64	0.202	0.257	0.181
67	85	29	1.2	62	0.186	0.201	0.142
68	3	0	-0.89	57	0.218	0.270	0.155
69	31	15	-0.82	59	0.192	0.274	0.215
70	42	16	-1.43	55	0.176	0.161	0.143
71	15	5	-1.17	58	0.192	0.260	0.211
72	20	2	-0.91	61	0.180	0.216	0.162
73	16	3	-1.03	58	0.192	0.280	0.212
74	67	23	0.97	61	0.171	0.156	0.122
75	35	14	-2.38	55	0.181	0.232	0.180
76	30	12	1.85	61	0.164	0.174	0.142
77	40	13	-1.9	60	0.186	0.220	0.169
78	6	1	0.46	58	0.180	0.158	0.127
79	13	4	-0.27	58	0.198	0.254	0.184
80	5	4	-1.59	55	0.184	0.231	0.161
81	12	10	0.25	55	0.174	0.194	0.168
82	13	3	-0.75	60	0.194	0.254	0.209
83	17	7	1.66	53	0.198	0.251	0.170

region	# daily stations	# hourly stations	H1	Mean number of data years*	Coeff. of L-variation Weighted Mean	L-Skewness Weighted Mean	L-Kurtosis Weighted Mean
84	47	22	-2.64	50	0.193	0.245	0.191
A1	1	2	N/A	65	0.188	0.279	0.202
A2	1	0	N/A	104	0.218	0.342	0.265
total	2846	994		63			

*includes both daily and hourly stations

Table A.7.2. Number of hourly stations, H1 statistic, mean number of data years, and weighted L-statistics of 60-minute data for each hourly region.

region	# hourly stations	H1	Mean number of data years	Coeff. of L-variation Weighted Mean	L-Skewness Weighted Mean	L-Kurtosis Weighted Mean
1	25	-1.30	38	0.201	0.163	0.157
2	57	1.46	44	0.182	0.193	0.161
3	55	-0.21	39	0.195	0.172	0.145
4	9	0.21	42	0.164	0.122	0.134
5	27	1.21	39	0.212	0.241	0.172
6	29	1.68	36	0.182	0.123	0.137
7	79	-0.41	35	0.205	0.207	0.172
8	19	-0.62	40	0.198	0.203	0.147
9	9	0.60	43	0.209	0.248	0.183
10	25	0.83	35	0.188	0.176	0.128
11	11	0.88	44	0.195	0.177	0.142
12	131	-0.16	40	0.196	0.181	0.147
13	36	-0.82	40	0.175	0.187	0.165
14	61	-0.12	40	0.187	0.235	0.178
15	12	0.83	44	0.165	0.170	0.155
16	63	-1.10	42	0.201	0.193	0.155
17	22	1.35	39	0.198	0.214	0.155
18	89	-1.72	42	0.188	0.181	0.155
19	26	-0.82	38	0.198	0.178	0.147
20	14	1.63	45	0.191	0.135	0.127
21	23	-0.50	40	0.205	0.218	0.193
22	71	0.80	41	0.186	0.178	0.157
23	64	0.04	43	0.169	0.165	0.153
24	8	-2.03	48	0.171	0.248	0.170
25	7	-0.40	37	0.194	0.170	0.171
26	22	0.59	36	0.196	0.181	0.141
total	994		40			

Appendix A.8. Heterogeneity statistic, H1, for regions and durations used in NOAA Atlas 14 Volume 2.

Table A.8.1. H1 for daily regions (1-84) for durations 24-hour through 60-day.

Region	24-hr	2-day	4-day	7-day	10-day	20-day	30-day	45-day	60-day
1	-1.22	-1.14	-0.70	-1.68	-0.87	-0.32	0.83	1.33	1.46
2	-0.42	-0.98	-0.39	-0.08	-0.27	-0.97	0.02	-0.60	-0.52
3	-0.44	0.72	-0.07	-0.06	0.02	-0.25	-1.93	-0.85	-0.36
4	-1.59	-1.50	-1.03	-1.87	-0.17	-0.59	-0.85	-0.60	-1.63
5	-1.47	-2.05	-1.28	-0.74	-1.34	-0.56	0.61	-0.48	0.30
6	-2.75	-2.47	-1.95	-2.18	-2.16	-2.73	-1.61	-1.29	-1.38
7	-2.56	-1.09	-1.80	-3.21	-2.50	-2.45	-1.16	-0.58	-1.55
8	-1.28	-0.21	-1.56	-1.85	-1.83	-0.39	-1.74	-0.93	-1.16
9	1.91	1.43	0.71	1.13	1.24	0.16	1.71	1.56	2.31
10	0.65	-0.34	-1.07	-1.68	-1.50	-1.57	1.06	-0.07	0.49
11	-0.32	0.70	-0.20	-0.14	0.24	0.27	1.52	1.02	1.84
12	-2.16	-2.39	-2.16	-1.00	-1.26	-1.44	-0.77	-0.33	-0.96
13	-1.51	-1.54	-1.66	-1.95	-0.43	-0.16	0.13	0.10	0.46
14	0.37	1.09	1.81	1.71	2.60	2.93	2.82	3.24	0.37
15	-0.96	-0.56	-0.05	-0.71	-0.74	-1.25	-1.38	-1.06	-1.02
16	-1.59	-1.45	-0.82	-0.05	-0.37	0.64	0.58	1.80	1.60
17	-0.11	-0.83	-0.06	0.03	0.09	-0.22	-1.18	0.80	1.82
18	-0.98	-1.73	-1.55	-1.70	-1.20	-0.64	0.40	0.73	-0.03
19	-0.72	-1.59	-1.60	-0.73	-1.24	0.05	-1.15	-0.52	-1.50
20	-1.03	0.25	0.73	2.20	2.78	2.90	3.59	2.30	3.96
21	1.97	2.84	4.15	3.97	4.66	5.00	3.40	1.21	1.31
22	-0.9	0.39	0.00	0.35	2.33	0.85	-0.11	-0.44	-0.50
23	0.8	1.45	2.53	2.31	2.75	2.52	1.56	3.29	3.68
24	-0.56	0.21	1.07	1.39	1.30	-0.09	2.12	3.35	2.33
25	1.5	1.06	1.84	2.06	2.16	1.03	0.51	0.11	-0.08
26	1.29	0.29	1.00	-0.26	-0.47	0.22	1.77	2.21	2.81
27	-0.05	0.50	0.10	-1.06	-1.81	0.07	-0.72	0.37	0.64
28	-1.16	-2.56	-2.92	-2.26	-1.36	-1.07	-0.10	1.39	0.55
29	-1.43	-1.23	-1.67	-1.97	-1.49	-1.08	0.21	-1.27	-0.79
30	-1.84	-0.91	-1.71	-0.60	0.96	0.53	1.01	0.23	0.77
31	0.76	-0.97	-2.66	-1.44	-1.23	0.21	0.64	0.03	1.34
32	0.19	-0.94	-1.44	-0.65	0.54	2.21	2.53	1.73	1.84
33	-2.64	-2.75	-0.92	0.19	0.10	0.19	0.09	0.71	2.71
34	1.42	1.24	1.42	1.05	0.41	-0.13	-0.52	-0.35	-0.25
35	-0.33	1.13	0.99	0.43	0.31	1.74	2.44	2.46	2.40
36	-0.46	-1.22	-1.40	0.63	0.66	2.10	0.73	-0.31	0.58
37	-0.33	0.18	-1.17	-1.23	-0.46	-0.47	-0.43	0.18	-1.40
38	-0.35	-1.75	-2.03	-2.61	-2.51	-2.38	-2.59	-1.17	-1.36
39	-0.52	-1.00	-1.46	-0.11	-0.37	-0.84	-2.44	-1.82	-0.81
40	-0.75	-0.54	-0.81	-1.42	-1.80	-1.27	-0.92	-0.16	-0.56
41	-0.68	0.43	0.53	0.45	0.13	0.93	1.09	0.79	0.72
42	0.01	-0.56	-1.20	-1.11	-0.75	-0.77	0.02	-0.41	-0.56
43	-1.01	-0.90	-1.23	-1.63	-1.09	-1.68	-0.99	-0.02	0.11
44	-0.41	0.06	-0.34	-0.68	-0.65	-1.12	-0.24	-0.12	0.03
45	0.64	-0.74	-1.86	-2.35	-2.50	-1.73	-2.34	-1.73	-1.96
46	-1.22	-0.06	0.19	-0.59	-0.77	-0.96	-0.16	1.38	1.78
47	-1.84	-2.13	-1.46	0.25	2.21	0.57	1.28	0.23	0.31

Region	24-hr	2-day	4-day	7-day	10-day	20-day	30-day	45-day	60-day
48	-0.89	-1.28	-1.49	-1.25	-1.24	-0.53	0.30	0.47	-0.52
49	-0.42	-0.73	-0.85	-0.37	-0.04	0.39	0.04	-0.19	-0.23
50	-0.69	-1.03	-0.68	-0.33	-1.00	-1.80	-0.97	-1.07	-1.37
51	-0.38	-0.06	0.69	0.40	0.59	0.14	-0.35	-0.63	-0.35
52	-1.71	-0.89	0.51	1.31	2.13	2.96	3.69	1.92	0.61
53	0.64	-0.10	-0.92	-0.54	-0.95	-1.32	-2.15	-1.94	-2.54
54	-0.02	-0.10	-0.67	-1.28	-1.53	-1.21	-1.17	-0.45	-0.99
55	-1.41	-0.29	-0.30	-1.22	0.18	1.22	2.28	1.89	2.31
56	1.34	1.17	0.74	0.06	-0.36	-0.67	0.24	-0.32	0.17
57	-2.41	-0.55	-0.91	-1.35	-0.45	-1.92	-1.52	-0.75	-0.68
58	-1.44	-1.23	-0.20	0.04	1.53	-1.00	-0.86	-0.27	-0.57
59	0.1	-0.40	-0.53	-1.16	-1.23	-1.69	-1.31	-0.85	-0.37
60	-1.8	-2.52	-2.61	-2.54	-2.36	-1.97	-1.53	-0.59	-0.50
61	0.36	-1.68	-2.86	-3.36	-2.97	-2.02	-2.61	-1.52	-1.73
62	-1.6	-3.20	-1.22	0.50	-0.75	-0.86	-1.10	-1.16	-0.23
63	-1.1	-0.59	-0.27	-1.70	-1.11	-2.21	-3.04	-3.01	-2.40
64	-0.62	-0.42	-1.50	-0.90	-0.51	-0.77	-0.58	-0.69	-1.27
65	-1.57	-1.50	-1.22	-2.05	-1.62	-0.69	-1.48	-0.97	-1.00
66	0.75	0.74	-0.54	-0.50	-1.50	-0.42	0.62	-0.01	-1.16
67	1.2	-1.12	-1.05	0.11	0.63	0.02	1.04	0.37	0.07
68	-0.89	-0.12	-0.64	-0.21	-0.83	-1.16	-1.07	-1.25	-1.57
69	-0.82	-1.03	-0.92	0.03	0.51	0.22	0.41	0.23	-0.11
70	-1.43	-1.06	-0.94	-1.72	-1.62	-2.25	-2.17	-1.11	-0.39
71	-1.17	-1.47	-0.81	-0.36	-0.17	-0.76	-0.02	0.67	0.30
72	-0.91	1.04	1.24	1.26	0.56	1.10	-0.73	-0.99	-0.98
73	-1.03	0.21	0.32	0.21	-0.65	0.13	0.51	0.93	1.42
74	0.97	0.97	0.07	0.28	-1.43	-1.04	0.40	-0.12	-1.19
75	-2.38	-1.57	-2.60	-1.77	-1.49	-0.70	-1.61	-0.85	-1.42
76	1.85	1.35	1.40	1.77	2.15	-0.55	0.47	-0.23	-0.59
77	-1.9	-2.26	-2.04	-1.35	-1.19	-0.54	-1.22	-1.09	-1.50
78	0.46	0.26	0.54	-0.31	-0.14	-0.72	-0.32	-1.51	-1.31
79	-0.27	-0.08	-0.83	-1.63	-1.80	-1.55	-1.06	-1.67	-2.19
80	-1.59	0.61	0.16	-0.86	-1.09	-0.50	-1.69	-0.97	-0.81
81	0.25	-1.34	-0.42	0.31	0.51	0.38	1.23	2.24	2.40
82	-0.75	-0.40	-0.60	-0.33	0.96	-0.39	-0.84	-1.65	-1.36
83	1.66	0.66	1.82	0.98	0.79	0.70	0.78	0.10	0.13
84	-2.64	-2.56	-2.68	-1.92	-0.83	-0.69	0.63	-0.48	-0.28

Table A.8.2. Heterogeneity statistic, H1, for hourly regions (1-26) for durations 60-minute through 48-hour.

Region	60-min	2-hour	3-hour	6-hour	12-hour	24-hour	48-hour
1	-1.30	0.26	0.74	0.27	-1.11	-1.79	-1.24
2	1.46	0.42	-1.15	-0.85	-0.87	-0.34	-0.71
3	-0.21	-0.76	-0.17	-0.74	-1.20	-0.55	-0.12
4	0.21	-1.20	-1.01	-0.47	0.42	0.21	-0.10
5	1.21	0.41	-0.18	-0.29	-0.22	0.10	0.31
6	1.68	2.73	3.17	1.01	-1.09	-0.38	-0.11
7	-0.41	-0.19	-0.30	1.45	0.62	-0.88	-1.65
8	-0.62	-0.10	0.30	-0.34	-0.47	0.35	-0.30
9	0.60	-0.77	-1.08	0.33	1.24	0.67	1.11
10	0.83	1.46	2.74	2.41	2.63	1.03	1.11
11	0.88	0.97	1.55	-0.75	-0.91	-0.07	-0.66
12	-0.16	0.42	0.33	1.32	0.41	-0.40	-1.20
13	-0.82	-0.70	-0.49	-0.27	-1.23	-1.60	-0.64
14	-0.12	-0.44	1.11	1.22	-0.92	0.29	-1.14
15	0.83	1.12	1.11	1.02	1.50	1.11	1.93
16	-1.10	-1.03	-1.47	-1.28	-0.63	0.82	1.39
17	1.35	0.09	-0.28	-0.28	-0.35	0.78	1.22
18	-1.72	0.28	1.32	0.16	-0.78	-0.57	-2.01
19	-0.82	-1.01	-0.42	-0.48	-0.81	0.35	1.08
20	1.63	-0.50	-1.95	-0.54	0.13	-0.28	0.12
21	-0.50	-1.11	-0.03	0.74	1.53	-0.17	-0.61
22	0.80	0.39	1.00	0.57	0.52	-0.71	-0.54
23	0.04	0.30	-0.11	0.90	1.74	3.11	2.70
24	-2.03	-2.36	-1.84	0.70	-0.20	-0.84	-0.39
25	-0.40	-0.76	-1.36	-1.25	-1.51	-1.13	-0.64
26	0.59	0.35	-0.28	0.10	-0.59	-1.67	-2.08

Appendix A.9. Regional growth factors for regions used in NOAA Atlas 14 Volume 2.

Table A.9.1. Regional growth factors for daily regions and at-site analyses for each duration 24-hour to 60-day for the annual maximum series results. *Note that the 1.58-year was computed to equate the 1-year average recurrence interval (ARI) for partial duration series results (see Section 4.6.2) and the 1.58 year results were not released as annual exceedance probabilities (AEP).

24-hour										
region	*1.58-year	2-year	5-year	10-year	25-year	50-year	100-year	200-year	500-year	1,000-year
1	0.799	0.896	1.237	1.504	1.897	2.234	2.614	3.042	3.694	4.263
2	0.807	0.905	1.242	1.498	1.864	2.171	2.508	2.879	3.430	3.899
3	0.801	0.894	1.228	1.494	1.889	2.233	2.624	3.069	3.757	4.364
4	0.810	0.908	1.247	1.496	1.834	2.102	2.384	2.680	3.097	3.432
5	0.809	0.897	1.215	1.470	1.852	2.187	2.570	3.010	3.693	4.301
6	0.809	0.903	1.231	1.485	1.853	2.166	2.514	2.903	3.488	3.993
7	0.831	0.921	1.225	1.449	1.760	2.013	2.285	2.578	3.001	3.352
8	0.805	0.897	1.225	1.483	1.868	2.201	2.579	3.009	3.670	4.251
9	0.814	0.909	1.234	1.480	1.832	2.125	2.448	2.803	3.329	3.775
10	0.842	0.935	1.234	1.438	1.701	1.900	2.102	2.309	2.590	2.809
11	0.834	0.928	1.238	1.453	1.734	1.950	2.171	2.399	2.711	2.957
12	0.824	0.907	1.196	1.429	1.800	2.148	2.573	3.093	3.969	4.812
13	0.834	0.921	1.218	1.439	1.747	1.999	2.272	2.567	2.996	3.353
14	0.854	0.946	1.231	1.418	1.653	1.827	2.001	2.176	2.410	2.591
15	0.843	0.931	1.221	1.428	1.708	1.930	2.164	2.411	2.758	3.038
16	0.838	0.923	1.204	1.421	1.752	2.051	2.404	2.823	3.503	4.134
17	0.855	0.941	1.217	1.407	1.657	1.849	2.046	2.248	2.525	2.742
18	0.830	0.917	1.208	1.435	1.786	2.105	2.486	2.942	3.689	4.388
19	0.836	0.924	1.221	1.438	1.739	1.982	2.242	2.520	2.921	3.250
20	0.818	0.902	1.205	1.447	1.811	2.130	2.495	2.914	3.564	4.142
21	0.822	0.916	1.236	1.472	1.801	2.069	2.358	2.671	3.123	3.498
22	0.829	0.912	1.205	1.432	1.763	2.046	2.361	2.715	3.249	3.712
23	0.867	0.947	1.201	1.375	1.600	1.772	1.946	2.124	2.365	2.553
24	0.825	0.923	1.246	1.472	1.772	2.003	2.240	2.486	2.825	3.093
25	0.817	0.913	1.239	1.481	1.822	2.102	2.406	2.735	3.216	3.618
26	0.850	0.937	1.220	1.417	1.678	1.881	2.090	2.307	2.606	2.842
27	0.829	0.915	1.211	1.437	1.764	2.038	2.342	2.678	3.180	3.610
28	0.861	0.953	1.231	1.409	1.628	1.788	1.945	2.101	2.308	2.465
29	0.821	0.904	1.203	1.441	1.797	2.108	2.462	2.867	3.494	4.050
30	0.851	0.935	1.210	1.406	1.672	1.882	2.102	2.334	2.661	2.924
31	0.858	0.940	1.206	1.392	1.641	1.836	2.037	2.247	2.539	2.770
32	0.864	0.945	1.205	1.383	1.616	1.795	1.978	2.165	2.419	2.618
33	0.843	0.926	1.205	1.412	1.702	1.940	2.198	2.477	2.884	3.224
34	0.882	0.960	1.196	1.348	1.537	1.674	1.808	1.939	2.108	2.233
35	0.840	0.919	1.196	1.408	1.715	1.974	2.262	2.581	3.060	3.470
36	0.856	0.943	1.217	1.406	1.651	1.838	2.029	2.223	2.488	2.694
37	0.830	0.919	1.222	1.447	1.763	2.023	2.304	2.610	3.056	3.428

24-hour										
region	***1.58-year**	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**200-year**	**500-year**	**1,000-year**
38	0.838	0.928	1.226	1.440	1.731	1.962	2.206	2.464	2.829	3.125
39	0.849	0.936	1.220	1.419	1.683	1.888	2.101	2.322	2.628	2.870
40	0.827	0.912	1.212	1.441	1.774	2.056	2.369	2.717	3.240	3.689
41	0.831	0.923	1.229	1.453	1.761	2.009	2.274	2.557	2.963	3.295
42	0.817	0.906	1.221	1.465	1.819	2.121	2.457	2.834	3.402	3.892
43	0.847	0.932	1.214	1.416	1.689	1.907	2.136	2.377	2.719	2.995
44	0.833	0.919	1.213	1.434	1.748	2.009	2.294	2.607	3.068	3.457
45	0.857	0.946	1.223	1.410	1.648	1.827	2.006	2.186	2.427	2.611
46	0.836	0.922	1.215	1.433	1.738	1.988	2.259	2.552	2.979	3.336
47	0.853	0.937	1.211	1.404	1.662	1.865	2.075	2.295	2.601	2.845
48	0.840	0.916	1.185	1.398	1.714	1.987	2.297	2.649	3.190	3.666
49	0.802	0.889	1.208	1.472	1.879	2.245	2.673	3.176	3.978	4.710
50	0.785	0.879	1.225	1.511	1.953	2.352	2.818	3.365	4.240	5.039
51	0.811	0.907	1.238	1.488	1.846	2.144	2.470	2.830	3.363	3.814
52	0.837	0.929	1.231	1.445	1.733	1.960	2.197	2.446	2.795	3.074
53	0.852	0.944	1.231	1.424	1.670	1.855	2.040	2.226	2.474	2.663
54	0.798	0.889	1.209	1.475	1.907	2.320	2.833	3.473	4.572	5.649
55	0.810	0.909	1.247	1.499	1.852	2.143	2.457	2.799	3.298	3.715
56	0.851	0.934	1.201	1.401	1.698	1.960	2.265	2.619	3.182	3.693
57	0.853	0.940	1.217	1.410	1.663	1.859	2.061	2.269	2.554	2.779
58	0.830	0.919	1.223	1.448	1.763	2.021	2.300	2.602	3.042	3.408
59	0.822	0.914	1.228	1.463	1.798	2.075	2.378	2.709	3.196	3.607
60	0.840	0.931	1.228	1.439	1.721	1.942	2.174	2.416	2.754	3.024
61	0.834	0.924	1.225	1.444	1.745	1.987	2.244	2.520	2.913	3.235
62	0.821	0.914	1.230	1.468	1.803	2.079	2.380	2.709	3.191	3.596
63	0.838	0.935	1.245	1.457	1.735	1.947	2.164	2.385	2.686	2.921
64	0.833	0.924	1.226	1.446	1.750	1.995	2.256	2.536	2.937	3.265
65	0.818	0.912	1.233	1.474	1.814	2.095	2.402	2.736	3.227	3.640
66	0.816	0.911	1.237	1.482	1.827	2.112	2.422	2.761	3.259	3.676
67	0.837	0.934	1.243	1.453	1.723	1.928	2.135	2.347	2.634	2.858
68	0.792	0.897	1.262	1.534	1.908	2.208	2.526	2.862	3.339	3.725
69	0.832	0.917	1.202	1.426	1.772	2.090	2.470	2.927	3.678	4.385
70	0.855	0.949	1.237	1.426	1.661	1.834	2.004	2.172	2.391	2.555
71	0.834	0.921	1.207	1.429	1.768	2.075	2.438	2.871	3.575	4.230
72	0.842	0.932	1.226	1.434	1.713	1.932	2.161	2.401	2.735	3.003
73	0.821	0.909	1.216	1.454	1.799	2.093	2.419	2.784	3.335	3.809
74	0.859	0.952	1.233	1.413	1.635	1.797	1.958	2.117	2.328	2.489
75	0.839	0.927	1.221	1.434	1.725	1.958	2.205	2.469	2.843	3.149
76	0.863	0.949	1.216	1.395	1.621	1.790	1.959	2.127	2.351	2.521
77	0.837	0.929	1.231	1.446	1.736	1.966	2.206	2.458	2.813	3.098
78	0.851	0.949	1.245	1.435	1.670	1.842	2.011	2.181	2.405	2.576
79	0.820	0.914	1.233	1.471	1.806	2.082	2.382	2.708	3.185	3.585
80	0.836	0.926	1.225	1.441	1.736	1.972	2.223	2.489	2.868	3.176

24-hour										
region	***1.58-year**	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**200-year**	**500-year**	**1,000-year**
81	0.851	0.940	1.224	1.419	1.673	1.867	2.065	2.267	2.542	2.756
82	0.833	0.921	1.211	1.434	1.774	2.080	2.442	2.870	3.564	4.207
83	0.820	0.915	1.235	1.474	1.807	2.081	2.377	2.698	3.165	3.554
84	0.826	0.919	1.231	1.460	1.779	2.039	2.319	2.620	3.055	3.416
A1	0.825	0.911	1.212	1.444	1.780	2.066	2.384	2.739	3.274	3.734
A2	0.788	0.878	1.215	1.498	1.940	2.343	2.821	3.388	4.305	5.153

48-hour										
region	***1.58-year**	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**200-year**	**500-year**	**1,000-year**
1	0.800	0.897	1.239	1.504	1.892	2.223	2.594	3.011	3.642	4.190
2	0.809	0.903	1.232	1.485	1.853	2.166	2.514	2.902	3.487	3.992
3	0.809	0.900	1.225	1.480	1.855	2.177	2.539	2.948	3.572	4.116
4	0.817	0.912	1.240	1.479	1.804	2.061	2.330	2.613	3.011	3.330
5	0.813	0.899	1.211	1.460	1.835	2.164	2.540	2.972	3.644	4.242
6	0.815	0.910	1.235	1.480	1.827	2.116	2.432	2.778	3.288	3.718
7	0.832	0.925	1.232	1.453	1.755	1.996	2.251	2.522	2.907	3.219
8	0.811	0.903	1.229	1.481	1.846	2.157	2.504	2.891	3.475	3.978
9	0.821	0.916	1.236	1.473	1.803	2.072	2.362	2.675	3.130	3.507
10	0.851	0.943	1.231	1.422	1.665	1.846	2.028	2.212	2.460	2.651
11	0.838	0.931	1.233	1.442	1.714	1.922	2.135	2.353	2.652	2.887
12	0.834	0.915	1.192	1.412	1.757	2.077	2.464	2.933	3.713	4.455
13	0.840	0.927	1.218	1.429	1.718	1.951	2.198	2.462	2.837	3.145
14	0.859	0.946	1.218	1.399	1.629	1.801	1.973	2.147	2.381	2.563
15	0.843	0.930	1.216	1.423	1.706	1.932	2.171	2.425	2.785	3.079
16	0.836	0.919	1.197	1.416	1.754	2.064	2.433	2.878	3.608	4.293
17	0.856	0.940	1.211	1.400	1.650	1.844	2.045	2.252	2.539	2.765
18	0.831	0.918	1.206	1.432	1.779	2.096	2.473	2.925	3.664	4.356
19	0.836	0.924	1.220	1.436	1.735	1.977	2.236	2.514	2.914	3.244
20	0.828	0.912	1.206	1.434	1.768	2.053	2.372	2.730	3.273	3.744
21	0.827	0.921	1.237	1.466	1.780	2.032	2.300	2.586	2.993	3.326
22	0.841	0.924	1.205	1.415	1.711	1.956	2.221	2.511	2.935	3.290
23	0.876	0.954	1.198	1.359	1.564	1.716	1.868	2.019	2.218	2.370
24	0.834	0.931	1.243	1.457	1.735	1.946	2.161	2.381	2.681	2.917
25	0.819	0.912	1.231	1.471	1.812	2.096	2.406	2.746	3.248	3.671
26	0.857	0.941	1.212	1.400	1.647	1.839	2.035	2.237	2.515	2.733
27	0.846	0.929	1.209	1.412	1.692	1.918	2.159	2.417	2.786	3.088
28	0.861	0.949	1.221	1.400	1.624	1.790	1.956	2.123	2.346	2.517
29	0.825	0.906	1.197	1.431	1.781	2.087	2.438	2.840	3.464	4.020
30	0.858	0.940	1.207	1.393	1.641	1.833	2.033	2.240	2.526	2.753
31	0.866	0.946	1.201	1.376	1.606	1.782	1.961	2.146	2.397	2.594
32	0.866	0.948	1.207	1.382	1.608	1.778	1.949	2.122	2.355	2.533

48-hour										
region	*1.58-year	2-year	5-year	10-year	25-year	50-year	100-year	200-year	500-year	1,000-year
33	0.851	0.931	1.202	1.399	1.671	1.891	2.125	2.376	2.736	3.031
34	0.884	0.959	1.188	1.338	1.527	1.665	1.801	1.936	2.112	2.243
35	0.837	0.919	1.202	1.418	1.727	1.987	2.274	2.590	3.062	3.464
36	0.856	0.943	1.218	1.406	1.649	1.835	2.023	2.215	2.474	2.675
37	0.840	0.930	1.228	1.439	1.723	1.947	2.181	2.428	2.772	3.049
38	0.837	0.925	1.220	1.435	1.733	1.975	2.232	2.509	2.906	3.232
39	0.857	0.943	1.215	1.402	1.646	1.832	2.023	2.218	2.483	2.690
40	0.836	0.919	1.207	1.425	1.736	1.996	2.281	2.595	3.059	3.453
41	0.838	0.928	1.226	1.440	1.729	1.959	2.202	2.457	2.818	3.110
42	0.827	0.912	1.211	1.441	1.775	2.059	2.375	2.727	3.258	3.715
43	0.852	0.936	1.211	1.406	1.668	1.875	2.090	2.316	2.631	2.883
44	0.849	0.935	1.215	1.413	1.679	1.888	2.106	2.335	2.654	2.910
45	0.861	0.948	1.220	1.402	1.632	1.804	1.975	2.147	2.375	2.548
46	0.842	0.929	1.216	1.424	1.709	1.937	2.178	2.435	2.801	3.099
47	0.849	0.933	1.211	1.409	1.679	1.893	2.119	2.358	2.694	2.966
48	0.841	0.919	1.192	1.404	1.712	1.974	2.266	2.594	3.088	3.514
49	0.800	0.883	1.196	1.463	1.885	2.276	2.743	3.304	4.224	5.084
50	0.801	0.894	1.226	1.490	1.885	2.230	2.623	3.072	3.767	4.382
51	0.819	0.912	1.231	1.470	1.810	2.091	2.398	2.734	3.229	3.646
52	0.848	0.936	1.222	1.421	1.686	1.892	2.105	2.326	2.631	2.873
53	0.854	0.945	1.229	1.419	1.661	1.842	2.023	2.206	2.448	2.633
54	0.811	0.899	1.204	1.455	1.855	2.234	2.699	3.274	4.248	5.192
55	0.826	0.919	1.233	1.464	1.783	2.042	2.319	2.617	3.047	3.401
56	0.858	0.939	1.195	1.387	1.669	1.917	2.203	2.534	3.057	3.529
57	0.861	0.948	1.219	1.400	1.631	1.803	1.975	2.148	2.377	2.552
58	0.842	0.929	1.219	1.427	1.710	1.937	2.176	2.429	2.788	3.080
59	0.829	0.916	1.215	1.442	1.766	2.036	2.334	2.662	3.148	3.561
60	0.836	0.926	1.224	1.441	1.738	1.977	2.230	2.500	2.885	3.200
61	0.834	0.922	1.221	1.441	1.746	1.995	2.262	2.549	2.965	3.308
62	0.828	0.920	1.231	1.458	1.774	2.030	2.305	2.600	3.025	3.375
63	0.842	0.938	1.241	1.447	1.714	1.917	2.123	2.332	2.615	2.834
64	0.843	0.933	1.227	1.434	1.710	1.926	2.151	2.386	2.712	2.972
65	0.831	0.923	1.230	1.453	1.759	2.006	2.269	2.550	2.952	3.281
66	0.828	0.924	1.240	1.467	1.775	2.020	2.279	2.552	2.938	3.250
67	0.843	0.938	1.239	1.442	1.700	1.895	2.091	2.290	2.560	2.769
68	0.807	0.911	1.264	1.515	1.851	2.112	2.384	2.666	3.058	3.370
69	0.830	0.917	1.207	1.434	1.782	2.099	2.477	2.929	3.668	4.360
70	0.857	0.948	1.231	1.417	1.651	1.824	1.995	2.164	2.388	2.556
71	0.842	0.929	1.209	1.421	1.738	2.020	2.348	2.733	3.347	3.907
72	0.845	0.939	1.236	1.438	1.700	1.900	2.103	2.309	2.589	2.805
73	0.834	0.921	1.219	1.439	1.747	1.999	2.271	2.566	2.995	3.351
74	0.861	0.953	1.232	1.410	1.629	1.789	1.946	2.103	2.310	2.467
75	0.847	0.935	1.222	1.423	1.690	1.900	2.117	2.342	2.656	2.905

48-hour										
region	*1.58-year	2-year	5-year	10-year	25-year	50-year	100-year	200-year	500-year	1,000-year
76	0.868	0.951	1.210	1.381	1.599	1.761	1.922	2.083	2.296	2.458
77	0.837	0.929	1.230	1.444	1.734	1.962	2.202	2.454	2.807	3.092
78	0.850	0.946	1.241	1.433	1.672	1.850	2.026	2.202	2.438	2.618
79	0.819	0.913	1.234	1.474	1.813	2.092	2.396	2.727	3.212	3.619
80	0.848	0.945	1.245	1.443	1.692	1.876	2.059	2.239	2.477	2.656
81	0.856	0.943	1.218	1.406	1.651	1.839	2.029	2.224	2.489	2.694
82	0.842	0.929	1.210	1.423	1.739	2.020	2.347	2.729	3.338	3.892
83	0.824	0.916	1.228	1.461	1.789	2.058	2.350	2.668	3.133	3.522
84	0.820	0.911	1.225	1.464	1.805	2.091	2.406	2.753	3.268	3.706
A1	0.832	0.921	1.223	1.445	1.754	2.006	2.278	2.570	2.994	3.345
A2	0.782	0.863	1.173	1.454	1.945	2.446	3.105	3.975	5.568	7.234

4-day										
region	*1.58-year	2-year	5-year	10-year	25-year	50-year	100-year	200-year	500-year	1,000-year
1	0.808	0.904	1.236	1.491	1.858	2.168	2.511	2.891	3.460	3.947
2	0.820	0.915	1.236	1.474	1.808	2.082	2.378	2.699	3.165	3.554
3	0.820	0.910	1.223	1.463	1.807	2.097	2.417	2.772	3.301	3.753
4	0.826	0.920	1.235	1.461	1.763	1.999	2.244	2.500	2.855	3.139
5	0.826	0.911	1.209	1.440	1.778	2.066	2.388	2.749	3.296	3.769
6	0.823	0.918	1.236	1.469	1.794	2.058	2.341	2.646	3.087	3.451
7	0.836	0.927	1.228	1.445	1.740	1.975	2.224	2.487	2.859	3.161
8	0.813	0.905	1.228	1.477	1.838	2.145	2.485	2.866	3.438	3.931
9	0.822	0.917	1.236	1.472	1.799	2.066	2.353	2.663	3.111	3.482
10	0.852	0.941	1.222	1.412	1.656	1.840	2.027	2.216	2.474	2.674
11	0.845	0.933	1.223	1.424	1.686	1.888	2.094	2.306	2.596	2.825
12	0.850	0.930	1.194	1.396	1.700	1.973	2.293	2.672	3.280	3.841
13	0.846	0.933	1.218	1.421	1.694	1.911	2.138	2.376	2.711	2.980
14	0.865	0.953	1.221	1.394	1.608	1.765	1.921	2.076	2.282	2.439
15	0.847	0.932	1.213	1.415	1.691	1.910	2.142	2.388	2.736	3.019
16	0.840	0.922	1.193	1.407	1.736	2.036	2.395	2.825	3.531	4.193
17	0.863	0.945	1.206	1.386	1.621	1.801	1.985	2.173	2.430	2.630
18	0.840	0.924	1.202	1.417	1.744	2.039	2.387	2.801	3.473	4.095
19	0.840	0.927	1.216	1.427	1.717	1.951	2.200	2.467	2.848	3.161
20	0.840	0.923	1.205	1.417	1.715	1.962	2.230	2.522	2.951	3.311
21	0.831	0.925	1.235	1.458	1.762	2.004	2.260	2.530	2.914	3.224
22	0.863	0.942	1.199	1.380	1.619	1.805	1.998	2.198	2.475	2.695
23	0.884	0.962	1.196	1.346	1.530	1.663	1.791	1.916	2.075	2.193
24	0.842	0.935	1.233	1.436	1.699	1.898	2.100	2.307	2.589	2.809
25	0.832	0.923	1.226	1.447	1.753	2.000	2.264	2.547	2.952	3.286
26	0.868	0.950	1.205	1.377	1.596	1.762	1.928	2.095	2.318	2.489
27	0.860	0.941	1.202	1.385	1.629	1.820	2.018	2.223	2.509	2.735

4-day										
region	***1.58-year**	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**200-year**	**500-year**	**1,000-year**
28	0.867	0.953	1.215	1.384	1.596	1.751	1.906	2.061	2.266	2.424
29	0.837	0.916	1.195	1.412	1.730	2.001	2.305	2.647	3.164	3.613
30	0.867	0.945	1.198	1.372	1.601	1.778	1.960	2.147	2.403	2.604
31	0.873	0.953	1.199	1.364	1.574	1.731	1.888	2.046	2.256	2.415
32	0.874	0.956	1.207	1.370	1.575	1.724	1.872	2.017	2.206	2.347
33	0.857	0.939	1.206	1.395	1.647	1.844	2.049	2.264	2.562	2.800
34	0.885	0.959	1.186	1.335	1.522	1.660	1.795	1.930	2.106	2.238
35	0.845	0.927	1.203	1.408	1.694	1.928	2.181	2.454	2.852	3.183
36	0.864	0.951	1.220	1.397	1.619	1.782	1.943	2.103	2.312	2.469
37	0.852	0.939	1.218	1.412	1.667	1.865	2.069	2.280	2.569	2.797
38	0.843	0.928	1.213	1.420	1.705	1.934	2.179	2.440	2.813	3.119
39	0.864	0.947	1.211	1.389	1.618	1.791	1.965	2.142	2.379	2.561
40	0.847	0.929	1.204	1.405	1.685	1.912	2.156	2.418	2.796	3.109
41	0.846	0.935	1.222	1.424	1.694	1.904	2.122	2.349	2.664	2.914
42	0.831	0.913	1.203	1.428	1.756	2.035	2.347	2.697	3.225	3.682
43	0.857	0.940	1.210	1.397	1.646	1.839	2.038	2.244	2.528	2.752
44	0.859	0.945	1.216	1.401	1.640	1.821	2.005	2.192	2.445	2.640
45	0.865	0.949	1.211	1.387	1.610	1.778	1.945	2.114	2.338	2.508
46	0.850	0.936	1.217	1.414	1.676	1.881	2.094	2.316	2.623	2.868
47	0.854	0.939	1.212	1.403	1.657	1.855	2.060	2.272	2.566	2.799
48	0.853	0.936	1.208	1.401	1.661	1.866	2.080	2.305	2.619	2.872
49	0.810	0.895	1.207	1.459	1.844	2.186	2.582	3.041	3.764	4.415
50	0.817	0.907	1.223	1.466	1.820	2.121	2.455	2.829	3.391	3.876
51	0.833	0.925	1.229	1.449	1.750	1.992	2.249	2.522	2.911	3.229
52	0.858	0.943	1.213	1.399	1.643	1.830	2.021	2.216	2.483	2.691
53	0.862	0.950	1.222	1.401	1.628	1.796	1.963	2.129	2.347	2.512
54	0.816	0.898	1.189	1.432	1.827	2.205	2.675	3.262	4.272	5.263
55	0.841	0.930	1.221	1.430	1.715	1.941	2.179	2.431	2.788	3.076
56	0.869	0.950	1.199	1.377	1.631	1.847	2.090	2.365	2.785	3.154
57	0.860	0.947	1.219	1.402	1.636	1.812	1.989	2.167	2.406	2.588
58	0.848	0.933	1.214	1.415	1.686	1.900	2.125	2.362	2.695	2.963
59	0.831	0.920	1.222	1.446	1.758	2.014	2.291	2.590	3.025	3.386
60	0.837	0.923	1.214	1.429	1.729	1.974	2.239	2.524	2.939	3.283
61	0.833	0.921	1.219	1.440	1.749	2.002	2.276	2.572	3.003	3.362
62	0.839	0.932	1.231	1.442	1.724	1.944	2.174	2.412	2.745	3.009
63	0.852	0.946	1.239	1.431	1.674	1.854	2.032	2.209	2.441	2.617
64	0.849	0.937	1.220	1.419	1.682	1.886	2.098	2.317	2.621	2.861
65	0.843	0.936	1.233	1.439	1.710	1.919	2.133	2.354	2.657	2.895
66	0.832	0.930	1.246	1.467	1.759	1.986	2.220	2.463	2.797	3.062
67	0.843	0.938	1.238	1.440	1.698	1.893	2.089	2.288	2.557	2.766
68	0.822	0.924	1.258	1.488	1.788	2.018	2.253	2.494	2.823	3.082
69	0.833	0.921	1.212	1.436	1.776	2.082	2.443	2.871	3.564	4.205
70	0.858	0.949	1.227	1.411	1.643	1.815	1.986	2.155	2.379	2.548

4-day										
region	*1.58-year	2-year	5-year	10-year	25-year	50-year	100-year	200-year	500-year	1,000-year
71	0.843	0.929	1.210	1.422	1.738	2.018	2.345	2.726	3.334	3.889
72	0.850	0.946	1.242	1.437	1.681	1.861	2.039	2.215	2.447	2.620
73	0.846	0.934	1.220	1.422	1.693	1.905	2.127	2.358	2.681	2.939
74	0.864	0.955	1.229	1.403	1.616	1.772	1.924	2.075	2.275	2.426
75	0.849	0.938	1.225	1.424	1.684	1.884	2.090	2.301	2.590	2.817
76	0.875	0.957	1.207	1.369	1.569	1.715	1.858	1.998	2.179	2.313
77	0.849	0.940	1.230	1.428	1.685	1.881	2.079	2.282	2.557	2.770
78	0.864	0.958	1.236	1.409	1.620	1.771	1.919	2.064	2.254	2.398
79	0.839	0.932	1.232	1.443	1.725	1.945	2.174	2.412	2.742	3.006
80	0.851	0.950	1.251	1.444	1.681	1.853	2.020	2.182	2.391	2.545
81	0.857	0.943	1.215	1.402	1.645	1.831	2.021	2.214	2.478	2.683
82	0.852	0.938	1.210	1.410	1.702	1.956	2.246	2.580	3.101	3.567
83	0.835	0.924	1.223	1.441	1.743	1.986	2.246	2.524	2.923	3.251
84	0.815	0.906	1.226	1.472	1.828	2.129	2.464	2.837	3.398	3.879
A1	0.843	0.930	1.217	1.424	1.705	1.930	2.167	2.418	2.774	3.063
A2	0.808	0.896	1.203	1.457	1.866	2.254	2.734	3.328	4.343	5.330

7-day										
region	*1.58-year	2-year	5-year	10-year	25-year	50-year	100-year	200-year	500-year	1,000-year
1	0.820	0.912	1.227	1.465	1.804	2.087	2.397	2.738	3.244	3.671
2	0.829	0.921	1.229	1.454	1.767	2.021	2.292	2.584	3.004	3.351
3	0.827	0.918	1.224	1.453	1.774	2.038	2.324	2.635	3.089	3.468
4	0.836	0.927	1.230	1.444	1.725	1.942	2.166	2.398	2.717	2.970
5	0.840	0.924	1.209	1.420	1.716	1.959	2.221	2.505	2.918	3.262
6	0.837	0.925	1.222	1.437	1.734	1.974	2.229	2.501	2.891	3.211
7	0.842	0.929	1.218	1.427	1.712	1.940	2.182	2.439	2.804	3.101
8	0.820	0.910	1.222	1.460	1.803	2.092	2.410	2.764	3.291	3.741
9	0.833	0.924	1.225	1.445	1.749	1.994	2.255	2.535	2.936	3.265
10	0.860	0.943	1.209	1.390	1.623	1.799	1.977	2.159	2.405	2.597
11	0.853	0.937	1.211	1.402	1.650	1.841	2.036	2.236	2.511	2.727
12	0.858	0.935	1.184	1.374	1.660	1.916	2.215	2.567	3.133	3.652
13	0.852	0.935	1.208	1.402	1.665	1.873	2.091	2.320	2.642	2.902
14	0.866	0.952	1.217	1.389	1.602	1.760	1.916	2.072	2.280	2.439
15	0.856	0.937	1.204	1.394	1.650	1.852	2.063	2.285	2.597	2.846
16	0.859	0.935	1.183	1.371	1.656	1.910	2.209	2.560	3.124	3.643
17	0.879	0.956	1.195	1.352	1.549	1.696	1.840	1.983	2.172	2.314
18	0.846	0.929	1.201	1.408	1.719	1.997	2.323	2.705	3.319	3.882
19	0.852	0.938	1.216	1.410	1.669	1.870	2.078	2.294	2.593	2.830
20	0.852	0.934	1.204	1.399	1.664	1.875	2.099	2.335	2.671	2.943
21	0.840	0.932	1.231	1.442	1.722	1.941	2.169	2.405	2.734	2.996
22	0.874	0.950	1.193	1.359	1.573	1.735	1.900	2.067	2.292	2.467

7-day										
region	***1.58-year**	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**200-year**	**500-year**	**1,000-year**
23	0.890	0.967	1.193	1.334	1.504	1.623	1.737	1.846	1.982	2.080
24	0.857	0.945	1.223	1.407	1.640	1.813	1.987	2.163	2.399	2.581
25	0.843	0.930	1.218	1.424	1.705	1.928	2.164	2.414	2.767	3.053
26	0.868	0.948	1.202	1.375	1.599	1.770	1.943	2.119	2.358	2.542
27	0.864	0.944	1.200	1.377	1.612	1.794	1.982	2.176	2.442	2.652
28	0.870	0.953	1.207	1.373	1.582	1.736	1.890	2.044	2.250	2.409
29	0.849	0.931	1.204	1.403	1.677	1.899	2.135	2.389	2.752	3.051
30	0.877	0.953	1.192	1.352	1.559	1.714	1.871	2.028	2.240	2.402
31	0.884	0.961	1.194	1.344	1.530	1.665	1.796	1.924	2.090	2.213
32	0.871	0.953	1.205	1.373	1.586	1.744	1.901	2.058	2.266	2.423
33	0.875	0.957	1.209	1.372	1.573	1.718	1.860	1.999	2.179	2.311
34	0.882	0.957	1.189	1.342	1.536	1.680	1.822	1.965	2.152	2.294
35	0.850	0.934	1.211	1.408	1.676	1.889	2.112	2.348	2.680	2.949
36	0.871	0.957	1.216	1.382	1.587	1.735	1.879	2.019	2.199	2.332
37	0.863	0.947	1.210	1.389	1.620	1.794	1.970	2.149	2.390	2.575
38	0.853	0.936	1.207	1.400	1.661	1.868	2.085	2.313	2.634	2.892
39	0.866	0.948	1.207	1.382	1.607	1.777	1.948	2.121	2.354	2.533
40	0.853	0.934	1.201	1.394	1.659	1.871	2.097	2.337	2.679	2.958
41	0.860	0.946	1.218	1.400	1.635	1.812	1.990	2.170	2.411	2.596
42	0.844	0.926	1.202	1.408	1.698	1.936	2.195	2.476	2.887	3.231
43	0.858	0.940	1.207	1.394	1.641	1.834	2.034	2.241	2.527	2.754
44	0.859	0.944	1.215	1.399	1.638	1.819	2.003	2.191	2.444	2.640
45	0.866	0.948	1.205	1.380	1.606	1.777	1.950	2.126	2.362	2.545
46	0.851	0.933	1.206	1.403	1.672	1.887	2.114	2.356	2.700	2.979
47	0.850	0.934	1.210	1.407	1.673	1.884	2.105	2.338	2.666	2.929
48	0.853	0.933	1.202	1.396	1.663	1.877	2.104	2.345	2.690	2.971
49	0.830	0.916	1.213	1.439	1.762	2.031	2.328	2.654	3.139	3.551
50	0.826	0.913	1.214	1.445	1.778	2.058	2.368	2.712	3.226	3.666
51	0.845	0.931	1.216	1.421	1.698	1.919	2.151	2.397	2.744	3.024
52	0.867	0.949	1.206	1.380	1.603	1.771	1.941	2.112	2.342	2.519
53	0.871	0.956	1.215	1.383	1.590	1.740	1.886	2.029	2.214	2.351
54	0.829	0.907	1.180	1.406	1.769	2.115	2.542	3.073	3.978	4.861
55	0.859	0.941	1.207	1.392	1.636	1.826	2.021	2.223	2.501	2.721
56	0.884	0.959	1.187	1.346	1.569	1.756	1.962	2.192	2.538	2.836
57	0.867	0.955	1.223	1.396	1.609	1.763	1.914	2.060	2.250	2.389
58	0.860	0.944	1.212	1.395	1.634	1.817	2.002	2.192	2.449	2.649
59	0.834	0.919	1.212	1.433	1.745	2.004	2.287	2.597	3.052	3.436
60	0.840	0.926	1.215	1.426	1.719	1.956	2.210	2.483	2.876	3.200
61	0.823	0.910	1.213	1.448	1.789	2.080	2.405	2.768	3.317	3.791
62	0.851	0.943	1.230	1.424	1.674	1.863	2.053	2.245	2.502	2.700
63	0.866	0.958	1.231	1.404	1.612	1.761	1.903	2.040	2.213	2.339
64	0.862	0.947	1.215	1.396	1.627	1.801	1.976	2.152	2.388	2.569
65	0.852	0.942	1.226	1.419	1.669	1.858	2.050	2.245	2.507	2.711

7-day										
region	*1.58-year	2-year	5-year	10-year	25-year	50-year	100-year	200-year	500-year	1,000-year
66	0.845	0.941	1.243	1.445	1.705	1.899	2.095	2.291	2.554	2.755
67	0.855	0.948	1.234	1.420	1.652	1.824	1.994	2.165	2.393	2.567
68	0.827	0.927	1.250	1.473	1.763	1.984	2.210	2.442	2.759	3.008
69	0.847	0.936	1.215	1.422	1.725	1.989	2.292	2.641	3.189	3.679
70	0.861	0.951	1.226	1.407	1.633	1.798	1.962	2.123	2.334	2.492
71	0.851	0.937	1.208	1.409	1.703	1.961	2.256	2.597	3.133	3.614
72	0.850	0.945	1.240	1.435	1.682	1.865	2.047	2.228	2.467	2.648
73	0.857	0.942	1.213	1.401	1.647	1.836	2.030	2.229	2.502	2.715
74	0.858	0.949	1.227	1.408	1.635	1.803	1.970	2.138	2.361	2.533
75	0.847	0.937	1.224	1.424	1.689	1.894	2.105	2.324	2.625	2.863
76	0.879	0.962	1.211	1.368	1.556	1.690	1.818	1.940	2.094	2.206
77	0.860	0.951	1.229	1.410	1.637	1.802	1.965	2.126	2.335	2.491
78	0.873	0.967	1.235	1.396	1.587	1.721	1.849	1.974	2.135	2.254
79	0.854	0.943	1.223	1.413	1.659	1.847	2.036	2.229	2.490	2.691
80	0.849	0.946	1.245	1.441	1.686	1.867	2.045	2.221	2.452	2.625
81	0.861	0.945	1.210	1.391	1.628	1.809	1.993	2.181	2.436	2.634
82	0.869	0.949	1.197	1.375	1.631	1.850	2.097	2.377	2.808	3.187
83	0.850	0.939	1.223	1.420	1.679	1.878	2.083	2.293	2.582	2.808
84	0.825	0.916	1.226	1.458	1.785	2.054	2.346	2.665	3.130	3.521
A1	0.849	0.940	1.230	1.428	1.685	1.881	2.081	2.284	2.559	2.773
A2	0.833	0.913	1.196	1.418	1.745	2.026	2.342	2.698	3.243	3.717

10-day										
region	*1.58-year	2-year	5-year	10-year	25-year	50-year	100-year	200-year	500-year	1,000-year
1	0.834	0.923	1.221	1.440	1.744	1.991	2.255	2.540	2.950	3.289
2	0.839	0.926	1.219	1.431	1.724	1.960	2.211	2.480	2.864	3.179
3	0.838	0.924	1.215	1.430	1.729	1.973	2.235	2.518	2.928	3.268
4	0.849	0.939	1.224	1.418	1.668	1.857	2.049	2.244	2.510	2.717
5	0.852	0.934	1.207	1.402	1.668	1.880	2.103	2.338	2.671	2.941
6	0.848	0.933	1.213	1.413	1.685	1.901	2.129	2.369	2.708	2.981
7	0.853	0.938	1.214	1.407	1.663	1.862	2.068	2.282	2.578	2.813
8	0.832	0.921	1.221	1.444	1.755	2.010	2.285	2.582	3.014	3.373
9	0.843	0.931	1.221	1.428	1.708	1.930	2.164	2.411	2.758	3.038
10	0.866	0.947	1.203	1.375	1.596	1.762	1.929	2.100	2.330	2.509
11	0.864	0.945	1.205	1.380	1.605	1.774	1.945	2.119	2.355	2.539
12	0.869	0.943	1.177	1.353	1.614	1.845	2.111	2.422	2.913	3.359
13	0.859	0.940	1.203	1.388	1.637	1.832	2.035	2.247	2.542	2.778
14	0.873	0.957	1.211	1.373	1.573	1.720	1.864	2.008	2.198	2.343
15	0.859	0.938	1.200	1.385	1.636	1.834	2.041	2.259	2.565	2.811
16	0.866	0.940	1.178	1.357	1.626	1.864	2.142	2.467	2.985	3.459
17	0.882	0.957	1.190	1.343	1.536	1.679	1.820	1.960	2.145	2.283

10-day										
region	***1.58-year**	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**200-year**	**500-year**	**1,000-year**
18	0.856	0.938	1.198	1.392	1.678	1.929	2.218	2.554	3.083	3.560
19	0.862	0.944	1.206	1.386	1.623	1.805	1.992	2.184	2.446	2.651
20	0.868	0.947	1.197	1.370	1.595	1.768	1.945	2.126	2.373	2.566
21	0.853	0.943	1.227	1.418	1.665	1.851	2.039	2.229	2.484	2.680
22	0.887	0.961	1.187	1.334	1.516	1.650	1.781	1.909	2.076	2.201
23	0.891	0.966	1.191	1.331	1.501	1.621	1.736	1.846	1.985	2.085
24	0.867	0.953	1.215	1.384	1.596	1.751	1.905	2.059	2.264	2.422
25	0.860	0.943	1.210	1.394	1.635	1.819	2.007	2.201	2.464	2.669
26	0.874	0.952	1.195	1.359	1.571	1.730	1.890	2.052	2.270	2.437
27	0.871	0.946	1.190	1.359	1.583	1.756	1.935	2.119	2.373	2.573
28	0.874	0.953	1.199	1.361	1.564	1.715	1.865	2.016	2.218	2.374
29	0.858	0.940	1.206	1.392	1.639	1.831	2.031	2.238	2.526	2.753
30	0.884	0.957	1.186	1.337	1.529	1.671	1.812	1.953	2.139	2.279
31	0.891	0.966	1.188	1.329	1.498	1.619	1.735	1.846	1.987	2.089
32	0.883	0.962	1.201	1.353	1.537	1.669	1.796	1.918	2.074	2.188
33	0.892	0.970	1.197	1.335	1.498	1.611	1.717	1.816	1.938	2.024
34	0.885	0.956	1.179	1.329	1.522	1.667	1.812	1.960	2.157	2.308
35	0.856	0.938	1.205	1.395	1.649	1.850	2.059	2.279	2.586	2.832
36	0.876	0.958	1.206	1.367	1.567	1.712	1.853	1.992	2.172	2.305
37	0.866	0.948	1.207	1.382	1.606	1.776	1.947	2.119	2.351	2.529
38	0.865	0.945	1.199	1.376	1.608	1.787	1.971	2.161	2.421	2.625
39	0.873	0.953	1.202	1.367	1.576	1.732	1.887	2.042	2.247	2.403
40	0.863	0.942	1.198	1.378	1.617	1.804	1.998	2.199	2.478	2.699
41	0.865	0.947	1.207	1.383	1.611	1.785	1.960	2.139	2.380	2.566
42	0.860	0.937	1.192	1.376	1.627	1.829	2.042	2.269	2.591	2.854
43	0.867	0.946	1.200	1.375	1.603	1.778	1.956	2.139	2.389	2.584
44	0.871	0.953	1.208	1.376	1.588	1.745	1.900	2.054	2.256	2.409
45	0.868	0.949	1.203	1.375	1.597	1.764	1.932	2.103	2.332	2.508
46	0.853	0.935	1.206	1.400	1.664	1.873	2.093	2.325	2.653	2.918
47	0.860	0.944	1.209	1.392	1.632	1.815	2.003	2.195	2.458	2.663
48	0.864	0.947	1.210	1.388	1.617	1.791	1.967	2.145	2.385	2.570
49	0.839	0.925	1.213	1.425	1.721	1.963	2.223	2.505	2.912	3.250
50	0.834	0.918	1.208	1.428	1.741	2.004	2.291	2.609	3.079	3.478
51	0.851	0.935	1.212	1.409	1.673	1.882	2.100	2.329	2.649	2.906
52	0.873	0.951	1.198	1.365	1.578	1.738	1.899	2.062	2.279	2.446
53	0.875	0.959	1.211	1.373	1.571	1.713	1.852	1.986	2.158	2.284
54	0.843	0.919	1.179	1.388	1.717	2.023	2.394	2.845	3.600	4.320
55	0.861	0.940	1.199	1.382	1.627	1.820	2.021	2.231	2.524	2.759
56	0.889	0.965	1.188	1.341	1.552	1.725	1.914	2.121	2.428	2.688
57	0.872	0.959	1.218	1.383	1.584	1.728	1.867	2.002	2.173	2.299
58	0.863	0.947	1.212	1.390	1.620	1.793	1.967	2.143	2.379	2.561
59	0.834	0.921	1.217	1.436	1.743	1.995	2.268	2.563	2.994	3.352
60	0.841	0.927	1.216	1.426	1.715	1.948	2.197	2.462	2.842	3.154

10-day										
region	***1.58-year**	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**200-year**	**500-year**	**1,000-year**
61	0.830	0.915	1.212	1.438	1.763	2.036	2.337	2.670	3.166	3.589
62	0.855	0.946	1.228	1.417	1.657	1.837	2.017	2.197	2.436	2.619
63	0.873	0.963	1.227	1.390	1.583	1.718	1.844	1.964	2.113	2.219
64	0.872	0.956	1.212	1.377	1.583	1.732	1.878	2.021	2.207	2.344
65	0.862	0.949	1.221	1.401	1.628	1.797	1.964	2.131	2.352	2.519
66	0.858	0.952	1.237	1.420	1.646	1.810	1.970	2.126	2.327	2.476
67	0.859	0.951	1.230	1.411	1.635	1.799	1.962	2.124	2.340	2.505
68	0.817	0.918	1.255	1.492	1.806	2.049	2.300	2.559	2.918	3.201
69	0.850	0.938	1.215	1.419	1.714	1.971	2.263	2.599	3.122	3.588
70	0.867	0.957	1.226	1.397	1.607	1.757	1.902	2.042	2.222	2.353
71	0.857	0.941	1.204	1.397	1.680	1.925	2.206	2.529	3.032	3.483
72	0.860	0.953	1.234	1.415	1.638	1.800	1.956	2.109	2.306	2.451
73	0.858	0.939	1.205	1.391	1.641	1.837	2.040	2.252	2.547	2.782
74	0.863	0.951	1.222	1.397	1.616	1.776	1.936	2.095	2.308	2.470
75	0.855	0.944	1.224	1.412	1.656	1.839	2.025	2.212	2.464	2.657
76	0.887	0.969	1.207	1.352	1.522	1.640	1.751	1.854	1.981	2.071
77	0.871	0.960	1.223	1.389	1.590	1.733	1.869	2.000	2.166	2.286
78	0.882	0.972	1.225	1.375	1.550	1.673	1.789	1.901	2.045	2.151
79	0.864	0.950	1.218	1.395	1.619	1.784	1.948	2.111	2.327	2.489
80	0.857	0.951	1.236	1.420	1.650	1.817	1.980	2.141	2.349	2.504
81	0.875	0.955	1.202	1.364	1.568	1.719	1.868	2.016	2.211	2.357
82	0.877	0.953	1.187	1.354	1.593	1.796	2.025	2.283	2.678	3.024
83	0.859	0.945	1.216	1.400	1.637	1.816	1.997	2.180	2.426	2.616
84	0.835	0.922	1.217	1.436	1.741	1.991	2.260	2.552	2.975	3.327
A1	0.864	0.952	1.222	1.398	1.619	1.781	1.940	2.097	2.302	2.456
A2	0.853	0.935	1.206	1.399	1.661	1.868	2.086	2.316	2.640	2.902

20-day										
region	***1.58-year**	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**200-year**	**500-year**	**1,000-year**
1	0.857	0.940	1.207	1.395	1.645	1.840	2.043	2.253	2.545	2.777
2	0.852	0.935	1.207	1.402	1.665	1.874	2.093	2.324	2.649	2.912
3	0.850	0.933	1.207	1.405	1.674	1.889	2.117	2.359	2.701	2.980
4	0.859	0.944	1.212	1.393	1.625	1.800	1.977	2.157	2.400	2.589
5	0.865	0.942	1.192	1.370	1.608	1.795	1.991	2.196	2.482	2.712
6	0.869	0.950	1.204	1.375	1.595	1.761	1.928	2.096	2.322	2.495
7	0.870	0.950	1.203	1.373	1.591	1.755	1.920	2.086	2.309	2.479
8	0.858	0.940	1.206	1.393	1.643	1.837	2.039	2.249	2.541	2.773
9	0.860	0.945	1.213	1.395	1.631	1.811	1.993	2.179	2.430	2.624
10	0.873	0.947	1.188	1.352	1.565	1.726	1.890	2.057	2.285	2.463
11	0.875	0.950	1.191	1.352	1.558	1.713	1.869	2.027	2.241	2.408
12	0.893	0.961	1.168	1.315	1.522	1.697	1.891	2.109	2.440	2.727

20-day										
region	***1.58-year**	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**200-year**	**500-year**	**1,000-year**
13	0.875	0.952	1.193	1.357	1.567	1.727	1.887	2.050	2.268	2.436
14	0.888	0.966	1.195	1.338	1.511	1.636	1.757	1.877	2.034	2.152
15	0.866	0.943	1.191	1.367	1.602	1.787	1.979	2.180	2.460	2.683
16	0.885	0.956	1.174	1.330	1.552	1.742	1.955	2.195	2.563	2.886
17	0.893	0.963	1.177	1.315	1.487	1.613	1.736	1.857	2.013	2.130
18	0.879	0.953	1.183	1.347	1.583	1.784	2.010	2.266	2.659	3.005
19	0.886	0.962	1.192	1.340	1.522	1.653	1.781	1.905	2.064	2.182
20	0.890	0.961	1.177	1.320	1.498	1.630	1.760	1.889	2.059	2.186
21	0.866	0.949	1.209	1.384	1.607	1.774	1.942	2.111	2.336	2.508
22	0.894	0.960	1.168	1.307	1.483	1.614	1.745	1.876	2.051	2.183
23	0.898	0.969	1.180	1.312	1.470	1.582	1.687	1.788	1.915	2.005
24	0.877	0.956	1.198	1.355	1.551	1.696	1.840	1.984	2.177	2.324
25	0.869	0.946	1.195	1.367	1.594	1.768	1.948	2.133	2.386	2.585
26	0.890	0.964	1.185	1.327	1.501	1.626	1.747	1.865	2.016	2.127
27	0.891	0.966	1.189	1.329	1.498	1.618	1.733	1.843	1.983	2.084
28	0.887	0.963	1.190	1.334	1.510	1.638	1.764	1.888	2.052	2.176
29	0.875	0.949	1.185	1.349	1.565	1.731	1.901	2.077	2.318	2.507
30	0.893	0.964	1.178	1.317	1.487	1.611	1.732	1.849	2.001	2.114
31	0.902	0.973	1.180	1.306	1.453	1.555	1.650	1.739	1.849	1.926
32	0.889	0.970	1.203	1.345	1.511	1.626	1.732	1.832	1.955	2.042
33	0.897	0.974	1.193	1.324	1.475	1.578	1.673	1.762	1.868	1.942
34	0.902	0.969	1.169	1.295	1.448	1.556	1.661	1.761	1.889	1.981
35	0.877	0.956	1.200	1.360	1.561	1.708	1.854	1.998	2.187	2.328
36	0.894	0.972	1.197	1.333	1.491	1.599	1.699	1.792	1.906	1.986
37	0.889	0.971	1.207	1.349	1.513	1.625	1.729	1.826	1.943	2.024
38	0.879	0.954	1.190	1.348	1.550	1.701	1.853	2.006	2.209	2.365
39	0.884	0.961	1.195	1.346	1.530	1.664	1.793	1.920	2.082	2.201
40	0.877	0.955	1.197	1.357	1.560	1.710	1.859	2.007	2.203	2.351
41	0.878	0.956	1.197	1.355	1.554	1.700	1.845	1.989	2.178	2.319
42	0.881	0.952	1.178	1.334	1.538	1.695	1.855	2.020	2.244	2.420
43	0.882	0.958	1.191	1.345	1.538	1.680	1.820	1.959	2.142	2.279
44	0.874	0.951	1.195	1.360	1.573	1.734	1.896	2.060	2.282	2.452
45	0.879	0.957	1.197	1.354	1.552	1.697	1.841	1.983	2.169	2.308
46	0.869	0.949	1.200	1.371	1.592	1.759	1.929	2.101	2.333	2.512
47	0.878	0.958	1.202	1.360	1.558	1.702	1.843	1.982	2.162	2.297
48	0.877	0.959	1.207	1.366	1.562	1.704	1.841	1.975	2.147	2.273
49	0.832	0.914	1.205	1.429	1.753	2.029	2.335	2.676	3.190	3.632
50	0.854	0.938	1.209	1.400	1.656	1.857	2.067	2.285	2.590	2.833
51	0.868	0.948	1.202	1.375	1.600	1.770	1.943	2.119	2.356	2.540
52	0.881	0.955	1.187	1.342	1.539	1.687	1.834	1.983	2.180	2.330
53	0.883	0.969	1.215	1.365	1.539	1.659	1.770	1.874	2.001	2.089
54	0.859	0.934	1.178	1.366	1.652	1.910	2.214	2.575	3.158	3.698
55	0.879	0.956	1.193	1.351	1.550	1.697	1.844	1.990	2.183	2.329

20-day										
region	*1.58-year	2-year	5-year	10-year	25-year	50-year	100-year	200-year	500-year	1,000-year
56	0.902	0.975	1.181	1.318	1.499	1.645	1.799	1.964	2.203	2.399
57	0.878	0.962	1.211	1.368	1.559	1.695	1.825	1.950	2.109	2.224
58	0.876	0.956	1.202	1.363	1.563	1.710	1.855	1.997	2.184	2.323
59	0.855	0.938	1.208	1.398	1.652	1.851	2.058	2.273	2.573	2.813
60	0.864	0.945	1.202	1.380	1.614	1.793	1.978	2.167	2.426	2.629
61	0.859	0.940	1.204	1.389	1.635	1.827	2.026	2.234	2.522	2.750
62	0.866	0.955	1.225	1.398	1.611	1.764	1.914	2.059	2.247	2.385
63	0.878	0.965	1.221	1.378	1.564	1.693	1.815	1.929	2.071	2.172
64	0.874	0.960	1.216	1.378	1.575	1.716	1.851	1.982	2.147	2.268
65	0.866	0.955	1.225	1.398	1.611	1.766	1.915	2.061	2.249	2.388
66	0.862	0.956	1.237	1.416	1.633	1.788	1.937	2.081	2.265	2.398
67	0.868	0.958	1.226	1.395	1.601	1.750	1.896	2.040	2.230	2.373
68	0.828	0.928	1.251	1.473	1.762	1.982	2.207	2.437	2.752	2.999
69	0.869	0.955	1.213	1.393	1.644	1.853	2.083	2.339	2.722	3.050
70	0.875	0.961	1.217	1.378	1.572	1.709	1.841	1.967	2.127	2.242
71	0.883	0.957	1.185	1.345	1.571	1.762	1.974	2.211	2.571	2.882
72	0.875	0.961	1.218	1.380	1.574	1.712	1.843	1.969	2.128	2.242
73	0.875	0.956	1.204	1.365	1.568	1.716	1.861	2.005	2.193	2.333
74	0.876	0.961	1.213	1.372	1.565	1.704	1.840	1.974	2.150	2.284
75	0.873	0.958	1.213	1.378	1.580	1.726	1.868	2.007	2.185	2.316
76	0.892	0.972	1.202	1.340	1.500	1.608	1.708	1.801	1.914	1.992
77	0.881	0.968	1.218	1.370	1.548	1.672	1.786	1.894	2.026	2.119
78	0.887	0.974	1.217	1.361	1.528	1.644	1.754	1.861	1.996	2.096
79	0.881	0.966	1.213	1.366	1.547	1.673	1.793	1.905	2.045	2.145
80	0.872	0.963	1.230	1.394	1.588	1.723	1.850	1.971	2.120	2.226
81	0.887	0.962	1.189	1.336	1.516	1.647	1.774	1.899	2.059	2.178
82	0.884	0.960	1.188	1.346	1.567	1.751	1.955	2.181	2.520	2.811
83	0.877	0.957	1.203	1.364	1.563	1.708	1.850	1.990	2.172	2.307
84	0.863	0.946	1.208	1.387	1.619	1.796	1.975	2.158	2.405	2.597
A1	0.864	0.949	1.214	1.392	1.618	1.788	1.957	2.127	2.353	2.525
A2	0.879	0.969	1.227	1.382	1.561	1.684	1.797	1.903	2.031	2.120

30-day										
region	*1.58-year	2-year	5-year	10-year	25-year	50-year	100-year	200-year	500-year	1,000-year
1	0.869	0.948	1.200	1.371	1.593	1.763	1.934	2.109	2.346	2.529
2	0.862	0.944	1.206	1.386	1.624	1.807	1.994	2.187	2.451	2.657
3	0.862	0.943	1.202	1.383	1.621	1.807	1.997	2.194	2.466	2.680
4	0.874	0.955	1.203	1.364	1.565	1.714	1.861	2.008	2.204	2.355
5	0.880	0.955	1.189	1.346	1.546	1.696	1.846	1.996	2.196	2.349
6	0.885	0.962	1.195	1.344	1.527	1.659	1.787	1.911	2.070	2.187
7	0.886	0.961	1.190	1.337	1.520	1.652	1.781	1.908	2.071	2.192

30-day										
region	*1.58-year	2-year	5-year	10-year	25-year	50-year	100-year	200-year	500-year	1,000-year
8	0.869	0.947	1.196	1.367	1.592	1.765	1.941	2.122	2.369	2.562
9	0.878	0.958	1.204	1.362	1.559	1.701	1.841	1.977	2.153	2.284
10	0.888	0.960	1.179	1.322	1.501	1.632	1.763	1.894	2.069	2.203
11	0.887	0.960	1.184	1.329	1.509	1.642	1.774	1.906	2.082	2.216
12	0.905	0.971	1.163	1.293	1.472	1.618	1.776	1.950	2.205	2.420
13	0.885	0.959	1.188	1.338	1.525	1.663	1.798	1.932	2.106	2.237
14	0.896	0.973	1.193	1.326	1.483	1.593	1.699	1.802	1.935	2.033
15	0.881	0.955	1.185	1.339	1.538	1.687	1.837	1.988	2.191	2.346
16	0.898	0.965	1.165	1.304	1.499	1.661	1.840	2.039	2.336	2.592
17	0.902	0.969	1.169	1.295	1.448	1.557	1.661	1.761	1.887	1.979
18	0.892	0.962	1.175	1.323	1.530	1.703	1.894	2.106	2.425	2.700
19	0.898	0.969	1.180	1.312	1.470	1.582	1.688	1.789	1.916	2.007
20	0.899	0.966	1.170	1.301	1.462	1.578	1.691	1.801	1.943	2.047
21	0.881	0.960	1.199	1.352	1.541	1.678	1.811	1.940	2.107	2.230
22	0.908	0.971	1.160	1.279	1.423	1.524	1.621	1.715	1.832	1.917
23	0.907	0.975	1.171	1.290	1.429	1.524	1.613	1.696	1.797	1.868
24	0.899	0.974	1.187	1.316	1.468	1.576	1.679	1.779	1.909	2.005
25	0.877	0.953	1.192	1.352	1.557	1.710	1.864	2.019	2.226	2.385
26	0.901	0.972	1.179	1.306	1.455	1.559	1.656	1.748	1.861	1.942
27	0.903	0.971	1.170	1.294	1.444	1.549	1.650	1.745	1.866	1.952
28	0.894	0.968	1.186	1.322	1.485	1.602	1.716	1.828	1.974	2.084
29	0.887	0.958	1.181	1.328	1.515	1.654	1.792	1.929	2.111	2.248
30	0.900	0.968	1.172	1.301	1.459	1.572	1.681	1.786	1.920	2.018
31	0.910	0.978	1.172	1.288	1.420	1.509	1.591	1.666	1.757	1.819
32	0.894	0.974	1.201	1.336	1.492	1.597	1.693	1.782	1.889	1.963
33	0.907	0.979	1.181	1.299	1.433	1.522	1.604	1.678	1.766	1.826
34	0.914	0.976	1.156	1.267	1.397	1.487	1.571	1.651	1.748	1.818
35	0.895	0.968	1.184	1.319	1.482	1.597	1.707	1.812	1.944	2.039
36	0.904	0.978	1.186	1.308	1.446	1.539	1.622	1.698	1.789	1.850
37	0.896	0.975	1.199	1.331	1.483	1.586	1.679	1.766	1.869	1.940
38	0.887	0.962	1.190	1.337	1.518	1.649	1.776	1.900	2.060	2.179
39	0.889	0.963	1.187	1.330	1.506	1.634	1.757	1.877	2.032	2.146
40	0.886	0.962	1.192	1.339	1.521	1.652	1.780	1.905	2.065	2.183
41	0.886	0.962	1.191	1.338	1.520	1.651	1.779	1.904	2.064	2.183
42	0.887	0.956	1.174	1.322	1.512	1.656	1.801	1.947	2.145	2.296
43	0.892	0.966	1.188	1.328	1.497	1.617	1.732	1.843	1.982	2.084
44	0.885	0.961	1.191	1.340	1.523	1.656	1.785	1.911	2.074	2.195
45	0.887	0.962	1.188	1.335	1.515	1.646	1.773	1.898	2.058	2.177
46	0.882	0.958	1.192	1.346	1.538	1.680	1.819	1.957	2.137	2.272
47	0.884	0.960	1.192	1.343	1.531	1.668	1.802	1.935	2.107	2.235
48	0.882	0.962	1.203	1.355	1.540	1.672	1.798	1.921	2.076	2.189
49	0.848	0.928	1.199	1.400	1.682	1.912	2.160	2.429	2.820	3.145
50	0.872	0.954	1.206	1.372	1.581	1.736	1.889	2.041	2.241	2.391

30-day										
region	***1.58-year**	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**200-year**	**500-year**	**1,000-year**
51	0.878	0.959	1.204	1.362	1.556	1.697	1.834	1.967	2.140	2.267
52	0.892	0.964	1.182	1.321	1.492	1.615	1.734	1.850	1.998	2.107
53	0.888	0.973	1.214	1.357	1.520	1.631	1.731	1.824	1.935	2.012
54	0.876	0.948	1.176	1.344	1.590	1.804	2.050	2.332	2.775	3.172
55	0.895	0.970	1.190	1.326	1.486	1.597	1.702	1.801	1.923	2.010
56	0.905	0.973	1.171	1.303	1.480	1.624	1.777	1.944	2.185	2.386
57	0.889	0.968	1.198	1.341	1.511	1.630	1.742	1.848	1.981	2.075
58	0.884	0.959	1.190	1.341	1.530	1.669	1.806	1.942	2.119	2.251
59	0.869	0.947	1.195	1.366	1.591	1.763	1.939	2.120	2.367	2.561
60	0.875	0.951	1.193	1.356	1.568	1.728	1.890	2.055	2.276	2.447
61	0.871	0.949	1.197	1.366	1.584	1.749	1.916	2.087	2.316	2.493
62	0.878	0.964	1.217	1.374	1.561	1.692	1.817	1.935	2.083	2.188
63	0.879	0.965	1.215	1.370	1.555	1.684	1.807	1.923	2.068	2.171
64	0.888	0.972	1.210	1.353	1.519	1.631	1.734	1.830	1.945	2.026
65	0.875	0.962	1.217	1.378	1.571	1.708	1.839	1.964	2.121	2.235
66	0.869	0.962	1.235	1.403	1.602	1.741	1.871	1.994	2.147	2.256
67	0.875	0.964	1.222	1.382	1.573	1.710	1.842	1.972	2.141	2.268
68	0.838	0.934	1.241	1.451	1.720	1.925	2.132	2.343	2.630	2.855
69	0.879	0.963	1.208	1.375	1.604	1.790	1.993	2.215	2.542	2.818
70	0.880	0.964	1.212	1.366	1.550	1.679	1.802	1.919	2.065	2.170
71	0.888	0.963	1.185	1.339	1.552	1.728	1.922	2.136	2.454	2.726
72	0.886	0.967	1.205	1.352	1.525	1.646	1.759	1.866	1.999	2.094
73	0.891	0.965	1.188	1.329	1.501	1.623	1.741	1.854	1.998	2.103
74	0.883	0.966	1.207	1.356	1.536	1.664	1.789	1.911	2.070	2.189
75	0.878	0.960	1.206	1.363	1.556	1.694	1.829	1.959	2.126	2.249
76	0.892	0.971	1.198	1.336	1.497	1.608	1.711	1.807	1.925	2.008
77	0.879	0.964	1.213	1.369	1.555	1.686	1.810	1.928	2.076	2.183
78	0.885	0.969	1.209	1.355	1.529	1.651	1.770	1.885	2.034	2.145
79	0.885	0.969	1.210	1.357	1.530	1.648	1.759	1.863	1.990	2.079
80	0.882	0.970	1.222	1.373	1.547	1.665	1.775	1.876	1.998	2.083
81	0.897	0.972	1.188	1.320	1.475	1.582	1.682	1.775	1.890	1.971
82	0.890	0.965	1.186	1.338	1.547	1.719	1.906	2.112	2.417	2.676
83	0.886	0.961	1.189	1.336	1.519	1.652	1.781	1.909	2.073	2.195
84	0.877	0.956	1.198	1.357	1.558	1.707	1.854	2.000	2.192	2.336
A1	0.879	0.959	1.201	1.358	1.552	1.693	1.831	1.966	2.141	2.271
A2	0.890	0.974	1.211	1.352	1.512	1.620	1.719	1.809	1.917	1.992

45-day										
region	***1.58-year**	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**200-year**	**500-year**	**1,000-year**
1	0.883	0.960	1.194	1.346	1.534	1.671	1.804	1.935	2.104	2.230
2	0.864	0.942	1.195	1.375	1.615	1.803	1.999	2.204	2.490	2.718

45-day										
region	**[*]1.58-year**	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**200-year**	**500-year**	**1,000-year**
3	0.871	0.948	1.193	1.362	1.582	1.750	1.923	2.099	2.339	2.526
4	0.885	0.962	1.195	1.343	1.523	1.654	1.782	1.909	2.077	2.204
5	0.888	0.960	1.179	1.324	1.507	1.642	1.776	1.909	2.083	2.215
6	0.894	0.967	1.186	1.323	1.487	1.604	1.715	1.821	1.955	2.051
7	0.898	0.971	1.183	1.314	1.468	1.576	1.677	1.772	1.890	1.974
8	0.884	0.960	1.191	1.342	1.529	1.665	1.799	1.930	2.100	2.227
9	0.886	0.965	1.197	1.344	1.521	1.647	1.767	1.883	2.029	2.135
10	0.896	0.964	1.170	1.303	1.467	1.587	1.706	1.825	1.982	2.102
11	0.900	0.969	1.174	1.301	1.457	1.568	1.677	1.784	1.925	2.031
12	0.920	0.980	1.150	1.262	1.411	1.530	1.655	1.790	1.983	2.142
13	0.894	0.966	1.180	1.317	1.484	1.604	1.720	1.832	1.976	2.081
14	0.907	0.981	1.184	1.303	1.440	1.534	1.624	1.709	1.818	1.897
15	0.895	0.967	1.180	1.316	1.480	1.597	1.710	1.819	1.957	2.057
16	0.908	0.974	1.163	1.290	1.462	1.601	1.750	1.912	2.147	2.344
17	0.910	0.976	1.167	1.282	1.415	1.507	1.592	1.671	1.768	1.836
18	0.904	0.971	1.165	1.297	1.478	1.625	1.784	1.959	2.215	2.431
19	0.908	0.978	1.177	1.295	1.428	1.518	1.600	1.674	1.764	1.825
20	0.906	0.971	1.165	1.285	1.430	1.533	1.630	1.723	1.840	1.924
21	0.893	0.968	1.190	1.329	1.494	1.610	1.719	1.824	1.955	2.048
22	0.917	0.978	1.153	1.259	1.382	1.466	1.545	1.618	1.707	1.770
23	0.910	0.976	1.167	1.282	1.416	1.507	1.592	1.671	1.768	1.835
24	0.911	0.980	1.173	1.287	1.418	1.510	1.596	1.679	1.785	1.863
25	0.889	0.959	1.177	1.321	1.503	1.638	1.772	1.906	2.083	2.216
26	0.913	0.982	1.172	1.283	1.406	1.487	1.560	1.626	1.704	1.756
27	0.916	0.982	1.167	1.274	1.393	1.472	1.543	1.607	1.682	1.733
28	0.908	0.980	1.180	1.298	1.434	1.529	1.619	1.705	1.816	1.897
29	0.891	0.959	1.172	1.313	1.494	1.629	1.763	1.898	2.078	2.214
30	0.908	0.974	1.166	1.283	1.422	1.518	1.608	1.693	1.798	1.873
31	0.917	0.982	1.165	1.270	1.389	1.467	1.537	1.600	1.674	1.725
32	0.904	0.981	1.192	1.314	1.449	1.538	1.617	1.688	1.771	1.827
33	0.916	0.985	1.174	1.280	1.396	1.471	1.536	1.594	1.661	1.705
34	0.922	0.981	1.150	1.250	1.364	1.441	1.511	1.576	1.653	1.707
35	0.906	0.974	1.172	1.292	1.434	1.532	1.624	1.709	1.815	1.889
36	0.910	0.981	1.178	1.293	1.422	1.507	1.584	1.653	1.735	1.790
37	0.905	0.984	1.199	1.320	1.451	1.536	1.610	1.676	1.751	1.800
38	0.895	0.968	1.185	1.320	1.481	1.595	1.703	1.806	1.935	2.027
39	0.899	0.969	1.177	1.307	1.463	1.574	1.679	1.780	1.906	1.998
40	0.897	0.970	1.184	1.317	1.476	1.587	1.692	1.792	1.916	2.006
41	0.894	0.966	1.181	1.318	1.484	1.602	1.717	1.827	1.967	2.069
42	0.899	0.965	1.168	1.299	1.462	1.581	1.697	1.811	1.959	2.069
43	0.899	0.971	1.184	1.314	1.467	1.574	1.674	1.768	1.884	1.966
44	0.893	0.966	1.186	1.324	1.492	1.610	1.724	1.834	1.972	2.072
45	0.894	0.967	1.184	1.321	1.487	1.605	1.718	1.827	1.965	2.065

45-day										
region	*1.58-year	2-year	5-year	10-year	25-year	50-year	100-year	200-year	500-year	1,000-year
46	0.898	0.972	1.187	1.318	1.473	1.580	1.680	1.773	1.889	1.970
47	0.893	0.966	1.184	1.322	1.489	1.609	1.724	1.835	1.976	2.079
48	0.896	0.972	1.194	1.328	1.483	1.590	1.689	1.781	1.893	1.972
49	0.863	0.938	1.189	1.370	1.617	1.815	2.025	2.248	2.565	2.824
50	0.887	0.963	1.192	1.338	1.517	1.645	1.768	1.888	2.041	2.152
51	0.887	0.963	1.192	1.337	1.515	1.643	1.766	1.886	2.039	2.151
52	0.899	0.969	1.175	1.305	1.461	1.572	1.679	1.781	1.910	2.003
53	0.893	0.977	1.211	1.347	1.501	1.602	1.694	1.777	1.875	1.941
54	0.888	0.960	1.179	1.332	1.547	1.727	1.926	2.149	2.485	2.774
55	0.907	0.979	1.180	1.298	1.432	1.521	1.602	1.676	1.763	1.823
56	0.912	0.980	1.170	1.293	1.455	1.583	1.718	1.861	2.063	2.229
57	0.894	0.971	1.194	1.330	1.489	1.599	1.702	1.797	1.915	1.998
58	0.892	0.965	1.184	1.324	1.493	1.615	1.731	1.844	1.989	2.094
59	0.875	0.952	1.193	1.356	1.565	1.722	1.881	2.041	2.256	2.421
60	0.883	0.956	1.184	1.337	1.532	1.677	1.823	1.969	2.163	2.312
61	0.887	0.962	1.191	1.338	1.517	1.647	1.773	1.895	2.052	2.168
62	0.884	0.968	1.210	1.358	1.533	1.654	1.767	1.874	2.006	2.099
63	0.887	0.972	1.214	1.358	1.523	1.635	1.738	1.833	1.948	2.027
64	0.890	0.971	1.204	1.344	1.507	1.618	1.721	1.817	1.934	2.015
65	0.882	0.967	1.214	1.365	1.543	1.666	1.782	1.891	2.025	2.121
66	0.874	0.965	1.228	1.389	1.579	1.710	1.833	1.949	2.091	2.192
67	0.882	0.968	1.216	1.366	1.545	1.671	1.793	1.911	2.064	2.178
68	0.843	0.935	1.232	1.434	1.695	1.893	2.094	2.300	2.579	2.798
69	0.884	0.967	1.206	1.366	1.583	1.758	1.947	2.152	2.450	2.698
70	0.886	0.969	1.208	1.354	1.526	1.644	1.755	1.858	1.986	2.075
71	0.890	0.965	1.184	1.334	1.542	1.714	1.901	2.108	2.414	2.674
72	0.887	0.969	1.205	1.349	1.520	1.637	1.748	1.852	1.980	2.070
73	0.897	0.969	1.181	1.314	1.473	1.585	1.692	1.794	1.922	2.014
74	0.890	0.970	1.202	1.342	1.508	1.626	1.739	1.849	1.992	2.098
75	0.884	0.965	1.206	1.356	1.535	1.660	1.780	1.893	2.035	2.136
76	0.897	0.974	1.194	1.327	1.479	1.583	1.679	1.767	1.874	1.949
77	0.886	0.968	1.208	1.355	1.527	1.645	1.757	1.861	1.989	2.079
78	0.888	0.970	1.206	1.348	1.517	1.636	1.751	1.862	2.006	2.114
79	0.879	0.961	1.208	1.364	1.555	1.692	1.823	1.950	2.112	2.231
80	0.890	0.975	1.214	1.354	1.513	1.620	1.716	1.805	1.909	1.981
81	0.906	0.979	1.183	1.303	1.439	1.529	1.611	1.686	1.775	1.836
82	0.894	0.967	1.182	1.329	1.529	1.693	1.871	2.066	2.353	2.595
83	0.895	0.967	1.181	1.316	1.479	1.595	1.706	1.812	1.947	2.045
84	0.887	0.962	1.190	1.337	1.518	1.649	1.776	1.901	2.061	2.180
A1	0.880	0.956	1.191	1.347	1.544	1.690	1.835	1.979	2.170	2.314
A2	0.877	0.962	1.216	1.375	1.566	1.702	1.830	1.954	2.109	2.220

60-day										
region	***1.58-year**	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**200-year**	**500-year**	**1,000-year**
1	0.893	0.968	1.189	1.327	1.491	1.607	1.717	1.822	1.952	2.046
2	0.874	0.950	1.192	1.357	1.571	1.733	1.898	2.066	2.292	2.467
3	0.882	0.956	1.187	1.341	1.536	1.682	1.827	1.972	2.164	2.309
4	0.891	0.967	1.192	1.331	1.499	1.620	1.737	1.852	2.003	2.116
5	0.896	0.965	1.176	1.311	1.477	1.597	1.713	1.827	1.972	2.079
6	0.902	0.974	1.182	1.307	1.453	1.553	1.646	1.733	1.839	1.913
7	0.904	0.975	1.179	1.302	1.446	1.544	1.634	1.719	1.822	1.893
8	0.893	0.966	1.186	1.325	1.492	1.611	1.725	1.835	1.973	2.073
9	0.894	0.969	1.188	1.324	1.487	1.601	1.709	1.812	1.940	2.032
10	0.910	0.975	1.165	1.280	1.417	1.514	1.608	1.699	1.817	1.904
11	0.907	0.973	1.165	1.284	1.426	1.528	1.626	1.722	1.848	1.941
12	0.931	0.989	1.147	1.246	1.373	1.470	1.570	1.675	1.819	1.933
13	0.903	0.973	1.177	1.301	1.446	1.546	1.640	1.728	1.836	1.912
14	0.909	0.981	1.180	1.295	1.428	1.520	1.607	1.689	1.795	1.872
15	0.901	0.969	1.170	1.297	1.452	1.562	1.668	1.769	1.899	1.993
16	0.913	0.977	1.158	1.279	1.441	1.570	1.709	1.859	2.076	2.255
17	0.914	0.978	1.161	1.271	1.398	1.485	1.565	1.638	1.728	1.790
18	0.910	0.974	1.160	1.285	1.454	1.591	1.739	1.900	2.134	2.330
19	0.916	0.984	1.172	1.279	1.396	1.473	1.541	1.601	1.671	1.718
20	0.912	0.976	1.161	1.274	1.407	1.498	1.584	1.664	1.763	1.833
21	0.903	0.976	1.182	1.305	1.448	1.545	1.634	1.716	1.816	1.885
22	0.920	0.980	1.150	1.252	1.370	1.451	1.525	1.594	1.677	1.735
23	0.919	0.984	1.162	1.265	1.379	1.453	1.520	1.580	1.650	1.696
24	0.915	0.981	1.166	1.274	1.400	1.487	1.569	1.648	1.749	1.823
25	0.897	0.966	1.174	1.308	1.472	1.590	1.705	1.816	1.960	2.065
26	0.919	0.986	1.167	1.269	1.381	1.453	1.517	1.573	1.637	1.680
27	0.919	0.983	1.161	1.264	1.379	1.454	1.522	1.583	1.655	1.703
28	0.914	0.983	1.175	1.285	1.411	1.498	1.579	1.657	1.755	1.827
29	0.892	0.955	1.159	1.302	1.490	1.635	1.785	1.941	2.154	2.323
30	0.914	0.978	1.161	1.271	1.398	1.484	1.563	1.637	1.726	1.788
31	0.922	0.986	1.159	1.258	1.366	1.437	1.499	1.554	1.618	1.661
32	0.909	0.984	1.189	1.304	1.430	1.512	1.584	1.647	1.720	1.769
33	0.918	0.987	1.172	1.276	1.389	1.461	1.524	1.580	1.643	1.685
34	0.925	0.984	1.148	1.243	1.350	1.420	1.482	1.539	1.606	1.650
35	0.909	0.977	1.172	1.289	1.424	1.515	1.599	1.677	1.770	1.835
36	0.913	0.983	1.177	1.288	1.411	1.492	1.563	1.627	1.702	1.751
37	0.910	0.988	1.195	1.308	1.429	1.506	1.571	1.628	1.693	1.734
38	0.903	0.974	1.178	1.303	1.449	1.549	1.643	1.730	1.837	1.913
39	0.906	0.976	1.174	1.294	1.433	1.528	1.616	1.697	1.796	1.866
40	0.903	0.975	1.182	1.306	1.449	1.547	1.637	1.721	1.823	1.893
41	0.901	0.971	1.176	1.304	1.455	1.562	1.662	1.758	1.877	1.962
42	0.905	0.971	1.166	1.288	1.435	1.539	1.638	1.733	1.852	1.938
43	0.901	0.972	1.179	1.306	1.456	1.559	1.656	1.748	1.860	1.940

60-day										
region	***1.58-year**	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**200-year**	**500-year**	**1,000-year**
44	0.892	0.964	1.182	1.321	1.492	1.615	1.734	1.850	1.999	2.108
45	0.897	0.968	1.178	1.311	1.471	1.585	1.694	1.798	1.931	2.027
46	0.903	0.975	1.181	1.306	1.451	1.550	1.641	1.726	1.830	1.902
47	0.899	0.972	1.185	1.314	1.466	1.572	1.670	1.762	1.875	1.955
48	0.906	0.980	1.185	1.304	1.438	1.527	1.607	1.679	1.764	1.822
49	0.872	0.945	1.183	1.352	1.578	1.756	1.942	2.137	2.409	2.626
50	0.895	0.971	1.191	1.325	1.483	1.591	1.693	1.788	1.906	1.988
51	0.896	0.972	1.192	1.325	1.480	1.587	1.686	1.778	1.891	1.971
52	0.906	0.974	1.172	1.293	1.436	1.534	1.627	1.714	1.821	1.896
53	0.902	0.983	1.203	1.327	1.463	1.551	1.628	1.697	1.775	1.827
54	0.896	0.968	1.178	1.321	1.517	1.677	1.851	2.042	2.322	2.559
55	0.906	0.977	1.179	1.299	1.436	1.528	1.612	1.690	1.782	1.846
56	0.914	0.982	1.169	1.289	1.447	1.571	1.700	1.837	2.030	2.186
57	0.899	0.974	1.189	1.318	1.469	1.572	1.667	1.755	1.862	1.937
58	0.897	0.969	1.182	1.315	1.474	1.586	1.691	1.792	1.918	2.009
59	0.879	0.956	1.195	1.353	1.552	1.699	1.845	1.990	2.180	2.324
60	0.888	0.961	1.185	1.331	1.512	1.644	1.773	1.900	2.065	2.188
61	0.897	0.972	1.189	1.322	1.478	1.585	1.685	1.779	1.894	1.975
62	0.893	0.974	1.203	1.340	1.497	1.603	1.701	1.790	1.899	1.973
63	0.897	0.980	1.209	1.340	1.485	1.580	1.664	1.739	1.826	1.885
64	0.897	0.977	1.201	1.333	1.482	1.582	1.672	1.754	1.852	1.919
65	0.887	0.973	1.216	1.359	1.523	1.634	1.735	1.827	1.939	2.015
66	0.875	0.963	1.222	1.383	1.576	1.711	1.838	1.960	2.111	2.220
67	0.886	0.970	1.212	1.358	1.530	1.651	1.768	1.881	2.027	2.135
68	0.857	0.950	1.232	1.414	1.641	1.807	1.973	2.138	2.357	2.525
69	0.889	0.969	1.200	1.355	1.562	1.730	1.909	2.103	2.385	2.619
70	0.883	0.963	1.203	1.354	1.536	1.666	1.790	1.909	2.060	2.169
71	0.890	0.962	1.176	1.327	1.537	1.713	1.908	2.125	2.451	2.732
72	0.891	0.969	1.198	1.338	1.504	1.619	1.727	1.829	1.954	2.043
73	0.897	0.970	1.184	1.317	1.475	1.586	1.690	1.790	1.913	2.002
74	0.894	0.973	1.197	1.332	1.491	1.603	1.710	1.814	1.948	2.047
75	0.889	0.969	1.203	1.346	1.513	1.628	1.736	1.837	1.962	2.049
76	0.900	0.977	1.193	1.321	1.466	1.564	1.652	1.733	1.830	1.896
77	0.893	0.973	1.201	1.338	1.496	1.603	1.701	1.793	1.903	1.979
78	0.893	0.971	1.195	1.331	1.492	1.606	1.716	1.823	1.961	2.064
79	0.886	0.967	1.203	1.349	1.523	1.644	1.759	1.868	2.004	2.102
80	0.892	0.974	1.206	1.344	1.501	1.606	1.703	1.791	1.897	1.970
81	0.911	0.980	1.174	1.288	1.417	1.503	1.581	1.653	1.738	1.795
82	0.901	0.974	1.182	1.321	1.506	1.655	1.814	1.984	2.231	2.435
83	0.901	0.974	1.183	1.309	1.456	1.557	1.651	1.738	1.845	1.920
84	0.896	0.969	1.183	1.316	1.476	1.589	1.696	1.799	1.927	2.019
A1	0.886	0.965	1.198	1.345	1.523	1.648	1.768	1.884	2.029	2.134
A2	0.886	0.967	1.203	1.349	1.523	1.645	1.760	1.869	2.005	2.102

Table A.9.2. Regional growth factors for hourly regions analyses for each duration 60-minute to 24-hour for the annual maximum series results. *Note that the 1.58-year was computed to equate the 1-year average recurrence interval (ARI) for partial duration series results (see Section 4.6.2) and the 1.58 year results were not released as annual exceedance probabilities (AEP).

60-minute										
region	***1.58-year**	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**200-year**	**500-year**	**1,000-year**
1	0.834	0.941	1.269	1.484	1.753	1.951	2.146	2.339	2.591	2.779
2	0.845	0.938	1.235	1.438	1.702	1.904	2.110	2.320	2.605	2.827
3	0.838	0.940	1.258	1.470	1.738	1.937	2.136	2.334	2.596	2.795
4	0.872	0.963	1.231	1.395	1.591	1.727	1.855	1.976	2.126	2.233
5	0.809	0.912	1.256	1.508	1.857	2.140	2.442	2.767	3.235	3.620
6	0.858	0.959	1.255	1.437	1.653	1.804	1.947	2.081	2.248	2.367
7	0.822	0.926	1.259	1.492	1.801	2.041	2.289	2.546	2.900	3.181
8	0.828	0.929	1.253	1.478	1.775	2.004	2.240	2.483	2.817	3.080
9	0.811	0.911	1.249	1.499	1.849	2.135	2.443	2.776	3.260	3.662
10	0.842	0.941	1.249	1.455	1.717	1.912	2.108	2.304	2.565	2.763
11	0.837	0.939	1.257	1.469	1.741	1.944	2.147	2.351	2.622	2.829
12	0.835	0.937	1.257	1.473	1.749	1.957	2.166	2.376	2.657	2.873
13	0.851	0.942	1.228	1.422	1.673	1.863	2.056	2.251	2.515	2.719
14	0.833	0.924	1.227	1.448	1.750	1.994	2.253	2.529	2.924	3.247
15	0.863	0.950	1.219	1.398	1.624	1.792	1.958	2.124	2.344	2.509
16	0.828	0.931	1.260	1.486	1.779	2.003	2.231	2.464	2.781	3.027
17	0.827	0.926	1.249	1.476	1.781	2.021	2.270	2.530	2.892	3.181
18	0.841	0.939	1.247	1.454	1.719	1.919	2.120	2.322	2.593	2.801
19	0.834	0.937	1.261	1.478	1.754	1.961	2.168	2.377	2.654	2.866
20	0.848	0.953	1.264	1.460	1.696	1.863	2.023	2.176	2.370	2.510
21	0.820	0.922	1.256	1.492	1.809	2.060	2.321	2.595	2.978	3.286
22	0.843	0.941	1.246	1.450	1.711	1.906	2.102	2.299	2.561	2.762
23	0.860	0.950	1.226	1.407	1.635	1.803	1.969	2.133	2.348	2.510
24	0.846	0.927	1.203	1.408	1.693	1.927	2.178	2.451	2.847	3.176
25	0.838	0.941	1.258	1.469	1.734	1.931	2.127	2.321	2.578	2.772
26	0.835	0.937	1.257	1.472	1.749	1.956	2.165	2.376	2.658	2.874

120-minute										
region	***1.58-year**	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**200-year**	**500-year**	**1,000-year**
1	0.830	0.936	1.267	1.488	1.770	1.981	2.191	2.403	2.684	2.898
2	0.838	0.932	1.236	1.449	1.733	1.954	2.183	2.420	2.750	3.011
3	0.828	0.929	1.253	1.478	1.776	2.007	2.245	2.490	2.829	3.096
4	0.861	0.947	1.217	1.399	1.630	1.804	1.978	2.154	2.388	2.567
5	0.817	0.916	1.249	1.491	1.824	2.093	2.380	2.686	3.125	3.485
6	0.846	0.940	1.237	1.438	1.697	1.894	2.092	2.293	2.563	2.771
7	0.820	0.921	1.252	1.488	1.809	2.063	2.330	2.611	3.008	3.328
8	0.835	0.932	1.244	1.460	1.745	1.966	2.193	2.427	2.748	3.001
9	0.812	0.908	1.241	1.490	1.845	2.138	2.459	2.810	3.328	3.764

120-minute										
region	*1.58-year	2-year	5-year	10-year	25-year	50-year	100-year	200-year	500-year	1,000-year
10	0.845	0.941	1.243	1.446	1.705	1.899	2.094	2.290	2.552	2.752
11	0.829	0.929	1.251	1.476	1.772	2.003	2.240	2.485	2.823	3.090
12	0.834	0.933	1.249	1.466	1.751	1.970	2.193	2.423	2.735	2.980
13	0.854	0.942	1.222	1.413	1.661	1.850	2.043	2.238	2.504	2.710
14	0.835	0.923	1.220	1.438	1.742	1.988	2.253	2.538	2.950	3.290
15	0.864	0.949	1.213	1.390	1.617	1.787	1.958	2.129	2.358	2.533
16	0.823	0.925	1.256	1.489	1.800	2.043	2.296	2.559	2.924	3.214
17	0.822	0.919	1.243	1.478	1.800	2.060	2.335	2.628	3.047	3.389
18	0.839	0.936	1.245	1.456	1.730	1.939	2.152	2.369	2.663	2.892
19	0.831	0.934	1.259	1.480	1.764	1.979	2.197	2.418	2.715	2.944
20	0.831	0.934	1.259	1.479	1.765	1.982	2.201	2.424	2.724	2.956
21	0.814	0.918	1.259	1.504	1.835	2.099	2.377	2.671	3.086	3.421
22	0.838	0.935	1.246	1.459	1.735	1.945	2.160	2.378	2.674	2.904
23	0.857	0.947	1.225	1.411	1.648	1.825	2.001	2.179	2.414	2.593
24	0.857	0.941	1.210	1.397	1.645	1.836	2.033	2.237	2.517	2.738
25	0.842	0.952	1.277	1.480	1.725	1.897	2.062	2.220	2.418	2.561
26	0.836	0.936	1.252	1.467	1.743	1.953	2.165	2.380	2.669	2.892

3-hour										
region	*1.58-year	2-year	5-year	10-year	25-year	50-year	100-year	200-year	500-year	1,000-year
1	0.827	0.931	1.262	1.489	1.784	2.009	2.238	2.472	2.789	3.036
2	0.831	0.923	1.231	1.454	1.760	2.006	2.266	2.544	2.940	3.263
3	0.828	0.929	1.254	1.479	1.776	2.005	2.241	2.485	2.819	3.081
4	0.858	0.943	1.213	1.399	1.640	1.825	2.013	2.206	2.468	2.673
5	0.827	0.921	1.235	1.464	1.779	2.034	2.305	2.594	3.009	3.349
6	0.840	0.932	1.232	1.443	1.723	1.943	2.170	2.407	2.735	2.997
7	0.825	0.921	1.242	1.473	1.789	2.041	2.308	2.592	2.995	3.323
8	0.838	0.931	1.232	1.445	1.729	1.952	2.183	2.425	2.762	3.031
9	0.815	0.910	1.234	1.479	1.828	2.117	2.434	2.782	3.295	3.728
10	0.846	0.937	1.227	1.428	1.694	1.899	2.111	2.329	2.628	2.864
11	0.824	0.925	1.254	1.485	1.793	2.034	2.284	2.545	2.908	3.196
12	0.834	0.931	1.243	1.461	1.750	1.974	2.205	2.444	2.774	3.035
13	0.852	0.939	1.219	1.414	1.669	1.867	2.069	2.278	2.565	2.790
14	0.840	0.927	1.217	1.429	1.719	1.953	2.203	2.469	2.850	3.162
15	0.866	0.948	1.208	1.384	1.609	1.779	1.950	2.123	2.355	2.533
16	0.823	0.923	1.252	1.485	1.799	2.045	2.303	2.574	2.952	3.255
17	0.819	0.916	1.242	1.481	1.813	2.083	2.373	2.684	3.134	3.505
18	0.836	0.932	1.241	1.456	1.741	1.962	2.190	2.427	2.752	3.009
19	0.827	0.932	1.264	1.491	1.785	2.009	2.236	2.467	2.780	3.022
20	0.823	0.925	1.257	1.489	1.799	2.041	2.292	2.552	2.914	3.201
21	0.814	0.918	1.263	1.508	1.840	2.102	2.377	2.667	3.074	3.401

3-hour										
region	*1.58-year	2-year	5-year	10-year	25-year	50-year	100-year	200-year	500-year	1,000-year
22	0.834	0.931	1.243	1.461	1.748	1.971	2.200	2.438	2.765	3.023
23	0.856	0.944	1.222	1.410	1.653	1.837	2.023	2.211	2.465	2.660
24	0.856	0.944	1.222	1.410	1.652	1.834	2.018	2.205	2.455	2.647
25	0.836	0.942	1.267	1.481	1.748	1.945	2.138	2.330	2.581	2.769
26	0.832	0.931	1.248	1.468	1.757	1.980	2.209	2.445	2.768	3.022

6-hour										
region	*1.58-year	2-year	5-year	10-year	25-year	50-year	100-year	200-year	500-year	1,000-year
1	0.825	0.923	1.247	1.477	1.788	2.034	2.292	2.564	2.945	3.252
2	0.829	0.921	1.230	1.455	1.767	2.019	2.289	2.578	2.994	3.336
3	0.824	0.921	1.240	1.472	1.790	2.045	2.315	2.603	3.014	3.349
4	0.858	0.944	1.215	1.401	1.642	1.826	2.014	2.205	2.464	2.666
5	0.835	0.922	1.216	1.434	1.738	1.988	2.257	2.549	2.973	3.326
6	0.840	0.932	1.230	1.440	1.720	1.938	2.165	2.402	2.730	2.992
7	0.832	0.925	1.231	1.452	1.754	1.994	2.249	2.519	2.903	3.214
8	0.843	0.927	1.211	1.419	1.706	1.939	2.188	2.455	2.839	3.156
9	0.826	0.921	1.236	1.466	1.781	2.036	2.306	2.596	3.010	3.348
10	0.857	0.938	1.204	1.392	1.644	1.842	2.048	2.264	2.566	2.808
11	0.820	0.915	1.235	1.473	1.807	2.080	2.375	2.696	3.162	3.550
12	0.838	0.930	1.231	1.444	1.732	1.958	2.194	2.442	2.789	3.067
13	0.847	0.933	1.214	1.415	1.687	1.902	2.128	2.366	2.702	2.972
14	0.851	0.934	1.209	1.406	1.673	1.885	2.108	2.344	2.677	2.946
15	0.864	0.948	1.212	1.390	1.618	1.790	1.963	2.138	2.372	2.552
16	0.823	0.919	1.241	1.475	1.796	2.054	2.329	2.622	3.040	3.383
17	0.817	0.913	1.239	1.482	1.821	2.100	2.401	2.728	3.205	3.602
18	0.838	0.932	1.237	1.449	1.731	1.951	2.178	2.413	2.738	2.996
19	0.810	0.913	1.256	1.507	1.853	2.132	2.430	2.750	3.208	3.584
20	0.821	0.921	1.249	1.485	1.804	2.058	2.325	2.607	3.006	3.328
21	0.819	0.921	1.253	1.491	1.813	2.068	2.336	2.618	3.015	3.336
22	0.835	0.931	1.240	1.457	1.745	1.970	2.202	2.443	2.777	3.041
23	0.856	0.943	1.219	1.407	1.652	1.838	2.027	2.220	2.482	2.685
24	0.852	0.943	1.227	1.420	1.669	1.857	2.047	2.240	2.499	2.699
25	0.828	0.924	1.242	1.469	1.776	2.020	2.276	2.546	2.925	3.232
26	0.840	0.938	1.245	1.453	1.723	1.927	2.134	2.344	2.627	2.846

12-hour										
region	*1.58-year	2-year	5-year	10-year	25-year	50-year	100-year	200-year	500-year	1,000-year
1	0.816	0.912	1.239	1.483	1.826	2.108	2.414	2.747	3.234	3.641
2	0.824	0.916	1.229	1.462	1.788	2.056	2.345	2.660	3.118	3.501
3	0.817	0.911	1.234	1.477	1.821	2.107	2.418	2.758	3.259	3.680

12-hour										
region	*1.58-year	2-year	5-year	10-year	25-year	50-year	100-year	200-year	500-year	1,000-year
4	0.850	0.942	1.230	1.426	1.678	1.868	2.061	2.256	2.518	2.721
5	0.829	0.918	1.222	1.449	1.767	2.029	2.313	2.622	3.072	3.449
6	0.837	0.928	1.228	1.443	1.735	1.967	2.212	2.471	2.836	3.132
7	0.834	0.923	1.223	1.442	1.746	1.993	2.257	2.540	2.947	3.283
8	0.841	0.921	1.198	1.409	1.711	1.965	2.245	2.554	3.015	3.407
9	0.848	0.942	1.237	1.435	1.689	1.879	2.071	2.264	2.521	2.719
10	0.868	0.953	1.215	1.387	1.602	1.761	1.918	2.074	2.277	2.430
11	0.825	0.917	1.228	1.459	1.785	2.052	2.342	2.657	3.117	3.501
12	0.843	0.930	1.218	1.425	1.706	1.930	2.166	2.416	2.770	3.057
13	0.846	0.932	1.215	1.418	1.693	1.912	2.142	2.384	2.727	3.004
14	0.856	0.939	1.208	1.398	1.650	1.848	2.053	2.267	2.564	2.800
15	0.861	0.948	1.220	1.401	1.631	1.803	1.974	2.146	2.373	2.545
16	0.825	0.920	1.237	1.467	1.786	2.042	2.316	2.609	3.029	3.373
17	0.828	0.922	1.235	1.461	1.771	2.020	2.284	2.566	2.966	3.293
18	0.843	0.936	1.234	1.440	1.710	1.918	2.132	2.351	2.652	2.888
19	0.816	0.917	1.250	1.493	1.825	2.092	2.377	2.680	3.113	3.466
20	0.827	0.923	1.241	1.469	1.779	2.026	2.286	2.561	2.951	3.266
21	0.830	0.929	1.249	1.472	1.768	1.997	2.233	2.478	2.816	3.082
22	0.840	0.934	1.237	1.447	1.724	1.939	2.159	2.387	2.700	2.947
23	0.852	0.941	1.225	1.418	1.669	1.861	2.055	2.253	2.521	2.729
24	0.847	0.938	1.229	1.430	1.692	1.894	2.100	2.311	2.600	2.826
25	0.816	0.916	1.250	1.493	1.828	2.097	2.384	2.690	3.128	3.487
26	0.837	0.934	1.243	1.456	1.736	1.950	2.170	2.395	2.703	2.944

24-hour										
region	*1.58-year	2-year	5-year	10-year	25-year	50-year	100-year	200-year	500-year	1,000-year
1	0.806	0.904	1.243	1.501	1.869	2.178	2.517	2.892	3.449	3.922
2	0.824	0.918	1.233	1.465	1.789	2.053	2.337	2.644	3.088	3.456
3	0.811	0.905	1.234	1.485	1.847	2.152	2.488	2.862	3.419	3.896
4	0.850	0.942	1.233	1.429	1.681	1.870	2.061	2.254	2.512	2.710
5	0.830	0.920	1.224	1.450	1.764	2.020	2.297	2.596	3.030	3.390
6	0.832	0.922	1.225	1.447	1.755	2.004	2.271	2.558	2.971	3.311
7	0.834	0.924	1.224	1.443	1.745	1.989	2.250	2.529	2.930	3.260
8	0.845	0.926	1.200	1.405	1.694	1.933	2.192	2.474	2.887	3.234
9	0.843	0.938	1.237	1.442	1.709	1.912	2.119	2.330	2.616	2.838
10	0.865	0.953	1.222	1.397	1.615	1.774	1.931	2.085	2.285	2.434
11	0.833	0.928	1.237	1.457	1.751	1.984	2.226	2.480	2.836	3.120
12	0.850	0.935	1.213	1.410	1.674	1.883	2.101	2.329	2.649	2.905
13	0.843	0.930	1.219	1.426	1.708	1.932	2.168	2.418	2.772	3.058
14	0.860	0.947	1.218	1.400	1.633	1.808	1.984	2.160	2.396	2.577
15	0.854	0.944	1.228	1.419	1.663	1.847	2.031	2.216	2.464	2.654

24-hour										
region	***1.58-year**	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**200-year**	**500-year**	**1,000-year**
16	0.831	0.926	1.238	1.460	1.760	1.998	2.246	2.508	2.875	3.171
17	0.843	0.935	1.231	1.437	1.709	1.919	2.135	2.358	2.664	2.906
18	0.841	0.933	1.233	1.442	1.719	1.934	2.157	2.387	2.705	2.957
19	0.817	0.916	1.249	1.491	1.824	2.092	2.378	2.684	3.121	3.480
20	0.834	0.928	1.236	1.454	1.747	1.977	2.218	2.471	2.823	3.106
21	0.828	0.928	1.251	1.477	1.775	2.007	2.246	2.494	2.835	3.105
22	0.841	0.936	1.239	1.447	1.718	1.926	2.138	2.354	2.649	2.879
23	0.851	0.943	1.233	1.427	1.677	1.864	2.053	2.242	2.496	2.690
24	0.846	0.935	1.224	1.426	1.695	1.905	2.122	2.349	2.662	2.911
25	0.814	0.913	1.246	1.493	1.836	2.116	2.418	2.743	3.215	3.606
26	0.826	0.922	1.241	1.470	1.782	2.031	2.295	2.574	2.969	3.290

48-hour										
region	***1.58-year**	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**	**200-year**	**500-year**	**1,000-year**
1	0.806	0.907	1.251	1.509	1.871	2.170	2.495	2.850	3.368	3.802
2	0.826	0.920	1.234	1.464	1.781	2.039	2.314	2.609	3.034	3.383
3	0.811	0.910	1.245	1.495	1.847	2.136	2.450	2.791	3.289	3.706
4	0.842	0.932	1.224	1.432	1.711	1.931	2.161	2.402	2.740	3.010
5	0.835	0.927	1.231	1.448	1.742	1.976	2.221	2.480	2.845	3.140
6	0.829	0.920	1.228	1.455	1.769	2.025	2.300	2.596	3.023	3.376
7	0.827	0.915	1.220	1.450	1.776	2.047	2.344	2.669	3.149	3.554
8	0.845	0.928	1.208	1.413	1.696	1.926	2.172	2.435	2.815	3.128
9	0.832	0.926	1.236	1.457	1.756	1.992	2.241	2.502	2.870	3.167
10	0.865	0.955	1.225	1.399	1.614	1.770	1.921	2.069	2.260	2.401
11	0.841	0.931	1.227	1.437	1.719	1.941	2.173	2.416	2.756	3.029
12	0.856	0.940	1.211	1.399	1.649	1.842	2.041	2.247	2.531	2.756
13	0.838	0.929	1.229	1.443	1.731	1.959	2.197	2.448	2.800	3.083
14	0.859	0.948	1.224	1.407	1.640	1.813	1.985	2.158	2.385	2.558
15	0.851	0.945	1.235	1.429	1.675	1.859	2.043	2.227	2.472	2.658
16	0.837	0.930	1.233	1.447	1.734	1.960	2.195	2.440	2.783	3.058
17	0.847	0.938	1.231	1.432	1.694	1.895	2.100	2.309	2.594	2.816
18	0.840	0.932	1.233	1.444	1.724	1.942	2.168	2.403	2.727	2.985
19	0.818	0.919	1.252	1.491	1.817	2.077	2.351	2.641	3.053	3.387
20	0.839	0.933	1.237	1.449	1.729	1.946	2.170	2.402	2.722	2.974
21	0.830	0.935	1.264	1.486	1.771	1.986	2.202	2.420	2.713	2.937
22	0.837	0.935	1.246	1.460	1.737	1.949	2.165	2.386	2.685	2.918
23	0.849	0.944	1.240	1.437	1.687	1.874	2.060	2.246	2.493	2.680
24	0.837	0.926	1.223	1.439	1.734	1.970	2.222	2.489	2.870	3.182
25	0.802	0.900	1.241	1.504	1.885	2.208	2.567	2.967	3.569	4.087
26	0.809	0.905	1.238	1.491	1.854	2.158	2.493	2.864	3.415	3.884

Glossary

annual exceedance probability (AEP) – The probability associated with exceeding a given amount in any given year; the inverse of AEP (1/AEP) provides a measure of the average time between *years in which a particular value is exceeded at least once*; the term is associated with analysis of annual maximum series.

annual maximum series (AMS) – Time series created by the extraction of the largest single case in each calendar year of record.

ArcInfo© ASCII grid – Also known as an ESRI© ASCII grid, a very simple grid format with a 6-line header, which provides location and size of the grid and precedes the actual grid data. The grid is written as a series of rows, which contain one ASCII integer or floating point value per column in the grid. The first element of the grid corresponds to the upper left-hand corner of the grid.

average recurrence interval (ARI) – Average time between *cases of a particular magnitude*; the term is associated with the analysis of partial duration series.

Cascade, Residual Add-Back (CRAB) – HDSC-developed spatial interpolation procedure for deriving grids of precipitation frequency estimates from mean annual maximum grids of different annual exceedance probability.

data years – Number of years in which enough data existed to extract maxima in a station's period of record.

depth-duration-frequency plot (DDF) - Graphical depiction of precipitation frequency estimates in terms of depth (y-axis) and duration (x-axis)

Discordancy – Measure based on coefficient-of-L-variation, L-skewness and L-kurtosis of a station's data, which represents a point in 3-dimensional space. Discordancy is a measure of the distance of each point from the cluster center of the points for all stations in a region. The cluster center is defined as the unweighted mean of the three L-moments for the stations within the region being tested. It is used for data quality control and to determine if a station is consistent with other stations in a region.

Federal Geographic Data Committee (FGDC)-compliant metadata – A document that describes the content, quality, condition, and other characteristics of data and follows the guidelines set forth by the FGDC; metadata is "data about data."

GEV - Generalized Extreme Value – A 3-parameter theoretical probability distribution function.

GLO – Generalized Logistic – A 3-parameter theoretical probability distribution function.

GNO – Generalized Normal – A 3-parameter theoretical probability distribution function.

GPA – Generalized Pareto – A 3-parameter theoretical probability distribution function.

heterogeneity measure, H1 – Measure that uses coefficient of L-variation to compare between-site variations in sample L-moments for a group of stations in a region with expectations for a homogeneous region. The H1 measure was used to assess regional homogeneity, or lack thereof.

"Index Flood" – The mean of the annual maximum series, also known as the scaling factor, at each observing station that is multiplied by the regional growth factor to produce precipitation frequency estimates. It is often referred to as the "Index Flood" because of the genesis of the statistical approach in flood frequency analysis.

intensity-duration-frequency curve (IDF) - A log-log graphical depiction of precipitation frequency estimates in terms of intensity (y-axis) and duration (x-axis).

internal consistency – Term used to describe the required behavior of the precipitation frequency estimates from one duration or frequency to the next. For instance, it is required that the 100-year 3-hour depth estimates be greater than the 100-year 120-minute depth estimates.

L-moments – Linear combinations of probability weighted moments that provide great utility in choosing the most appropriate probability distribution to describe the precipitation frequency estimates.

mean annual precipitation – The climatological average total annual precipitation. For the spatial interpolation of NOAA Atlas 14 Volume 1, the mean annual precipitation for the climatological period 1961-90 was used as a predictor grid for interpolating mean annual maximum precipitation to a uniformly spaced grid.

Monte Carlo simulation – Simulation technique used to randomly generate 1,000 synthetic data sets for each station in a region to determine sample L-moment estimates and test the fitting of theoretical distributions. The technique was also used to quantitatively assess confidence bounds.

n-minute – Precipitation data measured at a temporal resolution of 5-minutes that can be summed to various "n-minute" durations (10-minute, 15-minute, 30-minute, and 60-minute).

partial duration series (PDS) – Time series created by the extraction of all large events in which more than one large event may occur during a single calendar year. For this Atlas, the annual exceedance series (AES) consisting of the largest N events in the entire period of record, where N is the number of years of data, was used.

PE3 – Pearson Type III – A 3-parameter theoretical probability distribution function.

precipitation frequency – General term for specifying the average recurrence interval or annual exceedance probability associated with specific depths for a given duration.

Precipitation Frequency Data Server (PFDS) – The on-line portal for all NOAA Atlas 14 deliverables, documentation and information. Link to it via the HDSC home page at: http://www.nws.noaa.gov/ohd/hdsc/.

PRISM – Parameter-elevation Regressions on Independent Slopes Model – a hybrid statistical-geographic approach to mapping climate data developed by Oregon State University's Spatial Climate Analysis Service.

probability distribution – Mathematical description of a random variable, precipitation in this case, in terms of the chance of exceedance associated with each value.

pseudo data –Precipitation frequency estimates for stations that did not have observed data at a given duration. The estimates were based on ratios derived from nearby co-located stations and applied to actual observed data at the station.

quantile – Generic term to indicate the precipitation frequency estimates associated with ARIs and AEPs.

regional growth factor (RGF) – Dimensionless factors that are a function of appropriate higher order moments for a region; used to develop the site-specific quantiles for each region by multiplying by the site-specific scaling factor to produce the quantiles at each frequency and duration; there is a single RGF for each region that varies only with frequency and duration

root-mean-square-error (RMSE) – The positive square root of the mean-square-error (MSE). MSE is the mean square of any residual. RMSE is the also called the standard error of estimate.

shapefile – An ESRI© vector file format for displaying non-topological geometry and attribute information for use with Geographical Information Systems (GIS). The shapefile has the .shp extension, and comes with other associated files which can include, .shx, sbx, .sbn and .dbf.

temporal distribution – Temporal patterns in probalistic terms specifically designed to be consistent with the definition of duration used in this Atlas and for use with the precipitation frequency estimates. They are expressed as cumulative percentages of precipitation and duration at various percentiles for 6-, 12-, 24- and 96-hour durations.

t-test – for testing whether a difference between means of two samples is significant:

$$t = \sqrt{\frac{n_1 n_2 (n_1 + n_2 - 2)}{n_1 + n_2}} \frac{(\bar{x}_1 - \bar{x}_2)}{\sqrt{n_1 s_1^2 + n_2 s_2^2}}$$

, following a Student's t distribution with (n_1+n_2-2) degree of freedoms, where, $\bar{x}_1$ and $\bar{x}_2$ are the means for sample 1 and sample 2, respectively. s_1^2 and s_2^2 are sample variances. n_1 and n_2 are sample sizes. At 90% confidence level (or significance level α = 10%), reject H_0: the means have no significant difference if | t | > $t_{n_1+n_2-2,\alpha/2}$.

– for testing for population correlation:

$$t = \left| \frac{r\sqrt{n-2}}{\sqrt{1-r^2}} \right|$$

, following a Student's t distribution with (n-2) degrees of freedom. At 90% confidence level (or significance level α = 10%), reject H_0: there is no correlation or the correlation is not significant at significance level of 10% if | t | > $t_{n-2,\alpha/2}$.

Wakeby distribution – A 5-parameter theoretical probability distribution function.

References

Arkell, R.E., and F. Richards, 1986: Short duration rainfall relations for the western United States. *Conference on Climate and Water Management-A Critical Era and Conference on the Human Consequences of 1985's Climate, August 4-7, 1986*, Asheville, North Carolina.

Bonnin, G., D. Martin, T. Parzybok, B. Lin, D. Riley, and M. Yekta, 2006: Precipitation frequency atlas of the United States. *NOAA Atlas 14 Volume 1, Version 4.0*, National Weather Service, Silver Spring, Maryland.

Chow, V.T., D.R. Maidment, and L.W. Mays, 1988: *Applied Hydrology*. McGraw-Hill International Editions, 572 pp.

Daly, C., and R.P. Neilson. 1992: A digital topographic approach to modeling the distribution of precipitation in mountainous terrain. *Interdisciplinary Approaches in Hydrology and Hydrogeology*, American Institute of Hydrology, 437-454.

Daly, C., W.P. Gibson, G.H. Taylor, G.L. Johnson, and P.Pasteris, 2002: A knowledge-based approach to the statistical mapping of climate. *Climate Research*, **23**, 99-113.

Daly, C., R.P. Neilson, and D.L. Phillips, 1994: A Statistical-Topographic Model for Mapping Climatological Precipitation over Mountainous Terrain. *Journal Applied. Meteorology*, **33**, 140-158.

Daly, C., G. Taylor, and W. Gibson, 1997: The PRISM Approach to Mapping Precipitation and Temperature, *10th Conf. on Applied Climatology*, American Meteorology Society, 10-12, Reno, Nevada. http://www.ocs.orst.edu/pub/prism/docs/appclim97-prismapproach-daly.pdf

Durrans, S.R., and P.A. Brown, 2002: Development of an Internet-Based Rainfall Atlas for Alabama. *Water Science and Technology*, **45**, no. 2, 11-17.

Environmental Systems Research Institute, Inc. (ESRI), 2003: ArcMap, ArcGIS version 8.3. Redlands, California.

Frederick, R.H. and J.F. Miller, 1979: Short Duration Rainfall Frequency Relations for California. *Third Conference on Hydrometeorology, August 20-24, 1979*, Bogata, Columbia.

GRASS Development Team, 2002: Geographic Resources Analysis Support System (GRASS), Grass version 5.0.

Hershfield, D.M., 1961: Rainfall frequency atlas of the United States for durations from 30 minutes to 24 hours and return periods from 1 to 100 years. *Weather Bureau Technical Paper No. 40*, U.S. Weather Bureau, Washington, D.C., 115 pp.

Hosking, J.R.M. and J.R. Wallis, 1997: *Regional frequency analysis, an approach based on L-moments*. Cambridge University Press, 224 pp.

Hosking, J.R.M., and J.R. Wallis, 1991: Some statistics useful in regional frequency analysis. *Research Report RC 17096 (#75863) 8/12/1991*, Mathematics, IBM Research Division, T.J. Watson Research Center, Yorktown Heights, New York.

Huff, F. A., 1990: Time Distributions of Heavy Rainstorms in Illinois. *Illinois State Water Survey*, Champaign, **173**, 17 pp.

Institution of Engineers, Australia, 1987: *Australian Rainfall and Runoff, A Guide to Flood Estimation.* The Institution of Engineers, D.H. Pilgrim, ed., Canberra Australia.

Laurenson, E.M., 1987: Back to basics on flood frequency analysis. *Civil Engineers Trans.*, Institution of Engineers, Australia, **CE29**, 47-53.

Lin, B., G. Bonnin, D. Todd, T. Parzybok, M. Yekta, and D. Riley, 2004: Regional frequency studies of annual extreme precipitation in the United States using regional L-moments analysis. *International Ocean-Atmosphere Conference,* Chinese-American Oceanic and Atmospheric Association (COAA), Beijing, China, June 27-30, 2004.

Lin, B., and J.L. Vogel, 1993: A comparison of L-moments with method of moments. *Proceedings of the International Symposium on Engineering Hydrology,* American Society of Civil Engineers, July 1993, San Francisco, California.

Lin, Shao-Gong, 1980: *Basic Probability and Statistics*. People's Education Publisher, Beijing, China, 162 pp.

Maidment, D. R., 1993: *Handbook of Hydrology*. McGraw-Hill Publishing, 29.47 pp.

Miller, J.F., 1964: Two- to ten-day precipitation for return periods of 2 to 100 years in the contiguous United States. *Technical Paper No. 49,* U.S. Weather Bureau and U.S. Department of Agriculture, 29 pp.

Miller, J.F., R.H. Frederick and R.J. Tracy, 1973: Precipitation-frequency atlas of the western United States. *NOAA Atlas 2*, 11 vols., National Weather Service, Silver Spring, Maryland.

Myers, V.A. and R.M. Zehr, 1980: A Methodology for Point-to-Area Rainfall Frequency Ratios. *NOAA Technical Report NWS 24*, Office of Hydrology, National Weather Service, Silver Spring, Maryland.

Neteler, Markus and Helena Mitasova. 2002: *Open Source GIS: A GRASS GIS Approach*. Kluwer Academic Publishers, Boston.

Newbold, P., 1988: *Statistics for Business and Economics*. Prentice Hall, 866 pp.

Parzybok, T. and M. Yekta, 2003: NOAA/NWS precipitation frequency data server. *19th International Conference on Interactive Information Processing Systems (IIPS) for Meteorology, Oceanography, and Hydrology*, 83rd American Meteorological Society Annual Meeting, Long Beach, California.

Plantico, M.S., L.A. Goss, C. Daly, and G. Taylor. 2000: A new U.S. climate atlas. In: *Proc., 12th AMS Conf. on Applied Climatology,* American Meteorological Society, May 8-11, 247-248, Asheville, North Carolina.

Zehr, R.M., and V.A. Myers, 1984: Depth-area ratios in the semi-arid southwest United States. *NOAA Technical Memorandum NWS HYDRO-40*, Office of Hydrology, National Weather Service, Silver Spring, Maryland.