

# IMPROVE and RHR Summary Data

Up
Metadata
Graphic Viewer
Summary Data
ASCII Files
Aerosol Database
Optical Data
Photographs
Relative Hum.

IMPROVE data summaries and calculated values, such as light extinction and deciview. All Data aggregations, calculated variables and patched values in the daily values data sets were generated using the procedures from the [Guidance for Tracking Progress Under the Regional Haze Rule](#).

Note: many of the datasets provided below are also available from the VIEWS Query Wizard: <http://views.cira.colostate.edu/web/DataWizard/>

[Data Format Description](#): Microsoft Excel file describing the columns and general format of the summary files below. This description includes the parameter names used in the ASCII files with their associated parameter names in the integrated database. It also includes descriptions of the units and calculation algorithms used.

## Natural Haze Levels II

### Using the Revised (New) IMPROVE Algorithm:

[Natural Haze Levels II \(version 2, includes substituted data\)](#): This file contains the second version of the natural haze level II estimates based on the work of the Natural Haze Levels II Committee. A description of the procedures for estimating these values can be found [here](#). These data fix a minor error in the first version of the natural haze level II estimates. The first version of these data did not include values for monitoring sites with less than three complete years of monitoring data. States have provided substituted data for missing data values at these sites that represent haze in class I areas. For these sites the natural haze levels are estimated using only the measured data and using measured data and substituted data values.

[Natural Haze Levels II \(version 1\)](#): This file contains the first version of the natural haze levels II data. These data contain known errors and should not be used. These data are provided to maintain lineage and consistency with past analyses.

## Regional Haze Rule Summary data through 1988 - 2010 (posted December 2011)

### Using the Revised (New) IMPROVE Algorithm:

[Means for Best, Middle, and Worst 20% Visibility Days](#): 4 MB csv file with the means of the best 20% visibility days (G10), middle 20% visibility days (G50) and worst 20% visibility days (G90).

[Daily Values Including Patched Values](#): 180 MB csv file with the daily IMPROVE species mass concentrations and calculated aerosol mass and light extinction values. Also included are the patched values where applicable. ([zipped file 42 MB](#))

### Using the Original (Old) IMPROVE Algorithm:

[Means for Best, Middle, and Worst 20% Visibility Days](#): 4 MB csv file with the means of the best 20% visibility days (G10), middle 20% visibility days (G50) and worst 20% visibility days (G90).

[Daily Values Including Patched Values](#): 140 MB csv file with the daily IMPROVE species mass concentrations and calculated aerosol mass and light extinction values. Also included are the patched values where applicable. ([zipped file 42 MB](#))

## Regional Haze Rule Summary data through 1988 - 2008 (posted November 2008)

### Using the Revised (New) IMPROVE Algorithm:

**Means for Best, Middle, and Worst 20% Visibility Days:** 3 MB csv file with the means of the best 20% visibility days (G10), middle 20% visibility days (G50) and worst 20% visibility days (G90).

**Daily Values Including Patched Values:** 150 MB csv file with the daily IMPROVE species mass concentrations and calculated aerosol mass and light extinction values. Also included are the patched values where applicable.

### Using the Original (Old) IMPROVE Algorithm:

**Means for Best, Middle, and Worst 20% Visibility Days:** 3 MB csv file with the means of the best 20% visibility days (G10), middle 20% visibility days (G50) and worst 20% visibility days (G90).

**Daily Values Including Patched Values:** 115 MB csv file with the daily IMPROVE species mass concentrations and calculated aerosol mass and light extinction values. Also included are the patched values where applicable.



## Regional Haze Rule Summary data through 1988 - 2004 (posted March 2006)

### Using the Revised (New) IMPROVE Algorithm:

NOTE: Data aggregations, calculated variables and patched values in the daily values data sets were generated using the procedures from the [Guidance for Tracking Progress Under the Regional Haze Rule.](#))

**Baseline Haze Metrics for Best and Worst 20% Visibility Days:** 226 KB xls file with the means of the best 20% visibility days (G10), worst 20% visibility days (G90), and all visibility days (G100) for the 5 year Regional Haze Rule baseline period (2000-2004). The baseline values were calculated following the RHR guidance documents using the new IMPROVE algorithm both with and without the State supplied substituted data.

**Means for Best, Middle, and Worst 20% Visibility Days:** 3 MB csv file with the means of the best 20% visibility days (G10), middle 20% visibility days (G50) and worst 20% visibility days (G90).

**Daily Values Including Patched Values:** 100 MB csv file with the daily IMPROVE species mass concentrations and calculated aerosol mass and light extinction values. Also included are the patched values where applicable.

### Using the Original (Old) IMPROVE Algorithm:

**Means for Best, Middle, and Worst 20% Visibility Days:** 3 MB csv file with the means of the best 20% visibility days (G10), middle 20% visibility days (G50) and worst 20% visibility days (G90).

**Daily Values Including Patched Values:** 73 MB csv file with the daily IMPROVE species mass concentrations and calculated aerosol mass and light extinction values. Also included are the patched values where applicable.

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**NOTE: The following summary data used calculation procedures and/or data that has since been revised. These data are maintained**

for historical reason and should not be used for new analyses.

### Summary data through 2003: (Updated 2/05)

#### [Means for Best, Middle, and Worst 20% Visibility Days](#)

900 KB csv file with the means of the best 20% visibility days (G10), middle 20% visibility days (G50) and worst 20% visibility days (G90). These data aggregations were generated using the procedures from the [Guidance for Tracking Progress Under the Regional Haze Rule](#).

#### [Daily Values Including Patched Values](#)

28 MB csv file with the daily IMPROVE species mass concentrations and calculated aerosol mass and light extinction values. Also included are the patched values where applicable. Calculated variables and patched values were generated using the procedures from the [Guidance for Tracking Progress Under the Regional Haze Rule](#).

[Header Description](#) 18 KB excel file with descriptions of headers for the above two files. This includes parameter names as presented in the ASCII files and related parameter names in VIEWS, units, and calculation algorithms.

### Summary data through 2002: (Updated 2/04)

#### [Means for Best, Middle, and Worst 20% Visibility Days](#)

900 KB csv file with the means of the best 20% visibility days (G10), middle 20% visibility days (G50) and worst 20% visibility days (G90). These data aggregations were generated using the procedures from the [Guidance for Tracking Progress Under the Regional Haze Rule](#).

#### [Daily Values Including Patched Values](#)

28 MB csv file with the daily IMPROVE species mass concentrations and calculated aerosol mass and light extinction values. Also included are the patched values where applicable. Calculated variables and patched values were generated using the procedures from the [Guidance for Tracking Progress Under the Regional Haze Rule](#).

[Header Description](#) 18 KB excel file with descriptions of headers for the above two files. This includes parameter names as presented in the ASCII files and related parameter names in VIEWS, units, and calculation algorithms.

### Summary Data using [Regional Haze Guidance Document](#) (interim 2002) procedures

These data are used to generate some of the graphics presented in the Spatial Patterns, Composition, Trends, and Back Trajectories pages of the Annual Summary. The files here have data for the aerosol site (ASITE) and tracking progress site (TPSITE). Cases where the ASITE is different from the TPSITE are those where a Class I area designated as TPSITE uses aerosol data from a nearby Class I area designated as ASITE while using fRH from the TPSITE to calculate visibility metrics such as aerosol extinction and dv. Due to a possible bias in the pre 6/1996 nitrate data (see [IMPROVE QA issues](#)) the summary data are also reported with a constant particle NO<sub>3</sub> value in metrics requiring particle NO<sub>3</sub>. These NO<sub>3</sub> adjusted data are recommended for trend analysis prior to 2000, while the unadjusted data are recommended for use from 2000 on, or the period of Regional Haze Rule implementation.

#### [Trends \(5 Yr Rolling Avg\) - Average Aerosol Components for 20% best, worst and middle visibility days](#) (Update 4/03)

Five year rolling annual average concentrations of the total fine (PM<sub>2.5</sub>) and coarse (PM<sub>2.5</sub>-PM<sub>10</sub>) mass and major fine aerosol types for the 20% best (Group 10), worst (Group 90) and middle (Group 50) visibility days. The fractional contribution of the aerosol types to the reconstructed fine aerosol mass is also provided. These data are for all IMPROVE sites with data from 1988 - 2001. These data were used to construct the long term aerosol trends. **Data calculated using constant particle NO<sub>3</sub> values can be obtained [here](#).** Datasets formatted for data processing can be found [here](#) and [here](#)

(const. NO3). These trends were generated using the procedures from the [Draft Guidance for Tracking Progress Under the Regional Haze Rule](#).

**[Trends \(5 Yr Rolling Avg\) - Average Light Extinction for 20% best, worst and middle visibility days \(Update 4/03\)](#)**

Five year rolling annual averages of reconstructed light extinction and the light scattering of the major aerosol types for the 20% best (Group 10), worst (Group 90) and middle (Group 50) visibility days. The fractional contribution of aerosol type light scattering to reconstructed extinction is also provided. These data are for all IMPROVE sites with data from 1988 - 2001. These data were used to construct the long term reconstructed light extinction trends. **Data calculated using constant particle NO3 values can be obtained [here](#).** Datasets formatted for data processing can be found [here](#) and [here](#) (const. NO3). These trends were generated using the procedures from the [Draft Guidance for Tracking Progress Under the Regional Haze Rule](#).

**[Trends \(1 Yr\) - Average Aerosol Components for 20% best, worst and middle visibility days \(Update 4/03\)](#)**

Annual average concentrations of the total fine (PM2.5) and coarse (PM2.5-PM10) mass and major fine aerosol types for the 20% best (Group 10), worst (Group 90) and middle (Group 50) visibility days. The fractional contribution of the aerosol types to the reconstructed fine aerosol mass is also provided. These data are for all IMPROVE sites with data from 1988 - 2001. These data were used to construct the long term aerosol trends. **Data calculated using constant particle NO3 values can be obtained [here](#).** Datasets formatted for data processing can be found [here](#) and [here](#) (const. NO3). These trends were generated using the procedures from the [Draft Guidance for Tracking Progress Under the Regional Haze Rule](#).

**[Trends \(1 Yr\) - Average Light Extinction for 20% best, worst and middle visibility days \(Update 4/03\)](#)**

Annual averages of reconstructed light extinction and the light scattering of the major aerosol types for the 20% best (Group 10), worst (Group 90) and middle (Group 50) visibility days. The fractional contribution of aerosol type light scattering to reconstructed extinction is also provided. These data are for all IMPROVE sites with data from 1988 - 2001. These data were used to construct the long term reconstructed light extinction trends. **Data calculated using constant particle NO3 values can be obtained [here](#).** Datasets formatted for data processing can be found [here](#) and [here](#) (const. NO3). These trends were generated using the procedures from the [Draft Guidance for Tracking Progress Under the Regional Haze Rule](#).

## Summary Data using [Regional Haze Guidance Document](#) (draft September 2001) procedures

**[Trends \(5 Yr Rolling Avg\) - Average Aerosol Components for 20% best, worst and middle visibility days \(Update 3/02\)](#)**- Five year rolling annual average concentrations of the total fine (PM2.5) and coarse (PM2.5-PM10) mass and major fine aerosol types for the 20% best, worst and middle visibility days. The fractional contribution of the aerosol types to the reconstructed fine aerosol mass is also provided. These data are for all IMPROVE sites with data from 1988 - 1998. These data were used to construct the long term aerosol trends. **A fixed length ASCII file can be obtained [here](#).** These trends were generated using the procedures from the [Draft Guidance for Tracking Progress Under the Regional Haze Rule](#).

**[Trends \(5 Yr Rolling Avg\) - Average Light Extinction for 20% best, worst and middle visibility days \(Update 3/02\)](#)**- Five year rolling annual averages of reconstructed light extinction and the light scattering of the major aerosol types for the 20% best, worst and middle visibility days. The fractional contribution of aerosol type light scattering to reconstructed extinction is also provided. These data are for all IMPROVE sites with data from 1988 - 1998. These data were used to construct the long term reconstructed light extinction trends. **A fixed length ASCII file can be obtained [here](#).** These trends were generated using the procedures from the

[Draft Guidance for Tracking Progress Under the Regional Haze Rule.](#)

**[Trends \(1 Yr\) - Average Aerosol Components for 20% best, worst and middle visibility days \(Update 3/02\)](#)**- Annual average concentrations of the total fine (PM<sub>2.5</sub>) and coarse (PM<sub>2.5</sub>-PM<sub>10</sub>) mass and major fine aerosol types for the 20% best, worst and middle visibility days. The fractional contribution of the aerosol types to the reconstructed fine aerosol mass is also provided. These data are for all IMPROVE sites with data from 1988 - 1998. These data were used to construct the long term aerosol trends. **A fixed length ASCII file can be obtained [here](#).** These trends were generated using the procedures from the [Draft Guidance for Tracking Progress Under the Regional Haze Rule](#).

**[Trends \(1 Yr\) - Average Light Extinction for 20% best, worst and middle visibility days \(Update 3/02\)](#)**- Annual averages of reconstructed light extinction and the light scattering of the major aerosol types for the 20% best, worst and middle visibility days. The fractional contribution of aerosol type light scattering to reconstructed extinction is also provided. These data are for all IMPROVE sites with data from 1988 - 1998. These data were used to construct the long term reconstructed light extinction trends. **A fixed length ASCII file can be obtained [here](#).** These trends were generated using the procedures from the [Draft Guidance for Tracking Progress Under the Regional Haze Rule](#).

**[20% Worst Visibility Days \(Update 3/02\)](#)** - Daily aerosol composite components and their contribution to light extinction for the 20% worst visibility days for each year from 1989 - 1999.

**[20% Best Visibility Days \(Update 3/02\)](#)** - Daily aerosol composite components and their contribution to light extinction for the 20% best visibility days for each year from 1989 - 1999.

## Summary Data from [2000 IMPROVE Report](#)

**[Annual and Seasonal Fine Mass Composition](#)** - Annual and seasonal concentrations of the fine mass and major aerosol types aggregated over three years March 1996 - February 1999. The fractional contribution of each aerosol type to fine mass is also provided.

**[Annual and Seasonal Light Extinction Budget](#)** - Annual and seasonal reconstructed light extinction and absolute and relative contribution from the major aerosol types during the three year period March 1996 - February 1999.

**[Monthly Fine Mass Composition](#)** - Monthly summary data of reconstructed fine mass (PM<sub>2.5</sub>) and major fine aerosol species, (ammonium sulfate, ammonium nitrate, organics, light absorbing carbon, and fine soil). The data are aggregated over the 3 year period from March 1996 to February 1999. These data were used to create seasonal bar charts of the fine mass composition.

**[Monthly Light Extinction Budget](#)** - Monthly summary data of reconstructed aerosol extinction and species specific extinction for the fine aerosol species, ammonium sulfate, ammonium nitrate, organics, light absorbing carbon, and fine soil combined with coarse mass. The data are aggregated over the 3 year period from March 1996 to February 1999. These data were used to create seasonal light extinction budget bar charts .

**[Light Extinction Diurnal Cycles](#)** - Hourly light extinction data from IMPROVE transmissometer sites for each season of the year. In addition, the hourly F(rh), RH and temperature are provided. The aggregation was performed over each sites entire time series. These data were used to create best diurnal cycles.

**[Annual Fine Mass Group 10, 50, 90](#)** - Annual Group 10, 50, 90 average concentrations of the total fine (PM<sub>2.5</sub>) and coarse (PM<sub>2.5</sub>-PM<sub>10</sub>) mass and major fine aerosol types. The fractional contribution of the aerosol types to the reconstructed fine aerosol mass is also provided. These data are for all IMPROVE sites with data from 1988 - 1998. These data were used to construct the long term trends aerosol trends. A fixed length ASCII file can be obtained [here](#).

**[Annual Light Extinction Group 10, 50, 90](#)** - Annual Group 10, 50, 90 averages of reconstructed light extinction and the light scattering of the major aerosol types. The fractional contribution of aerosol type light scattering to reconstructed extinction is also provided. These data are for all IMPROVE sites with data from 1988 - 1998. These data were used to construct the long term trends aerosol trends. A fixed length ASCII file can be obtained [here](#).