

## NADP/NTN DATA Validation and Completeness Criteria

### A. Criteria for Determining a Valid Sample

Individual weekly samples are screened to determine their validity using criteria based on the following parameters:

- rain gage depth
- sample volume
- sampling interval
- lab type
- sample validation codes

**Rain gage depth** is the precipitation depth measured by the rain gage collocated with the wet/dry precipitation collector (see Bigelow 1984 for details).

**Sample volume** is the amount of precipitation contained in the wet-side sample bucket as determined by weight in the field laboratory.

**Sampling interval** is the time period over which the precipitation sample was collected. The standard interval is one week, from 9:00 a.m. Tuesday to 9:00 a.m. Tuesday of the following week. Samples are collected on this schedule whether or not precipitation occurs.

**Lab type** is a code assigned to samples received at the CAL, based on the volume of the sample available for analysis. Each lab type keys a different set of sample processing and measurement steps. A complete set of laboratory measurements (pH, specific conductance, concentrations of major cations and anions) is made only on samples with a lab type of wa or w, which are samples of 10 mL volume or more. (Samples of lab type wa are diluted in the laboratory to produce sufficient volume for analysis; samples of lab type w are large enough to be analyzed without dilution.) Lab type t samples are samples of less than 10 mL. Laboratory measurements of pH and conductance are made on these samples if there is sufficient undiluted sample volume. No other chemical constituents are measured for lab type t samples. A lab type of da indicates that the sample bucket was dry when it arrived in the laboratory. Chemical analyses for lab type da samples are not included in this report.

**Sample validation codes** (Bowersox 1985, Aubertin et al. 1990) are assigned during routine NADP/NTN quality assurance evaluations to identify samples that were not collected and/or processed according to NADP/NTN protocols, or were contaminated. Samples are considered valid and are included in calculations of ion concentration and deposition summary statistics if all of the following sample validity criteria are met:

1. NADP/NTN criteria for site location, sample collection and handling, and measurement protocols are satisfied (Bigelow 1984, Bigelow and Dossett 1988).
2. The sample consists of "wet-only deposition," i.e., it was not exposed to excess dry deposition (see Bowersox 1985).
3. The sample is not contaminated (see Bowersox 1985).
4. The sampling interval is less than 8 days and 2 hours.
5. There is a rain gage depth or sample volume reported for the sample.

In the evaluation of data completeness, two additional sample types are considered valid:

1. All samples from sampling periods during which it was confirmed that no precipitation occurred are considered valid. These samples are generally of lab type d.
2. All samples from sampling periods during which a trace of precipitation (<0.01 in.) occurred are considered valid if the sample volume was less than 10 mL (lab type d or t).

When calculating Data Completeness Criterion 1 values (see below) for periods of one year or longer, all sampling intervals with <0.02 in. of precipitation are treated as valid. (Note that this relaxation of the above criteria applies only to the calculation of data Completeness Criterion 1 and to summary periods of one year or longer.)

**B. Criteria for Including a Site in the Annual Isoleth Maps and Seasonal Data Summary Tables**

Three Completeness Criteria form the basis for the decision to include the laboratory chemistry data from a site in the Annual Isoleth Maps. All three criteria must be met. The criteria are listed below.

Criterion 1. There must be valid samples for at least 75 percent of the summary period.

Criterion 2. For at least 90 percent of the summary period there must be precipitation amounts (including zero amounts) either from the rain gage or from the sample volume.

Criterion 3. There must be valid samples for at least 75 percent of the total precipitation amount reported for the summary period.

Criteria 1 and 2 ensure that measurements on valid wet deposition samples and of precipitation amounts were reported for a minimum acceptable fraction of the summary period. This requires a properly operating wet/dry collector and rain gage. Criterion 3 ensures that there are valid precipitation chemistry data to represent 75 percent of the precipitation that was estimated to have occurred during the summary period.

It is important to recognize that if all the criteria were satisfied at the lower limit of acceptability, the summary could still account for less than 75 percent of the actual precipitation at the site. This could occur because the 90 percent precipitation coverage criterion (Criterion 2) is based on time and there may be no record of the amount of precipitation missed during the unsampled 10 percent of the period. Where the precipitation coverage is 100 percent, however, these criteria ensure that at least 75 percent of the precipitation is represented by valid samples.

The following example illustrates the interpretation of the Completeness Criteria values for a hypothetical site. For the annual summary period, the hypothetical values for this site are:

Criterion 1	(Percent valid samples)	91%
Criterion 2	(Percent precipitation coverage)	95%
Criterion 3	(Percent precipitation with valid samples)	65%

The values for Criteria 1 and 2 indicate that valid samples were obtained for 91 percent of the summary period while valid precipitation measurements were obtained for 95 percent of the summary period. (The amount of precipitation that occurred during the remaining 5 percent of the period is unknown.) Criterion 3 relates the amount of precipitation represented by valid samples to the total measured

precipitation. The value for this criterion is calculated by summing the rain gage measurements associated with valid samples (substituting the sample volume where necessary), then dividing by the total measured precipitation. In this case, although 91 percent of the summary period was represented by valid samples, only 65 percent of the measured precipitation was associated with valid samples. (This can occur when a few very large precipitation events are not represented by valid samples.)

Since Criterion 3 was not met for this hypothetical site, annual NADP/NTN Completeness Criteria are not satisfied; therefore, this site would not be included in annual isopleth maps in this report.