The Chemical Speciation Network (CSN) is a routine air monitoring network designed to complement the PM$_{2.5}$ monitoring network; support the implementation of PM$_{2.5}$ National Ambient Air Quality Standards (NAAQS); assist in developing and tracking emission control strategies; and provide data to aid in health studies. CSN sites are primarily located in urban areas and complement the largely rural Interagency Monitoring of PROtected Visual Environments (IMPROVE) network. The CSN target analytes are trace elements, ions, and carbon.

Percent of Samples Successfully Collected and Analyzed Per Year

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>97</td>
<td>99</td>
<td>99</td>
<td>98</td>
<td>97</td>
<td>98</td>
<td>96</td>
<td>92</td>
<td>95</td>
<td>93</td>
<td>87</td>
<td>98</td>
<td>96</td>
<td>99</td>
<td></td>
</tr>
</tbody>
</table>

Samples Successfully Collected and Analyzed in 2018 by Filter Type. PTFE: 121 (99.2%), Nylon: 122 (100%), Quartz: 120 (98.4%)

The plots below show temporal trends for site 51-087-0014 alongside network-wide CSN and IMPROVE average concentrations. The top plot shows the variability of the reconstructed fine mass (RFM) concentrations during 2018; RFM can only be calculated if all three filters collected on a sampling day are valid. The bottom plot illustrates the long-term trends of ambient concentrations; the gray shaded region represents the range of values measured each year at this site, illustrated using the 10$^{th}$ and 90$^{th}$ percentile values.

To view and download CSN data: [www3.epa.gov/airquality/airdata/](http://www3.epa.gov/airquality/airdata/)
The EPA website with guidance documents and background information: [https://www.epa.gov/amtic/chemical-speciation-network-csn](https://www.epa.gov/amtic/chemical-speciation-network-csn)
EPA real-time air monitoring data: [https://www.epa.gov/outdoor-air-quality-data](https://www.epa.gov/outdoor-air-quality-data)
The Univ. of California, Davis website with information about current research and publications: [https://aqrc.ucdavis.edu/csn](https://aqrc.ucdavis.edu/csn)
The Colorado State Univ. website with data resources, literature, and visibility overviews: [http://vista.cira.colostate.edu/improve/](http://vista.cira.colostate.edu/improve/)
The following plots summarize the chemical composition of particles collected at this site. The monthly averaged compositions calculated from 2014-2018 data are shown on the left while compositions for the day with the highest measured concentrations during 2018 are shown on the right.

### Average Monthly Particle Composition

#### Components Calculation

<table>
<thead>
<tr>
<th>Component</th>
<th>Calculation</th>
<th>Natural Sources</th>
<th>Anthropogenic Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt</td>
<td>$1.8 \cdot \text{Chloride}$</td>
<td>Ocean spray, dry lakebeds</td>
<td>Chemical manufacturing, lake consumption</td>
</tr>
<tr>
<td>Soil Dust</td>
<td>$2.2 \cdot Al + 2.49 \cdot Si + 1.63 \cdot Ca + 2.42 \cdot Fe + 1.94 \cdot Ti$</td>
<td>Soil resuspension, dust storms; long-range transport</td>
<td>Construction, agriculture, deforestation, unpaved roads</td>
</tr>
<tr>
<td>Soot</td>
<td>Elemental Carbon</td>
<td>Wildfires</td>
<td>Motor vehicles, wood burning, smoking</td>
</tr>
<tr>
<td>Organic Matter</td>
<td>$1.4 \cdot \text{Organic Carbon}$</td>
<td>Plants, animals, wildfires</td>
<td>Motor vehicles, cooking oils, household cleaners</td>
</tr>
<tr>
<td>Nitrate</td>
<td>$1.29 \cdot \text{Nitrate}$</td>
<td>Plants, animals</td>
<td>Fertilizer, stock yards, chemical manufacturing</td>
</tr>
<tr>
<td>Sulfate</td>
<td>$4.125 \cdot \text{Sulfur}$</td>
<td>Volcanism</td>
<td>Coal-fired power plants, chemical manufacturing</td>
</tr>
</tbody>
</table>

### Highest Day

#### Components
- Salt
- Soil Dust
- Soot
- Organic Matter
- Nitrate
- Sulfate

### Network

- CSN
- Henrico Co. (Richmond)
- IMPROVE

### Average RFM

**Network**

- CSN
- Henrico Co. (Richmond)
- IMPROVE

**Average RFM Micrograms Per Cubic Meter**

- 10
- 8
- 6
- 4